CITY OF VANCOUVER

COUNCIL REPORT

Report Date:	September 24, 2024
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Meeting Date:	October 23, 2024

Submit comments to Council

TO: Standing Committee on Policy and Strategic Priorities

FROM: General Manager of Engineering Services

SUBJECT: Zero Waste 2040 5-Year Implementation Update

Recommendations

THAT Council receive the Zero Waste 2040 5-Year Implementation Update report for information.

Purpose and Executive Summary

The Zero Waste 2040 strategic plan was adopted by Vancouver City Council in 2018, and includes a commitment to measure and report progress every five years. The purpose of this report is to provide a 5-year update.

Zero Waste 2040 establishes a vision of Vancouver becoming a zero waste community by 2040 and provides a strategic framework to achieve that vision. A “zero waste community” means a community that supports sustainable resource use, a healthy economy, affordability, vibrant and inclusive neighbourhoods, and equal opportunity through dramatically reducing solid waste. The City has led a variety of zero waste initiatives since 2018, and many more actions have been taken by residents, other levels of government, and the business and non-profit community. Through these combined efforts, Vancouver is making encouraging progress on our journey to become a zero waste community.

In 2022, Vancouver disposed an estimated 305,000 tonnes to landfill or incinerator, a reduction of 36% compared to the 2008 baseline. Vancouver reached this reduction level in 2020 but has not seen significant further reduction over the past two years of available data. As competing priorities and resource constraints limit the number of new initiatives the City can take on, staff are leveraging strategic approaches, such as: supporting other levels of government; collaboration and partnerships with industry, non-profits and other stakeholders; external funding opportunities; expanding existing outreach and education; and enhancing low-cost initiatives such as volunteer programs.

Staff are focusing on the following priority action areas over the next four years:

1. Long-term planning to manage waste in a changing urban environment.
2. Increasing diversion and reuse of construction and demolition waste
3. Increasing residential participation in existing diversion programs
4. Expanding share, reuse and repair activities for all residents
5. Preventing edible food waste
6. Supporting interventions by other levels of government
7. Expanding diversion opportunities at Vancouver's Landfill and Transfer Station
8. Participating in regional solid waste planning
9. Applying equity lenses to new and existing zero waste initiatives

Council Authority/Previous Decisions

- July 14, 2011: Vancouver City Council adopted the Greenest City Action Plan, including the long term goal to create zero waste and a 2020 target to reduce total solid waste going to landfill or incinerator by 50% from 2008 levels.
- May 31, 2016: Vancouver City Council directed staff to undertake a Zero Waste Strategy that creates a framework to achieve the long term goal of zero waste.
- May 16, 2018: Vancouver City Council adopted Zero Waste 2040.

City Manager's Comments

The City Manager concurs with the foregoing recommendations.

Context and Background

Zero Waste 2040 (ZW2040) establishes a vision of Vancouver becoming a zero waste community by 2040 and provides a strategic framework to achieve that vision. A "zero waste community" means a community that supports sustainable resource use, a healthy economy, affordability, vibrant and inclusive neighbourhoods, and equal opportunity through dramatically reducing solid waste. ZW2040 describes two frameworks for reducing waste.

1. **Zero Waste Hierarchy** is an approach that prioritizes reduction and reuse as the most preferable waste management strategies. Recycling and energy recovery should only be used after the higher levels have been applied.

Figure 1. Zero Waste Approach for Vancouver

2. **Circular Economy** means a society where all products are designed, produced and used in a way that eliminates waste, keeps materials in use at their highest value, and regenerates natural systems. Appendix A provides more detail about this framework.

Why reduce waste?

- Waste reduction ensures in-region disposal options, including the City-owned and operated Vancouver Landfill, last as long as possible. This avoids the need to transport waste outside the region or site a new disposal facility, both of which have impacts, including higher costs for Vancouver residents and businesses.
- Avoid environmental impacts associated with resource extraction, manufacturing, transportation and disposal. Reducing waste at the source conserves natural resources, reduces Scope 3 carbon pollution,[1,2,3] and prevents other types of environmental pollution (for example: ocean plastic).
- Transitioning to a circular economy creates economic value. Circular business models, including reuse and recycling, provide benefits such as new revenue streams, job creation and reduced supply chain risks.[4,5,6]

Each level of government has different responsibilities for managing and reducing waste:

- The Government of Canada regulates toxic substances to avoid harmful impacts to the environment and human health, and regulates the international and interprovincial movement of hazardous waste and hazardous recyclable material.
- The Province of BC approves and monitors waste disposal facilities, sets requirements for municipal solid waste in the Environmental Management Act, and develops provincial solid waste policy and regulations.
- Metro Vancouver is responsible for regional level planning for managing municipal solid waste,[7,8] running a region-wide network of public solid waste facilities (together with the City), and licensing private solid waste facilities.

The role of municipalities in managing and reducing waste includes:

- Design and direct delivery of waste collection services and reduction programs
- Direct communication opportunities with residents about waste reduction and recycling
- Leading or collaborating with external stakeholders, including other levels of government and industry, to identify and pilot initiatives
- Supporting other levels of government and stakeholders in advancing waste reduction by providing municipal-based input, research and data
- Adopting regulation to test new policy at the local level in support of future wider-scale harmonization, or in support of local or regional waste reduction goals (where regional governments do not have authority[9])

Discussion

Becoming a Zero Waste Community

ZW2040 identifies that reducing waste and transitioning to a circular economy requires active participation of all levels of government, businesses and the community. The City has delivered a variety of successful zero waste initiatives since 2018, which are detailed in Appendix B. Many more actions have been taken by residents, other levels of government, and the business and non-profit community (in Vancouver and across the region). Through these combined efforts, Vancouver is making encouraging progress on our journey to become a zero waste community. Signs of system-wide change, and examples of how the City has played a role include:

- **The City is a global leader in bringing industry together to tackle wasted edible food** through the Circular Food Innovation Lab. In partnership with Emily Carr University, and with funding from Carbon Neutral Cities Alliance, Environment and Climate Change Canada and Mitacs, the City is collaborating with businesses and their supply chains to test prototypes for reducing wasted edible food within their operations.

- **Vancouver's Single-Use Item Reduction Strategy and by-laws helped to test policy at the local level before being scaled up by other levels of government.** Bans and restrictions on single-use items have now been adopted for BC and Canada.
- **The City showed early leadership in Canada on construction and demolition waste**, through actions such as implementing the Green Demolition By-law and allocating grant funding towards a 'Rebuild Hub' for salvaged building materials. A growing number of jurisdictions are developing approaches to increase reuse and recycling of construction and demolition waste, including efforts at the federal level.
- **Vancouver has contributed knowledge and experience in support of waste reduction actions taken and proposed by all levels of government.** Since 2018, staff have provided input on 30 consultations on a variety of zero waste topics, including Extended Producer Responsibility (EPR)[10] programs, plastic waste, organics recycling, and construction and demolition waste. Appendix B includes a complete list. Appendix C summarizes the types of actions being taken by each level of government.
- **The City has launched outreach and diversion programs to support a culture shift and help to make waste reduction convenient and affordable.** Since 2018, more than 3,000 people have participated in Vancouver's repair cafes and free swap events, and over 15,000 participants have been served by our reuse and recycling drop-off events. The newest program, Zero Waste Ambassador, focuses on reducing waste in multi-family buildings. These programs also create social benefits by providing opportunities for community connectedness.
- **Circular economy businesses are locating in Vancouver and surrounding region.** Some examples include: textiles recycling, building deconstruction, to-go cup and container reuse, and commercial composter manufacturing. Staff believe that ZW2040, and Vancouver's reputation for sustainability, have helped encourage these businesses to launch here.

Measuring Progress

ZW2040 set an aspirational target to dispose zero tonnes of solid waste from Vancouver to landfill or incinerator by 2040, and adopted annual reduction in tonnes of waste disposed as the primary progress metric. Although a target of zero tonnes may seem unachievable to some, its purpose is to push organizations to rethink business-as-usual practices, foster culture and behaviour change, encourage long-term thinking, show leadership by the City, and ultimately build a movement towards broad societal change.

Staff use a combination of Vancouver-specific and regional-level data to calculate annual tonnes of waste disposed.[11] In 2022, Vancouver disposed an estimated 305,000 tonnes to landfill or incinerator, a reduction of 36% compared to the 2008 baseline (Figure 2). (The most recent year of available data is 2022, due to a 1-2 year data lag while regional tonnage data is compiled).

Figure 2. Solid waste disposed by Vancouver residents and businesses to landfill or incinerator

Reduction progress achieved to date is encouraging, and efforts made by residents and businesses to adopt zero waste and circular practices should be applauded. That being said, there has been no significant further reduction since 2020, meaning that progress has slowed and may be becoming more difficult to achieve.

Monitoring annual reduction in tonnes of waste disposed provides valuable insights but does not tell the whole story. In part, this is because the impact of Vancouver-based actions will be obscured due to significant reliance on regional data. Vancouver-specific tonnage data is only available for waste disposed by single-family households (our customers), and regional data is used to estimate other sectors. As a result, Figure 2 reflects the regional waste reduction trend, on an order of magnitude that represents Vancouver's share of the region's population.

Over-reliance on tonnage data alone risks giving the impression that becoming a zero waste community is impossible, especially when reduction progress slows. As such, we must evolve how we describe progress by adopting a more comprehensive set of metrics. For example, measuring access to reuse and recycling services,[12] climate and pollution impacts,[13] economic impacts,[14] etc. Metro Vancouver is currently working to develop a more comprehensive set of regional metrics in their updated solid waste management plan. The City is participating in planning and consultation to support this work, and will look to adopt similar progress metrics.

Opportunity Areas – Waste Composition

Waste composition studies conducted by Vancouver and the region provide valuable insights and help show where there are opportunities for further action. Appendix D provides detailed analysis of available tonnage and waste composition data, and Figure 3 highlights major components of Vancouver's waste disposed by all sectors (households, businesses, institutions, construction and demolition):

- **Building materials** make up 31% of Vancouver's garbage. In 2022, Vancouver disposed 95,000 tonnes of building materials as garbage (including 46,000 tonnes of wood). Most of this waste stream comes from construction and demolition activities (C&D).
- **Wasted edible food** represents needless global pollution and resource consumption, due to significant carbon emissions and water usage associated with food production. Vancouver residents and businesses threw out an estimated 21,000 tonnes of edible food in 2022 (7% of Vancouver's garbage). An additional 11,000 tonnes of food that could have been eaten is composted through the City's green bin program.[15]

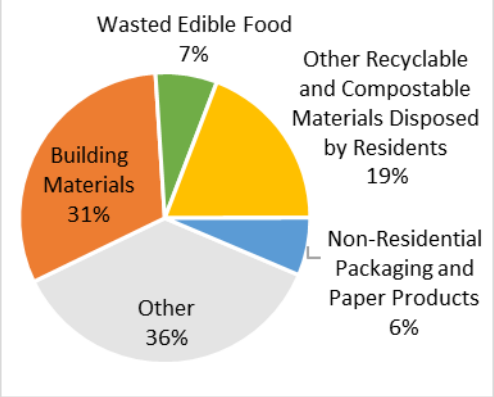

Figure 3. Composition of Vancouver's Waste Disposed to Landfill or Incinerator (2022)

- **Other recyclable and compostable materials, disposed by residents.** 19% of Vancouver's garbage is residential materials that could have been recycled or composted through existing programs (58,000 tonnes in 2022).[16] Despite the availability of diversion programs, some residents are not taking advantage of them.
- **Non-residential packaging and paper products** make up 6% of Vancouver's garbage. Packaging and paper product EPR programs regulated by the province exist for residential sectors but currently exclude commercial and institutional sources (ICI sector). Vancouver's ICI sector disposed around 20,000 tonnes of packaging and paper products in 2022 (20% of Vancouver's ICI garbage).

Examples of materials that make up the other 36% of Vancouver's waste disposed include: non-residential food scraps and yard trimmings (7%), furniture (6%), diapers (3%), wood pallets (2%), durable plastic products (2%), and non-residential textiles (1.6%).

Challenges

Several challenges impact our progress and inform the types of approaches the City can use when developing new zero waste initiatives. These include:

1. **Limited influence and control** over the systems and practices that generate waste. Our early success in reducing waste was due, in large part, to updating programs managed by the City, such as the Green Bin program rollout. Opportunities to address waste not directly collected by City programs (including waste generated by multi-family households, industry, and construction and demolition activities) are more complex and will take more time. Collaboration with other levels of government, industry and the public on new business models and systems are needed to transition to a circular economy, and culture and behaviour change are needed for residents to more fully participate in practices that reduce waste.
2. **Barriers to business.** Businesses and organizations that enable a circular economy report struggling to find space to set up shop due to a general shortage of industrial spaces within the city, and high operating costs.
3. **Changing urban environment.** As Vancouver's population grows and the city densifies, existing waste collection systems may become less efficient. For example, more multi-family buildings served by a variety of haulers may lead to more collection vehicles on the road and inconsistent and/or confusing programs for residents and businesses. As we densify, increased housing construction will also lead to more C&D waste.

4. **Regulation by other levels of government** has been introduced more slowly than anticipated. For example, the Province's new EPR programs, while more extensive than any other jurisdiction in North America, haven't kept pace with timelines identified by the Canadian Council of Ministers of the Environment.[17,18,19]
5. **Resource constraints and competing priorities** limit the number of zero waste initiatives the City can take on to generally those that fit within existing budgets. Managing and improving our core service delivery is taking precedent.

Next Steps

Zero Waste 2040 established a vision of Vancouver becoming a zero waste community and set an aspirational target of zero tonnes of solid waste disposed by 2040. Although tonnage reduction progress may have slowed in recent years, we remain committed to reducing waste and transitioning to a circular economy, and recognize the City has an important role to play.

In consideration of the opportunity areas and challenges, staff will focus on leveraging the following strategic approaches: supporting other levels of government (by sharing data and information to inform actions); collaboration and partnerships with industry, non-profits and other stakeholders; external funding opportunities; expanding existing outreach and education; and enhancing low-cost initiatives such as volunteer programs. The following priority action areas are planned over the next four years:

1. **Long-term planning to manage waste in a changing urban environment.** Staff will undertake planning to ensure public and private waste management systems, infrastructure and facilities can effectively deliver needed services in a densified urban environment. Staff will develop a scope of work and budget estimate to model the impacts of densification on existing waste management systems, and explore possible solutions to maintain and improve waste collection and diversion in a changing urban environment.
2. **Increasing diversion and reuse of construction and demolition waste.** Staff are exploring opportunities to develop and/or support new initiatives for increasing diversion and reuse of C&D materials, such as pilots and other collaborations with stakeholders.
3. **Increasing residential participation in waste diversion programs.** Staff are expanding outreach and behavior change initiatives that educate residents about participating in recycling and composting programs. Staff will also expand programs that create opportunities for residents to divert waste (e.g. pop-up reuse and recycling drop-off events).
4. **Expanding share, reuse and repair activities for all residents.** Staff are expanding opportunities for residents to participate in share, reuse and repair activities through the City's outreach events and programs, such as free swap events and repair cafes.
5. **Preventing edible food waste.** Staff are implementing a second iteration of the Circular Food Innovation Lab, which collaborates with food businesses and their supply chains to identify and test prototypes for reducing waste of edible food. Learnings will inform next steps, which could include developing policy approaches for preventing wasted edible food.
6. **Supporting interventions by other levels of government.** Staff are sharing input, data and research with other levels of government to support expanded regulations for EPR and circular packaging for the residential and ICI sectors, including the Province's current assessment of opportunities to manage ICI packaging and paper products. These programs will help to divert more waste, and can also be designed to grow reuse systems.
7. **Exploring future diversion opportunities at Vancouver Landfill and Vancouver South Transfer Station.** Staff have been piloting collection of bulky furniture and durable plastics at the Landfill Zero Waste Centre and will continue exploring opportunities to introduce new

and expanded programs to make reuse and recycling more convenient for visitors of our facilities.

8. **Participating in regional solid waste planning.** Staff are actively participating in Metro Vancouver's work to update its regional solid waste management plan. This includes engaging in and supporting efforts to develop a more comprehensive set of metrics beyond traditional waste data.
9. **Applying equity lenses to new and existing zero waste initiatives.** For example, staff will apply equity lenses when developing and implementing outreach programs to ensure all residents, including equity-denied communities, are able to fully participate in the City's zero waste programs. Applying equity lenses to long-term planning (action 1) will be important to ensure all residents and businesses can access needed waste management services. Equity lenses will also be important to ensure waste reduction initiatives are affordable and accessible.

Prioritizing these action areas will continue to build the movement guiding Vancouver towards becoming a zero waste community.

Financial Implications

There are no financial implications associated with this report's recommendations. Any budget implications associated with this work will be brought forward as part of the City's standard budgeting processes.

Legal Implications

There are no legal implications associated with this report's recommendations.

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APPENDIX A
CIRCULAR ECONOMY MODEL

The circular economy is an alternative to the traditional linear economy—a "take-make-use-waste" system where society extracts natural resources to make products and then disposes them to landfill or incinerator. Contrastingly, in a circular economy, society maintains a circular flow of resources, by recovering, retaining or adding to their value, while contributing to sustainable development.[20] Waste is eliminated or recovered at all stages in a product lifecycle, materials are kept in use at their highest value, and natural systems are regenerated.[21]

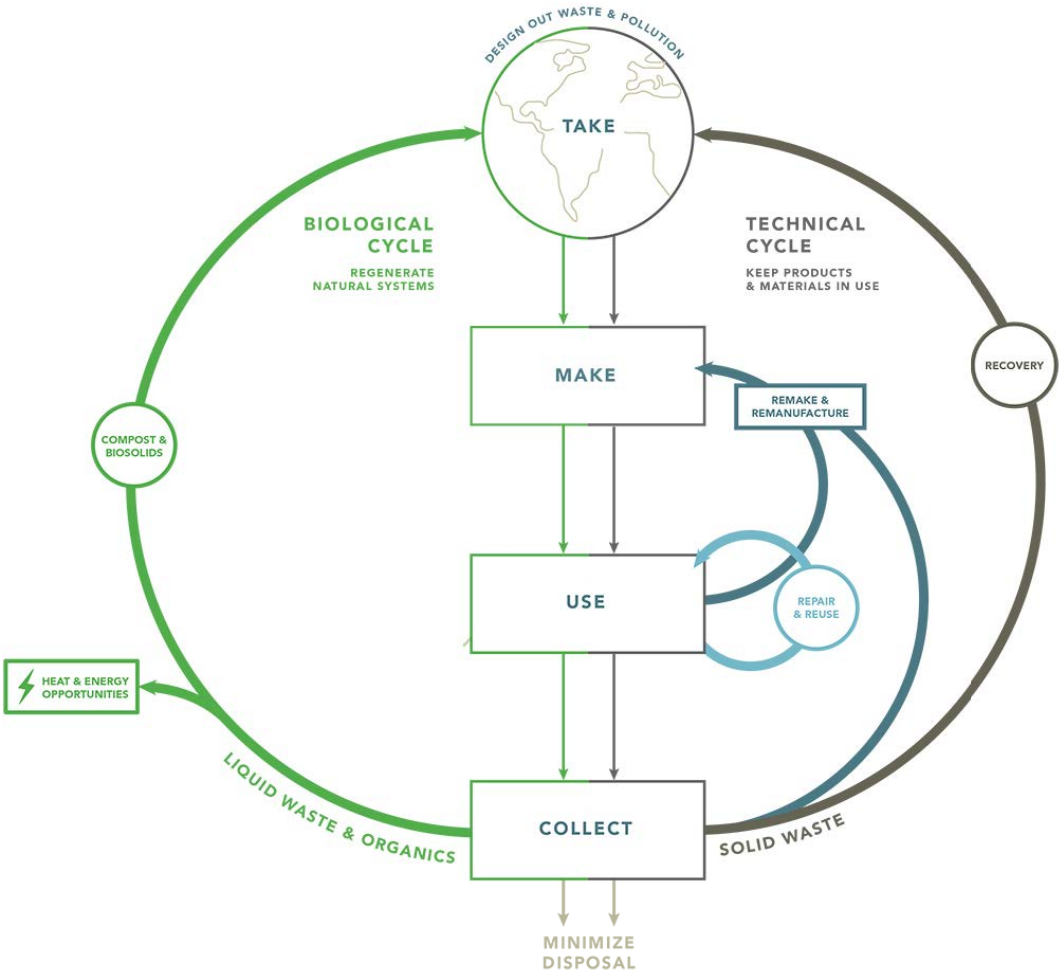

Figure 4. Circular Economy Model (National Zero Waste Council)[22]

Figure 4 demonstrates the two types of circular flows: the technical cycle—where products are designed to be continuously used, reused, remanufactured and recovered—and the biological cycle—where biological nutrients, such as those in food, are returned to the earth.

Transitioning to a circular economy is as an important pathway for becoming a zero waste community; however, it encompasses more than materials and waste management. For example: water management and energy systems.

APPENDIX B
ONGOING & COMPLETED ZERO WASTE INITIATIVES

This appendix describes actions taken by the City of Vancouver from 2018 to early 2024 in support of waste reduction and circular economy, including research and pilot projects. Fifteen of seventeen City action areas identified in Zero Waste 2040 are progressing as intended (e.g. ongoing continuous improvement) or have been completed. The remaining two actions are not being pursued at this time.

Built Environment and Residuals

Corresponding ZW2040 Action Area	Action	Status
Priority Action #1 – Develop a plan to recover wood and produce biofuel from demolition materials at the Vancouver Landfill	**Construction & Demolition (C&D) Material Recovery Facility (MRF) Pilot** (2018): A 6-month pilot to recover wood and produce biofuel from demolition materials at the Vancouver Landfill processed approximately 2,000 tonnes of C&D. Over 100 tonnes of Processed Engineered Fuel were created and provided to Lafarge cement kiln to offset their fossil fuel consumption, thereby reducing GHGs. C&D tonnage received at Vancouver Landfill significantly decreased in 2019 thereby making the business case to build a full-scale facility not feasible at that time. This initiative could be further explored in future, depending on C&D quantities received at Vancouver Landfill.	Completed
Priority Action #2 – Expand Green Demolition Bylaw	**Green Demolition By-law**: In 2014, the City of Vancouver became one of the first cities in the region to adopt a green demolition by-law. The by-law, most recently amended in 2019, requires 75% recycling of demolition waste from single-family homes built before 1950. This increases to 90% recycling for homes deemed to have character merit. Single-family homes built before 1910 and heritage-listed houses must meet the applicable recycling requirement, and salvage three tonnes of wood for reuse. Over the past 5 years (2019-2023), projects that are subject to the green demolition by-law have reported diverting an estimated 175,000 tonnes from landfill or incinerator. A number of other cities across BC have since adopted regulation to require reuse and recycling when homes are demolished.	Ongoing
Priority Action #3 – Identify and pursue options to support and grow market for salvaged deconstruction material	**Deconstruction Hub** (2020): Council approved up to $250,000 in funds to enable the establishment and early operation of a deconstruction hub, to expand the market for salvaged materials with a focus on wood. Through a competitive procurement process, Habitat for Humanity was selected. In its first three years of operation the Hub enabled salvage and reuse of materials from 56 fully or partially deconstructed houses in Vancouver and 49 houses elsewhere in the region.	Completed

Corresponding ZW2040 Action Area	Action	Status
Transformative Action #4 – Develop a zero waste building program	This action is not being pursued at this time. Sustainability Group is developing amendments to the Vancouver Building By-law to reduce embodied carbon in new Part 3 buildings, which will help to address similar goals. For example, by including provisions that recognize the climate benefits of salvaging building materials for reuse.	Not started

Food

Corresponding ZW2040 Action	Action	Status
Priority Action #5 – Identify and pursue options to improve food rescue and redistribution systems Transformative Action #2 – Become a leading city in food waste prevention	**Grocery Retail Solutions Lab** (2019-2020): A collaboration between Solid Waste and the City's Solutions Lab, which involved 14 grocery retailers joining the six-month project to influence and support the long-term adoption of behaviours to eliminate avoidable food waste. This lab was a prototype for the Circular Food Innovation Lab.	Completed
	Circular Food Innovation Lab 1[23] (CFIL-1) (2021-23): Solid Waste and the City's Solutions Lab partnered with Vancouver Economic Commission and Emily Carr University to recruit 18 businesses from Vancouver's food industry to participate in CFIL-1. Working closely with the Emily Carr University design team, businesses co-developed and tested 9 prototype concepts to reduce wasted edible food within their operations. The final report, Peeling Back the Layers: Learnings from the Circular Food Innovation Lab and the CFIL Prototype Collection were made publicly available in May 2023.	Completed
	Food Recovery Network with FoodMesh (2023): Funded as an extension of CFIL-1 and building on Metro Vancouver's successful Regional Food Recovery Network[24], Vancouver created its own Food Recovery Network with support from FoodMesh to rescue surplus food, measure food waste repurposing and diversion, pilot donation tracking, and provide a marketplace for surplus foods. Between September 1 and December 31, 2023, 341,900 kg of food was rescued, 626,000 equivalent meals were provided, 808,700 kg of CO2e was reduced, and $1.9 million in donated value was generated.	Completed
	Circular Food Innovation Lab 2 (CFIL-2) (2024-2026): In partnership with Emily Carr University, this project brings together three food sector interventions to further an equitable circular economy of food in Vancouver. Members of Vancouver's food sector: businesses, institutions and their supply chain partners will identify root causes of wasted food in their supply chains and test and iterate prototype solutions supported by design team	Ongoing

Corresponding ZW2040 Action	Action	Status
	members from Emily Carr University. Additionally, they will have the opportunity to identify and prototype policy concepts that encourage the prevention and reduction of avoidable wasted food by industry which will help inform the development of future regulations and guidelines by the City and potentially other jurisdictions. Finally, the CFIL-2 project will bring Indigenous representatives, food recovery organizations, and food businesses and institutions together as part of an Equitable Food Circle to co-create a roadmap and education materials to advance an equitable circular economy of food. The materials will be tested by food sector project participants to inform a second iteration of the materials by Circle participants. The CFIL-2 project is made possible by external funding from the Carbon Neutral Cities Alliance (CNCA) Game Changer Fund, the Environment and Climate Change Canada (ECCC) Food Waste Prevention and Diversion: Research and Capacity Building Fund, and the Mitacs Accelerate Research Internship Program.	

Consumer Goods

Corresponding ZW2040 Action	Action	Status
Priority Action #6 and Transformative Action #3 – Implement a single-use item reduction strategy	**Single-use item by-laws** (2020-2024): The City implemented by-laws to ban single-use foam cups and foam take-out containers (2020), ban plastic and compostable plastic straws (2020), restrict utensils (2020), ban plastic shopping bags (2022) and restrict paper and new reusable shopping bags (2022). Recognizing the City can't solve single-use waste and plastic pollution on its own, the City advocated for federal and provincial regulations to provide consistency across Canada and BC. To avoid overlap, and simplify compliance for businesses, Council resolved to relinquish the regulation of single-use items to the federal and provincial governments by rescinding the City's single-use item by-laws in two phases: 1. On March 12, 2024, by-laws for foam containers, plastic straws, single-use utensils and plastic shopping bags 2. On July 15, 2024, by-laws for paper and reusable shopping bags. **Single-use cups** (2024): Council resolved to request that the Province work in consultation with local governments, industry, producer responsibility organizations, and other stakeholders to develop province-wide circular cup packaging regulations, including exploring broader end-markets for single-use cups. As part of the City's commitment to support the Province in advancing this work,	Completed

Corresponding ZW2040 Action	Action	Status
	Council shared with the Minister of Environment and Climate Change Strategy a staff report[25] summarizing research on policy options in place, or being considered, in 50 jurisdictions worldwide.	
	Reusable shopping bag program (2021-present): As part of the City's efforts to address the potential negative impacts of the shopping bag by-law on marginalized residents, this program redistributes donated reusable shopping bags to people with low incomes or experiencing homelessness. Bags are collected at the Vancouver Zero Waste Center, sorted, washed, and then sent out to be distributed at 10 community organizations across Vancouver. Since 2021, this program has helped redistribute 14,000 reusable bags.	Ongoing
	Return-It cup pilot (2022-2024): Return-It, in partnership with quick-service restaurant chains, ran a pilot to give consumers convenient ways to return borrowed reusable cups, and recycle single-use cups. Consumers returned the cups through bins located on sidewalks, plazas, office buildings and restaurants. The program started in downtown Vancouver and expanded in January 2024 to the Broadway corridor and Cambie street. The City supported the pilot with locating bins in plazas and sidewalk locations. The pilot concluded in June 2024 and Return-it stated the pilot provided valuable insights and learnings that are essential for the success of the reusable cup initiatives. The partners remain dedicated to finding new ways to support sustainability and reduce waste.[26]	Completed
Priority Action #7 – Expand community zero waste drop-off events	**Reuse and recycling drop-off events**:[27] Localized events hosted by the City to allow residents opportunities to drop-off items such as small electronics and clothing for recycling and reuse (46 events and 15,820 participants since 2018). Items initially collected include electronics, small appliances, light bulbs, batteries, smoke alarms, cell phones, computers, video game consoles, clothing, textiles, shoes, and books. Since then, material streams added include writing instruments, e-mobility batteries, razors and razorblades and reusable shopping bags (see "Reusable Shopping Bag Program" action above). The team has also set up a strategic partnership with Recycle BC, the EPR organization for packaging and paper products, to start piloting the collection of flexible plastics at some of the drop-off events in 2024. To date, the City has collected over 260 tonnes of recyclable materials through these events.	Ongoing

Corresponding ZW2040 Action	Action	Status
Priority Action #9 – Identify and pursue options to support and grow product reuse and sharing	**Free swaps**[28] (2023-present): New event launched by the City to promote sharing and reuse of items such as clothing and household goods. Since 2023, the City and our partners have hosted 6 free swaps with about 1,200 items picked up, recycled, or donated. Free swap tables have also been added to drop-off events (see above). Adding a free swap table to drop-off events reflects the Zero Waste Hierarchy by creating more opportunities for items in good working condition to be reused locally, instead of recycled.	Ongoing
	Repair cafes[29] (2018-present): The City and Metro Vancouver, with help from non-profit partner organizations, hosts periodic repair cafés to foster reuse through free repair of items such as small electronics and textiles (23 events and 1,360 participants since 2018)	Ongoing
Priority Action #8 – Develop new reduction, diversion & recovery strategies targeting paper and plastic (ICI-focused)	**Province of BC engagement on non-residential packaging and paper products (2024):** Staff submitted comments on the Clean BC discussion paper, Preventing Waste in British Columbia: Non-Residential Packaging & Paper Products. The submission was designed to help the Province identify "quick start" actions and a strategy to gradually expand BC's non-residential packaging policies over time through targeted programs that prevent waste, carbon pollution and other environmental impacts.	Ongoing
Priority Action #10 – Develop an apparel waste reduction strategy	**Leverage Lab Collaborative for Textiles** (2018): City staff collaborated with Metro Vancouver, Vancouver Economic Commission and industry stakeholders to research challenges and opportunities for reducing apparel waste in the region, culminating in a research paper.[30] Research findings were used by Metro Vancouver to help inform the development of their regional clothing waste reduction campaign, Think Thrice About Your Clothes (launched in 2019). Findings also informed amendments to Vancouver's Licence By-law regulating donation bins, and implementation of the City-branded donation bin program (see actions below).	Completed
	Licence By-law requirements for donation bins (2019): Vancouver's Licence By-law was amended to allow for safe operation of clothing donation bins.[31] Amendments included requirements to prevent the display of misleading information about charitable partners, and requirements for accepting items for both reuse and recycling, as long as the materials are clean and dry.	Completed
	City-branded donation bin program[32] (2022-present): New clothing donation bins branded with the City's logo launched at Zero Waste Centres in 2022 through a contract with a consortium of two charitable service providers. The City collaborated with Metro Vancouver to amplify the Think	Ongoing

Corresponding ZW2040 Action	Action	Status
	Thrice About Your Clothes campaign on the bins' exteriors. Monthly collection data and annual data about the end fate of collected materials are reported to City staff. From 2022-2023, over 250 tonnes of clothing, shoes, accessories and household textiles were donated using the bins at Zero Waste Centres.	

Composting and Recycling

Corresponding ZW2040 Action	Action	Status
Transformative Action #1 – Refocus operations of Vancouver Landfill to recovery & diversion over disposal	**Zero Waste Centres** (ZWC) (1984, 2018): The City operates two Zero Waste Centres. The Landfill Zero Waste Centre (formerly Residential Drop Off) in Delta, opened in 1984. In March 2018, the City opened the Vancouver Zero Waste Centre at 8588 Yukon St to provide Vancouver residents with a more convenient location for free recycling. Materials added in recent years include: • Product Care Collection (2020): The Landfill ZWC formally began accepting paint and household hazardous wastes as part of the Product Care Association of Canada collection program in December 2020. • Pilot to accept upholstered furniture and non-packaging durable plastics (2023): Collection of these two items began in August 2023 at the Landfill ZWC to assess the operational and financial feasibility of collecting these difficult-to-recycle items and preparing them for hauling. More than 2,000 pieces of upholstered furniture (110 tonnes) were diverted from the Landfill for recycling between August 2023 and July 2024, in addition to 20 tonnes of durable plastic products. Safe and effective procedures have been implemented to facilitate the collection and recycling of these items. Next steps for this pilot are to review data and feedback from the pilot period to consider expansion to a full-scale recycling program, trial collection of durable plastics at the Vancouver Zero Waste Centre, and promote the new recycling options to the public.	Ongoing
	Landfill gas management system (1991 to present): Vancouver Landfill has collected and flared landfill gas (LFG) since 1991 to reduce greenhouse gas (GHG) emissions and odours. Starting in 2003, LFG was sold for beneficial use in a nearby combined heat and power cogeneration facility. With the LFG utilization equipment reaching its end of life, the City partnered with FortisBC and Village Farms Clean Energy to supply their respective new facilities to convert LFG to renewable natural gas (RNG): the FortisBC RNG project and the DeltaRNG project.	Ongoing

Corresponding ZW2040 Action	Action	Status
	The design and construction of these two partner RNG facilities began in 2023 and start up of commercial operations for both is planned in 2024. The expansion of these facilities is supportive of the City's goal to reduce GHG emissions as defined in the City's Corporate Plan 2020, the Zero Waste 2040 Plan, and the Climate Emergency Action Plan.	
Priority Action #4 – Identify and plan organics processing opportunities	**Organics diversion and mixed waste processing study** (2018-2020): In 2018, City staff began evaluating a business case for waste processing systems designed to increase diversion from disposal while recovering materials that can be put to a higher and better use, without undermining source separation as a higher priority. The work was put on hold in March 2020. Initial considerations included building solid waste processing facilities at Vancouver Landfill for one or more or combinations of: 1. Processing organics using anaerobic digestion to produce biomethane for beneficial use, aerobic composting to produce a marketable compost product and/or biodrying to produce a marketable biofuel; and 2. Recovering recyclable materials from solid waste such as metals for recycling; organics for the production of biomethane; and other materials for use as alternative fuels. At this time, the City has decided to continue working with a contracted processor to manage organic waste collected by the City. A Request for Information has been issued to explore the marketplace for future organics processing solutions. Findings and recommendations will be reported to Council in 2025.	Completed
	In-vessel pilot with Anaconda Systems (2021): 6-month pilot assessed the feasibility of processing green bin material (high concentration of yard trimmings) in an in-vessel system that typically processes a homogenous stream of food waste from commercial sources. Learnings from this pilot helped staff to understand organics processing capacity within the region.	Completed
Other	**Green bin public education** (resident-focused) (2015-present): Since 2015, the City has provided education to residents on how to divert their organic waste away from garbage. This includes making education material available such as the green bin program brochure and posters. The City also creates social media campaigns during the summer months on ways to avoid pest and odour issues when using the green bin. Single-family residents in Vancouver that use their green bin consistently sort organics correctly. Contamination rates are estimated between 1-4% from 2013	Ongoing

Corresponding ZW2040 Action	Action	Status
	to 2023. The most common contaminants are treated and painted wood, and plastic bags.	
	Education on organics and recycling diversion plans (business-focused) (2015-present): Since 2015, the City requires all buildings and businesses to have both an organic waste and a recycling diversion plan. Staff use an educational approach to ensure buildings and businesses are in compliance with the by-law.	Ongoing
	On-street recycling and organics (2016-present): In 2016 the first on-street paper recycling enclosures were installed in Olympic Village. Since that time, 85 Zero Waste stations have been installed in strategic locations throughout the city, including across the downtown core and at Parks concession stands.	Ongoing
	Dog waste collection pilot[33] (2016-present): This project provides separated dog waste collection within seven City parks, diverting approximately 30,000 kg of dog waste annually from landfill to secondary sewage treatment.	Ongoing
	Green events (2016-present): Organizers of events on City property and in parks can schedule recycling pick-up by the City's Sanitation Operations staff. From 2016 to 2023, Sanitation Operations have delivered separated waste collection to over 1,030 events.	Ongoing
	Put waste in its place campaign (2018-present): An annual awareness campaign since 2018, mostly using social media posts and radio advertisement, to encourage residents to dispose waste properly when they are in the public realm.	Ongoing
	Annual grants to Binners' Project ($55,000 per year) (2015-present): Informal waste pickers, also known as binners, have played a crucial role in supporting Vancouver's recycling efforts. Since its inception in 2015, the Binners' Project has experienced continuous growth, and the City's grants have helped support this group with implementing pilot programs and initiatives aimed at fostering the binners' financial independence. A core initiative of the Binners' Project is the Coffee Cup Revolution program, which is a one-day depot where Binners can refund used coffee cups for 10 cents each. During the 2023 event, over 145,000 cups were collected in three hours, resulting in nearly $15,000 going back to Binners at the event. This program demonstrates binners' readiness and willingness to assist with waste diversion in the City, as well as the potential opportunity for a coffee cup deposit refund system and improved recycling markets to be developed.	Ongoing

Lead by Example

Corresponding ZW2040 Action	Action	Status
Priority Action #11 – Develop a green operations zero waste plan	In 2020, an updated Green Operations Plan was developed, which identified a number of key opportunities to reduce waste. Successes under the plan include: • 83% of waste generated in City buildings is diverted from landfill or incinerator[34] • Single-use plastics have been removed from many City operations, such as Vancouver Civic Theatres • Engineering Services reuses more than 100,000 tonnes of aggregate per year in City construction projects Work is ongoing to continue reducing waste from corporate operations.	Completed
	Working with Park Board to help identify products aligned with waste streams (2018): Reviewed foodware used at parks concession stands to ensure alignment with zero waste station streams, and minimize any non-compostable or recyclable items.	Completed
	Reusable cup pilot at Civic Theatres (2022): The Annex theatre launched a reusable cup pilot in 2022 and started using 100% reusable cups in June 2022. At the Playhouse, 99% of shows used reusable glassware in 2023. In addition, all events at VCT venues are "Crack and Go" for beer and ready-to-drink cocktails. This means that audience members taking drinks into the auditorium drink their beer or ready to drink (RTD) cocktail from the can unless they request a plastic cup.	Ongoing
	Cup borrowing pilot at Vancouver Park Board (2022): Golf Clubhouses offer reusable coffee mugs for dine-in and patio seating. All Clubhouses and Pitch and Putts also offer reusable to-go cups and encourage customers to bring their own clean reusable cups. Parks Board facilities have switched to cold beverage cups with a sip portal to eliminate straws except when needed for accessibility.	Ongoing
Transformative Action #5 – Develop a zero waste procurement standard	**Procurement of City equipment, products and materials**: Annually, the City awards purchase contracts valued at over $200 million. Of this, 25-30% is for equipment, products, materials and inventory. Evaluation of good/products includes assessing a wide range of environmental sustainability criteria. Since 2018, zero waste principles, such as packaging reduction/elimination, Life Cycle Analysis, durability, the use of recycled content and process for decommissioning or end-of-life, have been included and continue to evolve.	Ongoing

Corresponding ZW2040 Action	Action	Status
	Sustainable and Ethical Procurement: In addition to product/material sustainability, in 2019, the City began to request information from vendors about their operations and initiatives that advance social and environmental sustainability. The standard questionnaire was mandated to be included in every public procurement process undertaken by the City for both services and materials The questionnaire helps the City's Supply Chain Management department gather market information for the development of future procurement strategies and informs vendors about the City's values, goals, practices, and expectations around sustainability and zero waste. Annually, of the 70% of vendors who have completed the questionnaire, almost all indicate that they implement waste reduction measures. While the percentages have stayed the same over the years, the quality of information and quantity of details have improved.	Ongoing

Cross-Cutting

Corresponding ZW2040 Action	Action	Status
Transformative Action #6 – Form a zero waste innovation fund with like-minded partners	This action is not being pursued at this time due to resource constraints. Staff are in discussions with other levels of government to identify and explore potential funding opportunities for innovative waste reduction and circular economy actions. For example, this could include collaboration with industry partners on pilots.	Not started
Outreach and behaviour change Programs	**Zero Waste Ambassador Pilot Program** (2022-present): A pilot program focused on training zero waste champions living in multi-unit residential buildings to promote waste reduction and zero waste initiatives (32 ambassadors trained since 2022 reaching over 3,700 residential units).	Ongoing
	Amplification of Metro Vancouver's Campaigns: the City of Vancouver regularly amplifies Metro Vancouver's public education and behavior change campaigns through various channels including VanCollect app/emails, residential collection calendars, outreach booth at events, social media posts, website content, and posters and decals. Some of these campaigns include "Food scraps aren't garbage", "Think Thrice", "Love Food Hate Waste", and "Memories Not Garbage".	Ongoing
	Outreach booths and presentations: City staff attend community events to host education tables or deliver presentations to provide outreach and education around zero waste programs and initiatives. Outreach staff have	Ongoing

Corresponding ZW2040 Action	Action	Status
	attended 107 events and engaged with 11,000 residents since 2018.	
	School programs: 1. Zero Waste Place: A series of workshops for elementary and secondary school students in Vancouver focused on zero waste education and behaviour change (5,380 participants in 738 workshops since the 2018-19 school year). 2. Zero Heroes and Clean Up Your Act School Live Plays: Two live plays delivered at elementary schools by DreamRiders Production to engage students about zero waste and keeping streets and neighbourhood litter free (45,300 students viewed 168 plays since the 2018-19 school year).	Ongoing
Other	**Sharing input and data with other levels of government and other organizations**: Between 2018 and early 2024, City staff have participated in 30 consultation processes undertaken by ECCC, MoECCS, Metro Vancouver and others on a variety of zero waste topics,[35] including EPR programs, plastic waste, organics recycling, and construction and demolition waste. Mayor and Council have sent eight letters to other levels of government, and submitted five motions to Union of BC Municipalities or Federation of Canadian Municipalities on zero waste topics. Table 1 provides an overview of all the consultations that City staff took part in with other levels of government on topics related to circular economy and zero waste.	Ongoing
	Large site re-zoning zero waste requirements (2018-present): The rezoning policy for sustainable large developments was adopted by City Council and went into effect in 2018. The intent of the policy is for large developments to demonstrate leadership in sustainable design. It is expected that large developments will use an integrated design approach and employ district-scale solutions. Zero Waste Planning requirements are one of eight sustainability sections developers must meet under this policy. In the Zero Waste Planning section, applicants must show how they will implement at least seven of 18 potential initiatives. These include: implementing recycling for three or more provincial product stewardship programs such as batteries or soft plastics, creating centralized recycling and organics disposal "depots" on each floor, and providing reusable dishware and dishwashers in common areas. As part of this section, applicants must also identify three out of	Ongoing

Corresponding ZW2040 Action	Action	Status
	seven zero waste outreach and education actions that they intend to pursue post-occupancy.	
	Zero Waste Demonstration Site (2016-2024)**:** The City collaborated with Vancouver Economic Commission (VEC) to explore transforming our former recycling materials receiving yard, located at 1198 East Kent Avenue South, into a Zero Waste Demonstration Site for start-up businesses to ideate and demonstrate Zero Waste technology. Due to budgeting constraints, this pilot concluded in early 2024.	Completed
	Participation in networks: City staff participate in various networks and associations on zero waste topics, including C40, National Zero Waste Council, Coast Waste Management Association, Urban Sustainability Directors Network, Solid Waste Association of North America and Pacific Coast Collaborative. Participation in these networks allows staff to exchange knowledge and lessons learned with other jurisdictions and stakeholders.	Ongoing

Table 1. Consultations by other levels of government and other organizations to which City staff provided input

Level of Govt/ Type of Org	Year	Title
Provincial	2018	Organic Matter Recycling Regulation (OMRR) Intentions Paper
Regional	2019	Regional Organic Waste Management
Provincial	2019	CleanBC Plastics Action Plan
EPR Steward	2019	Streetscape Recycling Roundtable Series
Provincial	2019	Low Carbon Fuel Standard Consultation Paper
Provincial-Federal	2019	Regulatory Approaches for Priority Plastic Wastes (National Zero Waste Council paper)
Provincial-Federal	2020	CCME Action Plan on Zero Plastic Waste (Phase 2 Action Plan)
Provincial	2020	Recycling Regulation Policy Intentions Paper
Federal	2020	Integrated Management Approach to Plastic Products Discussion Paper
EPR Steward	2020	Return-it's Beverage Container Stewardship Plan
Provincial	2021	Enabling Municipal Single-Use Plastics By-law Authority
Provincial	2021	Hazardous Waste Regulation Intentions Paper
Provincial	2021	Methane Management Offset Protocols Intentions Paper
Regional	2021	Regionally Harmonized Approach to Municipal Single-Use Item Reduction By-laws
Federal	2021	Proposed Single-Use Plastics Prohibitions Regulations
Standards	2022	Public Review Comments for CAN/BNQ 0017-088: Specifications for Compostable Plastics
Provincial	2022	CleanBC Intentions Paper – Preventing Single-Use and Plastic Waste

Level of Govt/ Type of Org	Year	Title
Federal	2022	Towards Canada-wide rules to strengthen recycling and composting of plastics through accurate labelling - Consultation Paper
Federal	2022	Exploring a Circular Economy Strategy for Canada
Provincial	2022	EPR Five-Year Action Plan
EPR Steward	2022	Recycle BC program plan
Federal	2023	Canada's landfill methane emissions - proposed regulatory framework
International	2023	United Nations plastics treaty
EPR Steward	2023	Recycle BC Streetscape Consultation
Provincial	2024	BC's Approach to the Circular Economy
Federal	2024	Opportunities for Circularity of Wood in Construction, Renovation and Demolition in Canada
Regional	2024	Municipal Workshop on C&D Waste Reduction in Metro Vancouver
Provincial	2024	CleanBC Intentions Paper - ICI Packaging
Provincial	2024	Circular Cup Policy Research – presentation to MoECCS staff
International	2024	Ending Plastic Pollution: Towards a Local and Subnational Government Position for INC-4 of the Global Plastics Treaty

APPENDIX C
OTHER LEVELS OF GOVERNMENT

This appendix provides an overview of the actions taken by other levels of government to reduce waste and transition to a circular economy. Table 2 summarizes the different types of approaches federal and provincial levels of government have used to advance waste reduction and circular economy since 2018. (This list is non-exhaustive.)

Table 2. Highlighted Actions by Other Levels of Government to Advance Waste Reduction and Circular Economy

		Plastic	Food	Organics Recycling	Recycling and EPR	C&D	Circular Economy	Landfill Gas
Federal	Commitments and Collaboration	X					X	
	Research and Studies	X	X			X	X	
	Strategy and Planning	X	X				X	
	Funding	X	X					
	Regulation	X						X
	Procurement						X	
Provincial	Commitments and Collaboration		X					
	Strategy and Planning	X			X		X	
	Funding	X		X				X
	Regulation	X		X	X			X
Inter-governmental	Commitments and Collaboration	X						
	Strategy and Planning	X						

Table 3 summarizes the types of actions taken by Metro Vancouver in support of waste reduction and circular economy since 2018.

Table 3. Summary of Metro Vancouver's Actions in Support of Waste Reduction and Circular Economy

Type of Action	Examples
Initiated process to update solid waste management plan	• Engagement and consultation are underway to update the regional solid waste management plan • Background: o Regional solid waste management plans require provincial approval and set the framework for solid waste management in Metro Vancouver, including setting recycling rate targets o The current Integrated Solid Waste and Resource Management Plan includes goals such as reducing the

Type of Action	Examples
	waste we each generate and aspiring to recycle 80% of the region's waste. About 65% of garbage generated in the region is recycled (2022).[36]
Disposal bans	• Several product stewardship materials and recyclable materials are banned from being disposed as garbage at Metro Vancouver's solid waste facilities • Examples include electronics, appliances, tires, food waste, yard waste, clean wood, beverage containers, expanded polystyrene packaging, cardboard, paper, and containers made of metal, glass and other recyclable materials
Public education and behaviour change campaigns	• Launched or continued several regional campaigns on zero waste topics, including: o Waste reduction during winter holidays (Create Memories Not Garbage); o Food scraps recycling (Food Scraps Aren't Garbage); o Food waste reduction (Love Food Hate Waste); o Single-use item reduction (What's your Superhabit?); and o Clothing waste reduction and diversion (Think Thrice).
Funding	• Launched a program to support members for hosting municipal and non-profit repair cafes
Technology pilots	• Launched several pilots to test new technologies in support of zero waste, including: o Carpet recycling, o Recovery of recyclables and alternative fuel from mixed waste, o Beneficial use of bottom ash, and o Smart bins with AI-enabled sensors to identify banned items and fullness levels in dumpsters.
Reuse pilots	• Worked with Ocean Ambassadors to launch a reusable takeout containers pilot • Expanded reuse day events at the North Shore Recycling and Waste Centre
Recycling depots	• Finalized a funding strategy for the region's recycling depots • Added an Encorp Return-It Express and GO at the North Shore Recycling and Waste Centre • Started collection of commercial food waste for composting at North Shore Recycling and Waste Centre
Research	• Completed research on various topics to inform zero waste policy and programs, including: o Apparel research and engagement; o Assessment of online marketplace for C&D materials; o Compost quality study; o Mapping compost markets for BC; and o Annual waste composition studies.
Support and partnerships	• Provided support for waste exchanges through the National Industrial Symbiosis Program • Partnered with FoodMesh to develop a regional food recovery network to help rescue and redistribute surplus food • Continued support for the Binners' Project Coffee Cup Revolution to raise awareness around the scale of single-use plastic-lined paper cups being disposed in commercial/institutional sector

Type of Action	Examples
Toolkits and resources	• Published and updated toolkits and resources that help to support municipalities in their waste reduction efforts, such as the C&D toolkit, and Regionally Harmonized Approach to Municipal Single-Use Item Reduction By-laws • Integrated Metro Vancouver Recycles with Recycling Council of BC's Recyclepedia system (online searchable database for nearest recycling location)
National Zero Waste Council (NZWC)	• Actions led by the NZWC include: o Working with Metro Vancouver to deliver an annual Zero Waste Conference in Vancouver; o Publishing research on waste reduction topics, including: circular economy, food, plastics, product design and packaging, reuse, and waste prevention; o National public education and behaviour change campaigns, such as launching Love Food Hate Waste as a Canada-wide campaign; o Pilot projects, such as developing a certification process for the use of recycled asphalt pavement; o Played a leadership role in the creation of the Canada Plastics Pact; and o Launched the Canadian Circular Cities and Regions Initiative as a one-year national pilot, in partnership with the Federation of Canadian Municipalities and others to support the journey to a circular economy for local governments in Canada through knowledge sharing and capacity building. City of Vancouver participated in the first year of the initiative. • Background: A Metro Vancouver initiative, the NZWC brings together governments, businesses and non-governmental organizations to lead Canada's transition to a circular economy

APPENDIX D
WASTE COMPOSITION ANALYSIS

This appendix estimates the composition of Vancouver's garbage disposed to landfill or incinerator from 2016 to 2022, using waste composition studies[37] conducted by the City[38] and Metro Vancouver.[39] Solid waste composition is analyzed by looking at five different sectors. Table 4 defines acronyms used for each sector.

Table 4. Index of Acronyms Representing Sectors Used in Waste Composition Analysis

Acronym	Sector
SF	Single-Family households
MF	Multi-Family households
ICI	Industrial / Commercial / Institutional
DO/SL	Drop-Off / Small Load (i.e. Garbage dropped off directly at transfer stations and landfill, usually for a fee, by all types of residents and businesses.)
C&D	Construction and Demolition

Throughout this appendix, composition estimates are provided for Vancouver's waste disposal from all sectors, unless a specific sector is identified.

Highlighted Opportunity Areas

In 2022, Vancouver residents and businesses disposed an estimated 305,000 tonnes to landfill or incinerator. Waste composition studies conducted by Vancouver and the region help show where there are opportunities for further action. Figure 5 shows Vancouver's waste disposed to landfill or incinerator, grouped into five major categories.[40]

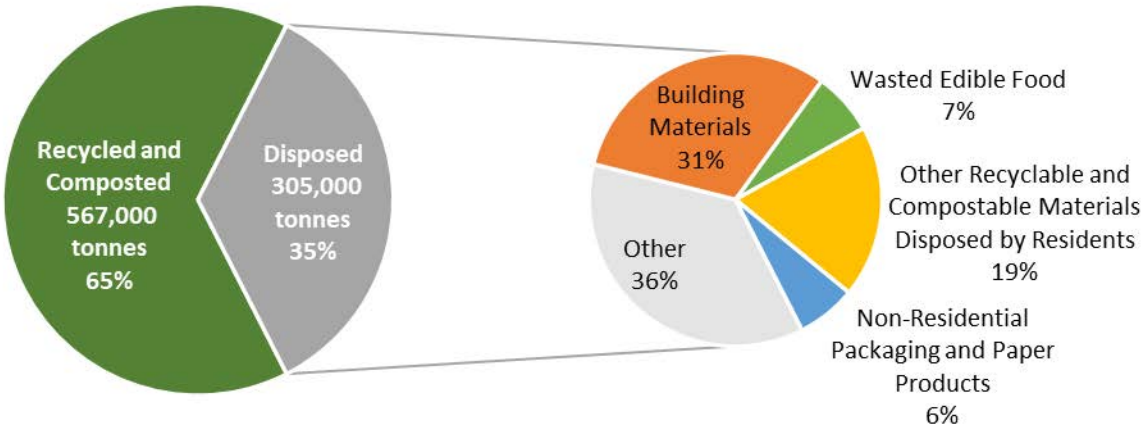

Figure 5. Highlighted opportunities for reducing waste disposed to landfill or incinerator by Vancouver residents and businesses (2022).

- **Building materials** make up 31% of Vancouver's garbage. In 2022, Vancouver disposed 95,000 tonnes of building materials as garbage, including 46,000 tonnes of wood. Most of this waste stream comes from construction and demolition activities (C&D).
- **Wasted edible food** represents needless global pollution and resource consumption, due to significant carbon emissions and water usage associated with food production. Vancouver residents and businesses threw out an estimated 21,000 tonnes of edible food in 2022 (7% of Vancouver's garbage). An additional 11,000 tonnes of food that could have been eaten is composted through the City's green bin program.
- **Other recyclable and compostable materials, disposed by residents.** 19% of Vancouver's garbage is disposed in residential garbage, but could have been recycled or

composted through existing programs (58,000 tonnes in 2022). (Does not include wasted edible food). Despite the availability of composting and recycling programs, some residents are not taking advantage of them.

- **Non-residential packaging and paper products** make up 6% of Vancouver's garbage. Packaging and paper product EPR programs regulated by the province exist for residential sectors but currently exclude commercial and institutional sources (ICI sector). Vancouver's ICI sector disposed around 20,000 tonnes of packaging and paper products in 2022 (20% of Vancouver's ICI garbage).
- **Other.** Some examples of materials that make up the other 36% of Vancouver's waste disposed to landfill or incinerator include: non-residential food scraps and yard trimmings (7%), furniture (6%), diapers (3%), wood pallets (2%), durable plastic products (2%), and non-residential textiles (1.6%).

Figure 6 shows how the weight of these five categories has changed since 2016. The total amount of each stream has decreased (or stayed about the same) from 2016 to 2022, consistent with the overall waste reduction trend observed for Vancouver and the region. The decrease in disposed building materials from 2016 to 2022 (a reduction of 43,000 tonnes) is primarily driven by an estimated decrease in wood building materials over the same time period (a reduction of 35,000 tonnes); however, the reduction in wood building materials from 2016 to 2022 may be overestimated. More detail is provided in the Building Materials section to follow.

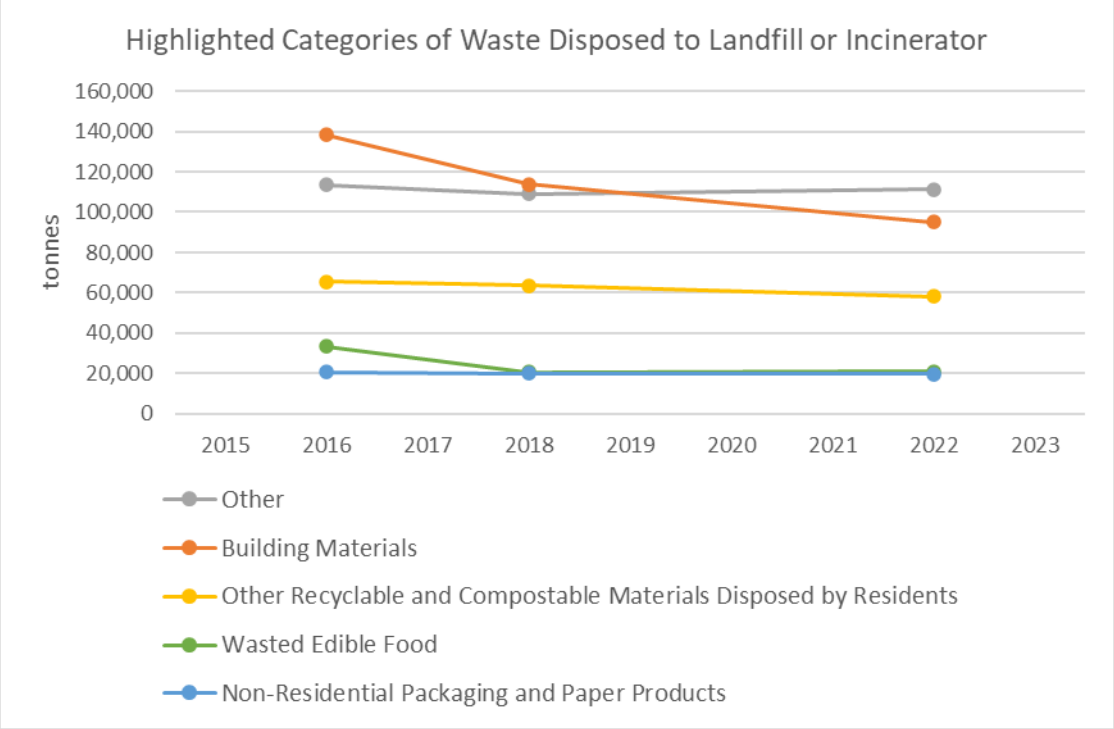

Figure 6. Change in quantities of highlighted waste categories disposed to landfill or incinerator by Vancouver residents and businesses from 2016 to 2022.

Analysis of all the highlighted categories of waste is provided in further detail in the sections to follow.

Building Materials

The majority of the building materials disposed to landfill or incinerator originate from construction and demolition activities (C&D sector). Residents and other types of businesses (SF & MF, ICI and DO/SL sectors) also dispose some types of building materials, such as wood,

asphalt roofing shingles, metal building materials, carpet waste and drywall. Figure 7 shows the portion of disposed building materials originating from each sector.

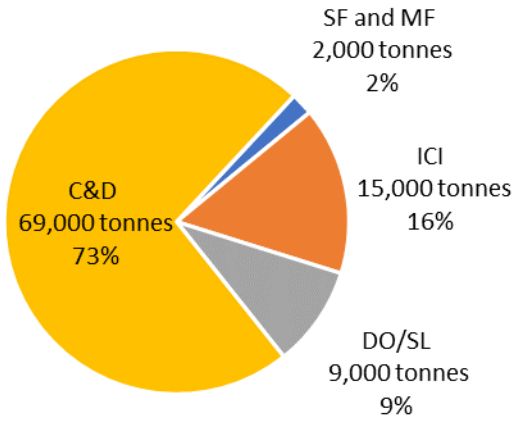

Figure 7. Quantities of disposed building materials originating from each sector in Vancouver (2022).

Figure 8 shows the composition of building materials disposed to landfill or incinerator in 2022. The majority is wood (48%) (includes clean wood and treated/painted wood).

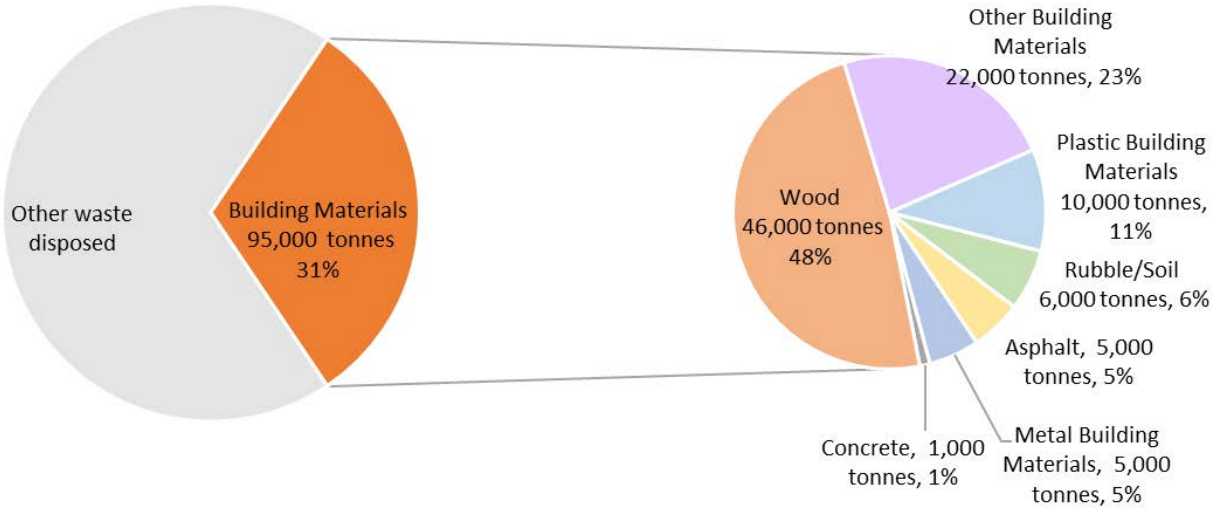

Figure 8. Composition of building materials disposed to landfill or incinerator by Vancouver residents and businesses (2022). Includes waste disposed by all sectors (SF, MF, ICI, DO/SL, and C&D), with the majority coming from C&D activities.

Figure 6 (see previous section) showed that the amount of building materials disposed to landfill or incinerator decreased significantly from 2016 to 2022 (a reduction of 43,000 tonnes). Figure 9 shows that this trend is mainly driven by an estimated decrease in wood building materials over the same time period (a reduction of 35,000 tonnes). The reduction in disposed wood building materials (and disposed building materials overall) may be less significant than presented here, due to a change in C&D waste sampling methodology in 2022.[41] Staff plan to work with Metro Vancouver to assess this further in future C&D waste composition studies.

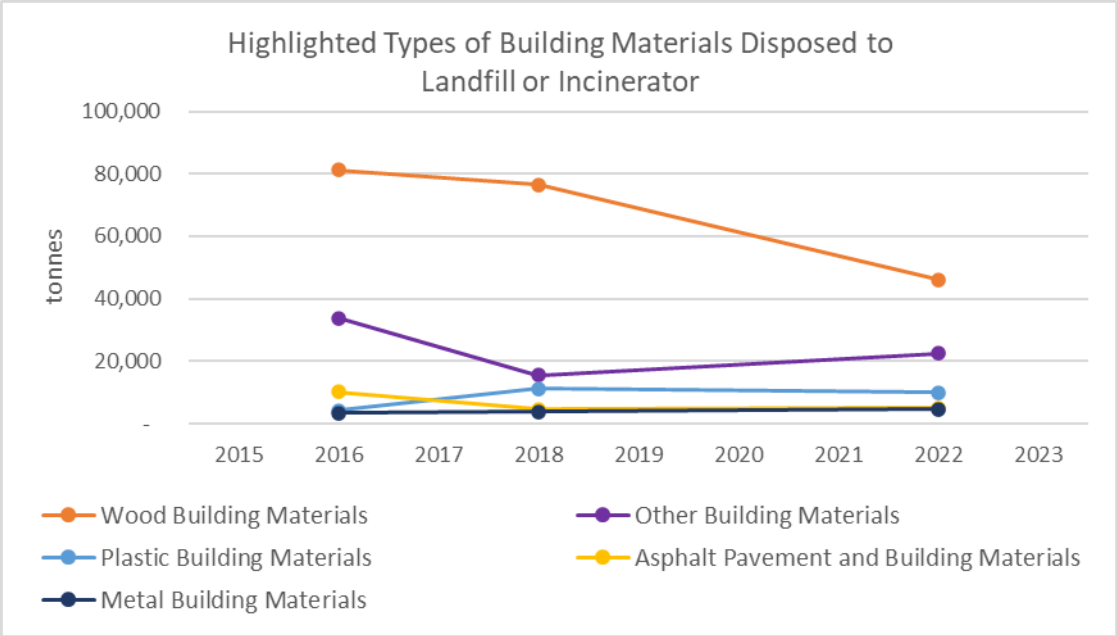

Figure 9. Change in the quantities of highlighted building materials disposed to landfill or incinerator by Vancouver residents and businesses from 2016 to 2022.

Table 5 shows each type of building material disposed in 2022 as a percentage of all disposed building materials, and as a percentage of all waste disposed by Vancouver residents and businesses. Regardless of the possible underestimate described above, wood building materials make up at least 15% of Vancouver's waste disposed to landfill or incinerator.

Table 5. Type and weight of building materials as a percentage of disposed building materials, and as a percentage of all waste disposed by Vancouver residents and businesses (2022)

Type of Building Material	Tonnes Disposed to Landfill or Incinerator (2022)	Percentage of Disposed Building Materials	Percentage of all waste disposed by Vancouver residents and businesses
Wood building materials	46,000	48%	15%
Other building materials (e.g. carpet waste, stone and other masonry, tile and ceramics)	22,000	23%	7%
Plastic building materials	10,000	11%	3%
Rubble/soil	6,000	6%	2%
Asphalt pavement and asphalt building materials	5,000	5%	2%
Metal building materials	5,000	5%	2%
Concrete	1,000	1%	0.4%

Wasted Edible Food

Food waste is broadly categorized as unavoidable food waste and edible food/avoidable food waste.

- Edible food/avoidable food waste means: food that could have been eaten, such as unfinished meals, whole fruits and vegetables, whole meats and fish, canned food, packaged food, baked goods, etc.
- Unavoidable food waste means: scraps generated during food preparation, such as bones, egg shells, tea bags, fruit and vegetable peels, oil, fat, etc.

The preferred end-of-life waste management stream for unavoidable food waste is composting. While it's better to compost edible food than dispose it to landfill or incinerator, its best and highest use is to be eaten. Wasting edible food represents needless global pollution and resource consumption, due to significant greenhouse gas emissions and water usage associated with food production. Accordingly, the City's food waste reduction goals are to:

- Reduce the amount of overall food waste disposed as garbage
- Reduce the amount of edible food thrown away via any stream (garbage or compost)

All food waste. Figure 10 shows the amount of both edible and unavoidable food waste disposed as garbage by Vancouver residents and businesses.

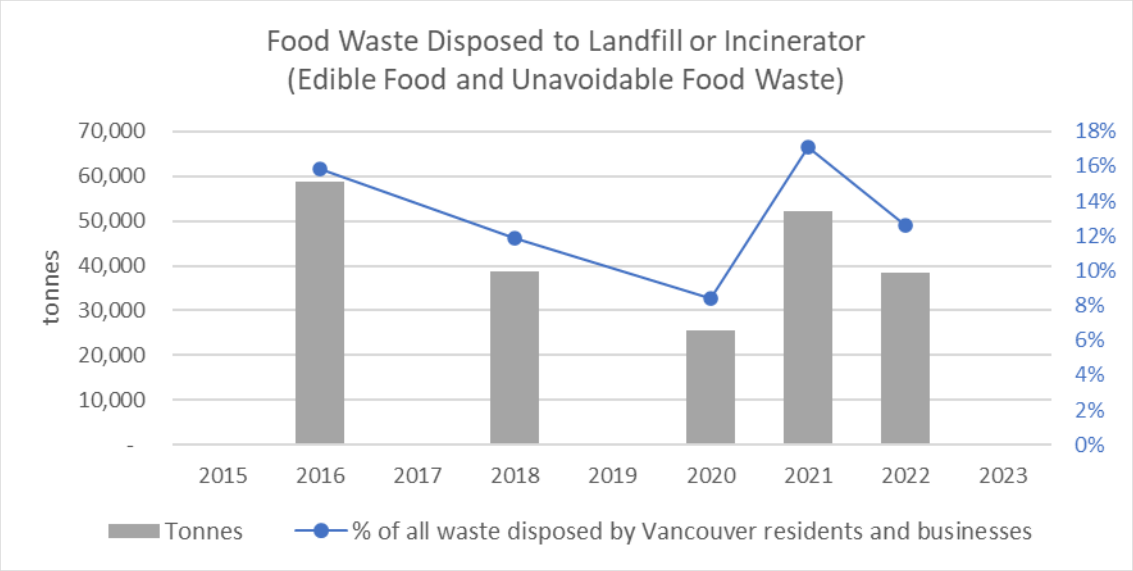

Figure 10. Change in quantities of food waste disposed to landfill or incinerator by Vancouver residents and businesses from 2016 to 2022 (SF, MF, ICI and DO/SL).

Overall food waste disposed to garbage decreased from 2016 to 2018, and reached a minimum in 2020 (26,000 tonnes, or 8% of Vancouver's garbage), when many people were staying home due to restrictions associated with the COVID-19 pandemic. Food waste significantly increased in 2021 (when restrictions were being lifted), but returned to 2018 levels in 2022 (39,000 tonnes, or 12-13% of Vancouver's garbage).

Edible food. Edible food disposed to landfill and incinerator comes from SF, MF and ICI sectors. Figure 11 shows the portion of wasted edible food that comes from each sector.

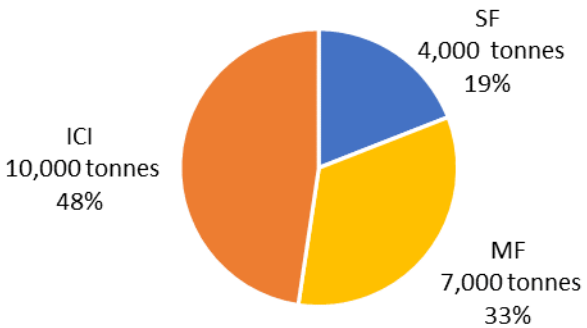

Figure 11. Quantities of wasted edible food originating from each sector in Vancouver (2022).

Figure 12 shows the amount of edible food disposed as garbage by Vancouver residents and businesses, while Figure 13 shows the amount of edible food composted in SF green bins.

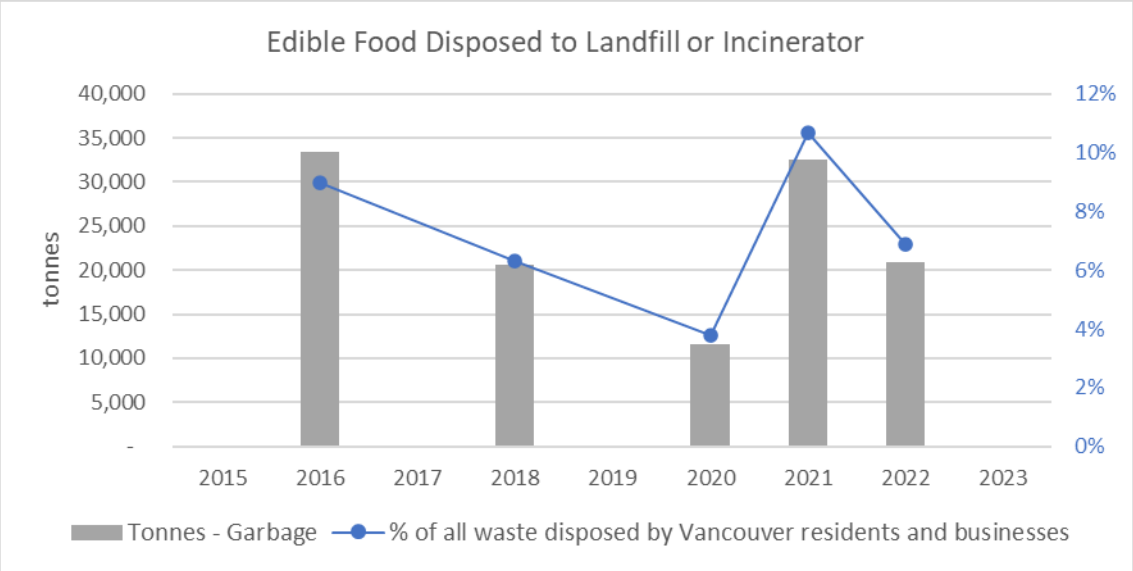

Figure 12. Change in quantities of edible food disposed in to landfill or incinerator by Vancouver residents and businesses from 2016 to 2022 (SF, MF, ICI and DO/SL).

Edible food disposed as garbage has followed a similar trend from 2016 to 2022 as overall food waste. In 2022, Vancouver sent an estimated 20,000 tonnes of edible food to landfill or incinerator (7% of Vancouver's garbage, all sectors).

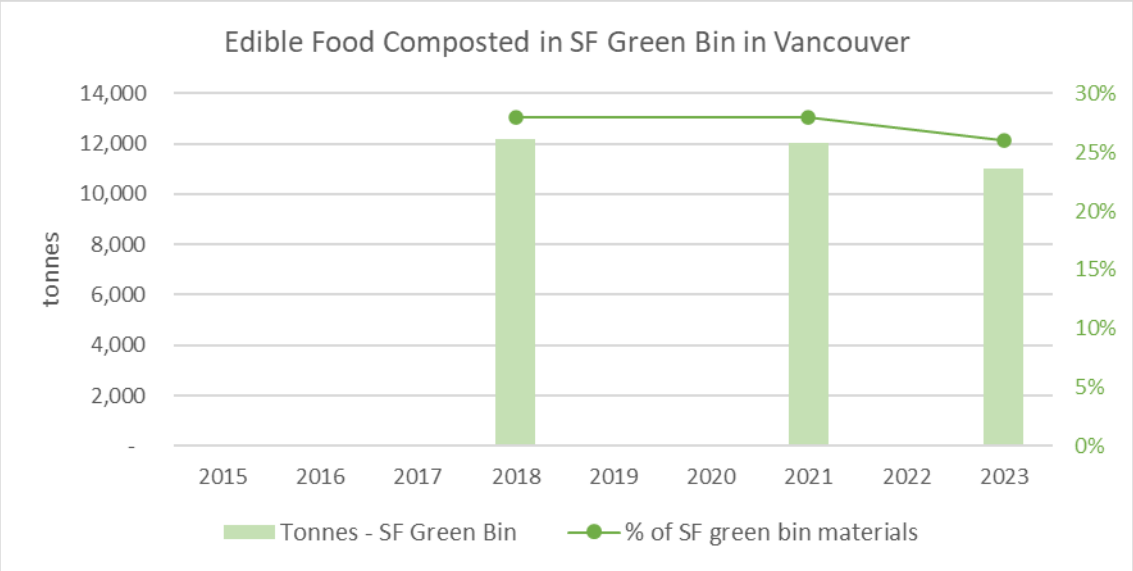

Figure 13. Change in quantities of edible food composted in SF green bin in Vancouver from 2018 to 2023. The amount of edible food in green bin is based on point-in-time waste composition measurements, adjusted to account for seasonal fluctuation in green bin composition.

An additional 11,000-12,000 tonnes of edible food is composted through SF green bins each year (plus an unknown amount composted in multi-family and businesses' organics recycling programs). Over time, the goal is to reduce edible food thrown away via any stream (whether garbage or compost).

Recyclable and Compostable Materials Disposed by Residents

Despite the availability of composting and recycling programs, some residents are not taking full advantage of them. Figure 5 identified that 19% of Vancouver's disposed waste is residential materials that could have been recycled or composted. Figure 14 provides a more granular composition of the recyclable and compostable residential materials disposed to landfill or incinerator in 2022.

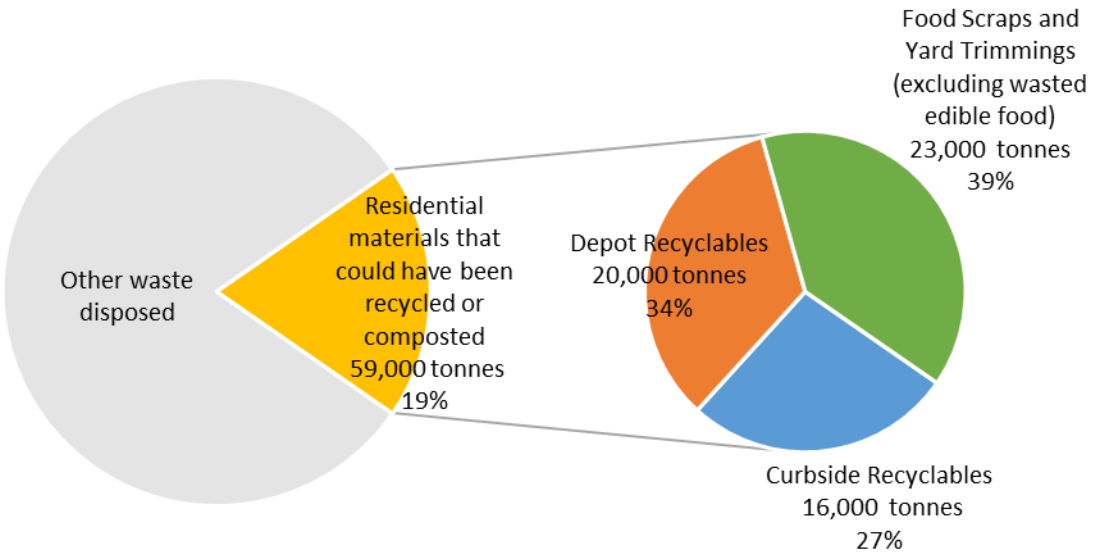

Figure 14. Composition of SF and MF materials disposed to landfill or incinerator by Vancouver residents that could have been recycled or composted (2022).

Curbside recyclables includes all residential materials accepted in Recycle BC's single-family and multi-family residential recycling program. For example, food and product packaging, single-use items and other packaging-like products, paper, and paper products.

Depot recyclables includes residential materials collected for reuse or recycling via various drop-off locations, such as Vancouver Zero Waste Centre and Landfill Zero Waste Centre. For example: flexible plastics (2% of Vancouver waste disposal), residential clothing and textiles (2%), metal (1%), electronics (0.5%), books (0.2%), household hazardous waste (0.1%) and large appliances (0.1%).

Figure 15 shows how the amounts of curbside recyclables, depot recyclables, and food scraps/yard trimmings disposed to garbage have changed from 2016 to 2022 (residential sectors). Annual disposal of residential food scraps and yard trimmings has decreased over this time period (suggesting that more residents are participating in composting programs). Annual disposal of residential curbside recyclables and depot recyclables decreased in 2020 and 2021, respectively, but both streams have increased back to 2016 levels as of 2022 (around 16,000 tonnes per year of residential materials that could have been collected with curbside recycling, and 20,000 tonnes per year that could have been dropped off at depot for recycling).

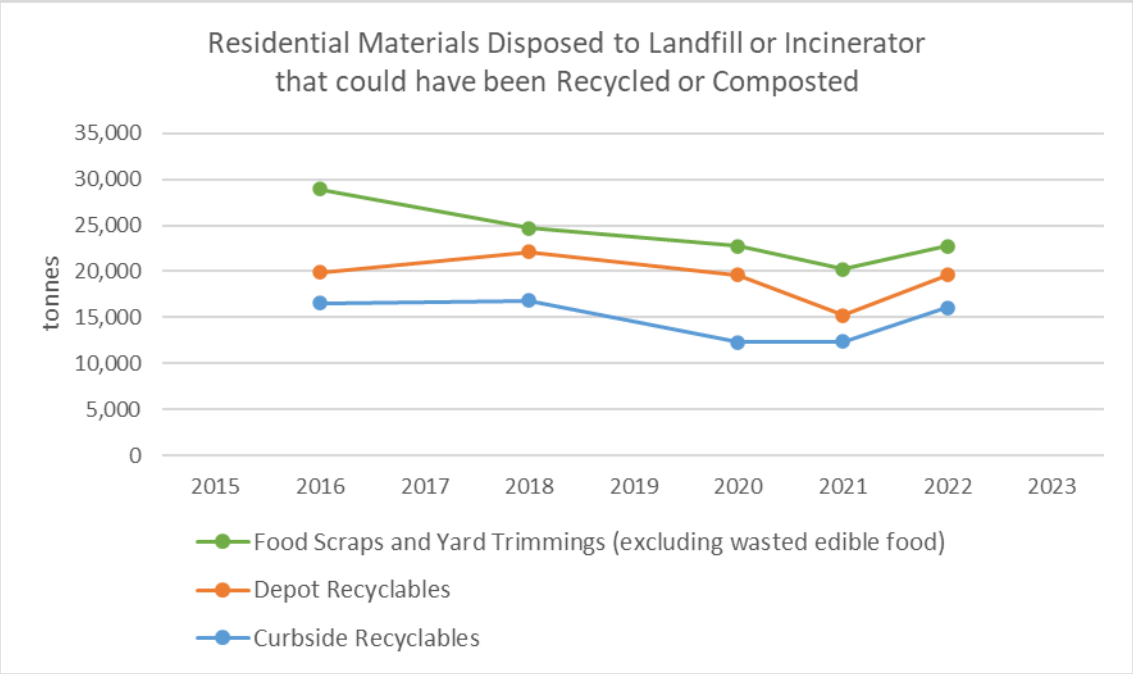

Figure 15. Change in the quantities of Vancouver's residential materials disposed to landfill or incinerator that could have been recycled or composted, from 2016 to 2022 (SF and MF).

Figure 16 shows the composition of single-family curbside garbage in 2022 and Figure 17 shows the composition of multi-family garbage in 2022.

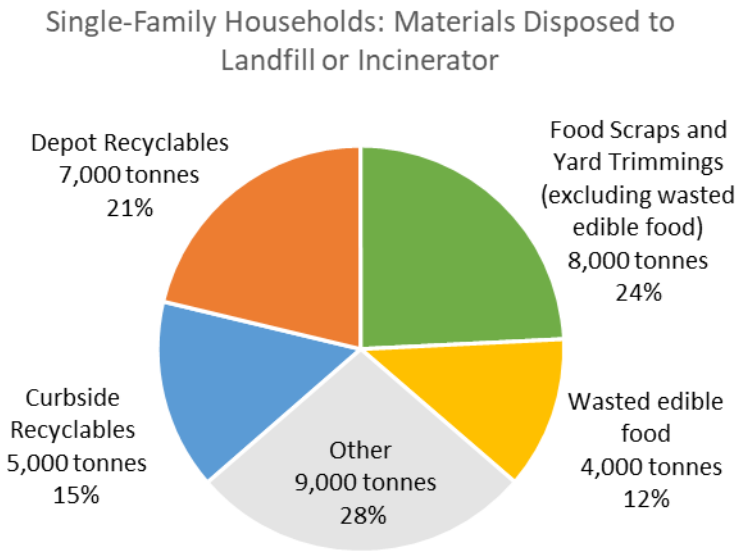

Figure 16. Composition of materials disposed to landfill or incinerator by SF households in Vancouver, 2022.

In 2022, 72% of materials disposed by single-family households could have been recycled or composted. This includes curbside recyclables (15%), depot recyclables (21%), food scraps and yard trimmings (24%) and wasted edible food (12%).

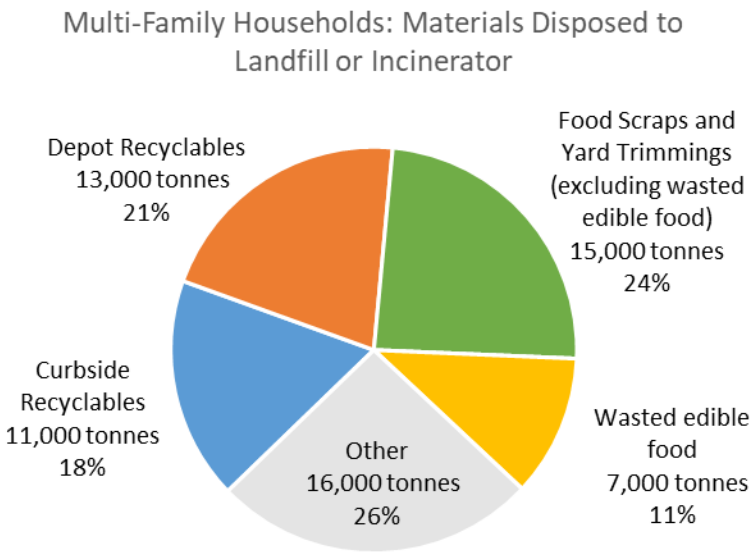

Figure 17. Composition of materials disposed to landfill or incinerator by MF households in Vancouver, 2022.

In 2022, 74% of materials disposed by multi-family households could have been recycled or composted. This includes curbside recyclables (18%), depot recyclables (21%), food scraps and yard trimmings (24%) and wasted edible food (11%). Vancouver's Solid Waste By-law requires all MF buildings to have a diversion program for both organics and recyclable materials.

Non-Residential PPP

Packaging and paper product EPR programs regulated by the province exist for residential sectors but currently exclude commercial and institutional sources (ICI sector). Figure 5 showed that 6% of Vancouver's disposed waste is non-residential packaging and paper products (PPP). Figure 18 shows that annual disposal of non-residential PPP has stayed fairly constant since 2016 (around 20,000 tonnes per year). It decreased in 2020 (during the COVID-19 pandemic), but has since returned to pre-pandemic levels.

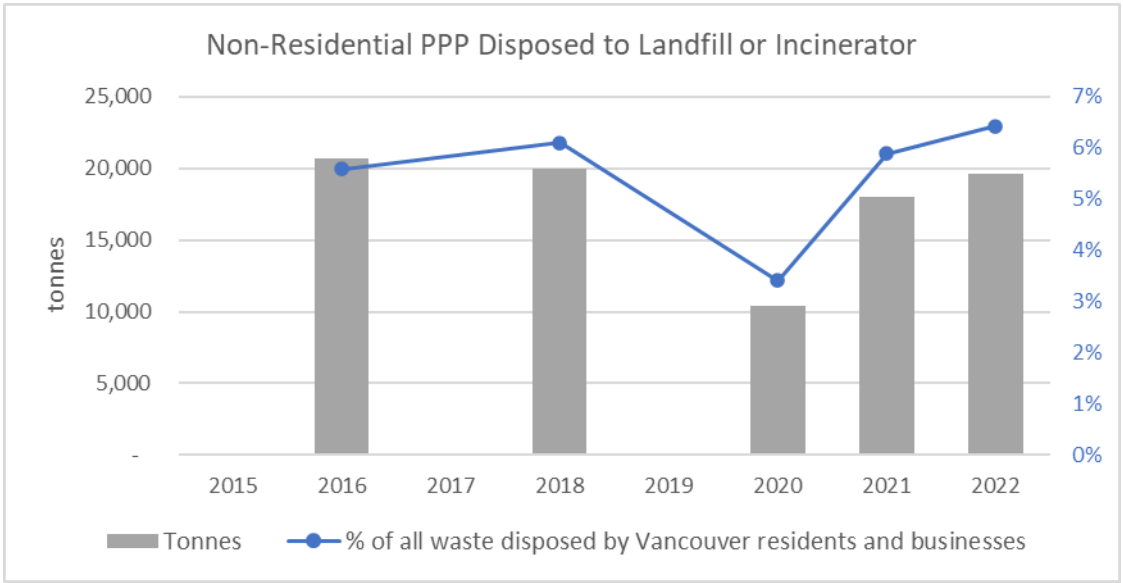

Figure 18. Change in the quantities of non-residential PPP disposed to landfill or incinerator by Vancouver businesses from 2016 to 2022 (ICI).

Other

Figure 5 categorized 36% of Vancouver's waste disposed to landfill or incinerator as 'other.' Table 6 provides a more granular breakdown of the materials included in the 'other' category for 2022.

Table 6. Type and weight of 'other' disposed materials as a percentage of the 'other' category, and as a percentage of all waste disposed by Vancouver residents and businesses (2022)

Material	Tonnes Disposed to Landfill or Incinerator (2022)	Percentage of 'Other' disposal category	Percentage of all waste disposed by Vancouver residents and businesses
Non-residential food scraps and yard trimmings (excluding wasted edible food)	22,000	20%	7%
Furniture	18,000	16%	6%
Diapers	8,000	7%	3%
Wood pallets	7,000	6%	2%
Household garbage observed in C&D studies (not sorted further; composition unknown)	7,000	6%	2%
Durable plastic products	6,000	5%	2%
Non-residential textiles	5,000	5%	1.6%
Pet waste	4,000	4%	1.3%
Other household hygiene	2,000	2%	0.7%
Non-residential electronic waste	2,000	2%	0.7%
Masks and PPE	1,000	1%	0.3%
Tires and other rubber	1,000	1%	0.3%
Everything else*	27,000	25%	9%

* For example: non-residential beverage containers, non-residential metal, non-residential books, waxed cardboard, wax, other glass and ceramics, sharps, animal carcass, sods and soils

APPENDIX E
ENDNOTES

[1] Scope 3 carbon pollution means the carbon pollution generated elsewhere in the world as a result of producing the goods consumed by Vancouver residents and businesses. Traditional carbon pollution inventories only count emissions produced within a region, which can obscure the full climate impact of "consumer societies" and assign disproportionate responsibility for global emissions to low-consumption societies that produce goods for export.

[2] C40 Cities, Arup, and University of Leeds (2019). The Future of Urban Cities in a 1.5°C World. https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q000000MdxA/V3QLW6RLSz3O1N7QGaBkJC_ezIfKteg_zgIe5o57GFI

[3] Saanich 2021 Consumption-Based Ecological and Carbon Footprint Assessment. Submitted by CHRM Consulting (2023). https://www.saanich.ca/assets/Community/Documents/Planning/sustainability/2021-Consumption-Based-Emissions-Inventory-Ecofootprint.pdf

[4] Council of Canadian Academies, 2021. Turning Point, Ottawa (ON). The Expert Panel on the Circular Economy in Canada, Council of Canadian Academies. https://cca-reports.ca/reports/the-circular-economy-in-canada/

[5] In 2014, EPR programs were estimated to reduce mixed waste collection and landfilling costs by $32 million, and recycle and sell into markets $47 million in materials. EPR programs resulted in almost 2,300 jobs when losses from reduced mixed waste (garbage) collection and landfilling were taken into account. EPR programs diverted 160,000 tonnes of mixed waste from landfilling, and reduced over 200,000 tonnes carbon dioxide equivalent (CO2e) (equivalent to taking over 42,000 cars off the roads for a year), with an energy saving of 3.2 million GJ (equivalent to the energy content of over 500,000 barrels of crude oil). These results do not include EPR programs that were introduced or expanded after 2014. For example, the new Recycle BC program for residential packaging and paper products, and the expanded electronic and electrical waste and beverage container deposit-refund program.

[6] Morrison Hershfield, 2014. Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs Operating in BC in 2014. Presented to BC Ministry of Environment and Metro Vancouver. https://www2.gov.bc.ca/assets/gov/environment/waste-management/recycling/recycle/rel-res/2014_assessment_of_economic_environmental_impacts_of_extd_producer_responsibility_programs_bc.pdf

[7] Metro Vancouver is required by the BC Environmental Management Act to develop a regional plan for managing municipal solid waste. The Integrated Solid Waste and Resource Management Plan defines regional targets, guiding principles and actions, and includes goals to minimize waste generation and maximize reuse and recycling.

[8] Metro Vancouver Solid Waste Management Plan https://metrovancouver.org/services/solid-waste/solid-waste-management-plan

[9] For example, Vancouver's by-law requirements to have a plan for separating organic waste for recycling help to reinforce Metro Vancouver's organics disposal ban, and Vancouver's Green Demolition by-law was informed by Metro Vancouver's efforts to encourage municipalities to adopt requirements for diverting construction and demolition waste.

[10] EPR shifts the financial burden of managing specified end-of-life products from the taxpayer to producers.

[11] Staff calculate annual tonnes of waste disposed using the best available data each year. Currently, Vancouver-specific data is only available about garbage disposed by single-family residential homes. For other sectors, including multi-family residential, industrial/commercial/institutional, and construction and demolition, staff rely on regional-level data, scaled to represent our share of the region's population.

[12] For example, the portion of residents that live within a 15-minute walk or bike ride to recycling depots and other drop-off locations.

[13] For example, Scope 3 carbon pollution prevented by reducing wasted edible food (whether disposed or composted).

[14] For example, economic value created by reusing or diverting wood waste from construction and demolition activities, or the number of jobs created by circular business models.

[15] Plus an unknown amount of edible food waste composted in multi-family and businesses' organics recycling programs.

[16] Does not include wasted edible food.

[17] The Canadian Council of Ministers of the Environment (CCME) is composed of the 14 environment ministers from the federal, provincial and territorial governments. CCME has played a guiding role in developing and implementing provincial and territorial EPR programs, particularly through the adoption of the Canada-Wide Action Plan for Extended Producer Responsibility (2009). Under this plan, Canadian provinces and territories committed to introduce operational EPR programs for many different types of products and packaging waste in two phases. Phase 1, to be implemented by 2015, includes packaging, printed materials, mercury containing lamps, other mercury-containing products, electronics and electrical products, household hazardous and special wastes, and automotive products. Phase 2, to be implemented by 2019, includes construction materials, demolition materials, furniture, textiles, carpet, and large appliances. In 2022, the CCME published guidance to encourage the provinces and territories to prioritize plastic products within the Phase 1 and Phase 2 product categories in order to achieve zero plastic waste. BC has introduced regulations to require EPR for all phase 1 categories and large appliances, but not the phase 2 categories of furniture (e.g. mattresses), textiles and carpet, construction materials, or demolition materials.

[18] CCME Canada-wide Action Plan for Extended Producer Responsibility (October 2009). https://ccme.ca/en/res/cap-epr_e.pdf. Accessed August 14, 2024.

[19] CCME Guidance To Facilitate Consistent Extended Producer Responsibility Policies And Programs For Plastics (December 2022). https://ccme.ca/en/res/eprguidanceen.pdf Accessed Sep. 9, 2024.

[20] ISO 59004:2024 Circular economy – Vocabulary, principles and guidance for implementation https://www.iso.org/standard/80648.html

[21] Circular Economy, National Zero Waste Council https://nzwc.ca/focus-areas/circular-economy/issue/Pages/default.aspx

[22] Ibid

[23] Circular Food Innovation Lab https://vancouver.ca/green-vancouver/circular-food-innovation-lab.aspx

[24] Metro Vancouver Regional Food Recovery Network https://foodmesh.ca/about/special-projects/metro-vancouver-regional-food-recovery-network/

[25] Single-Use Item By-laws and Report Back on Cup Policies https://council.vancouver.ca/20240228/documents/pspc1.pdf

[26] Return-It Cup Pilot https://www.return-it.ca/cups/

[27] Reuse and recycling drop-off events https://vancouver.ca/green-vancouver/zero-waste-drop-off-events.aspx

[28] Share, reuse and repair https://vancouver.ca/green-vancouver/share-reuse-and-repair.aspx

[29] Ibid

[30] Storry, K. and McKenzie, A., 2018. Unravelling the problem of apparel waste in the greater Vancouver area. https://www.researchgate.net/publication/323525011_Unravelling_the_Problem_of_Apparel_Waste_in_the_Greater_Vancouver_Area

[31] Vancouver City Council directed staff to address the safety risks associated with clothing donation bins on January 15, 2019. https://council.vancouver.ca/20190115/documents/regu20190115min.pdf

[32] Vancouver City Council directed staff to launch a City-branded clothing donation bin program on May 28, 2019. https://council.vancouver.ca/20190528/documents/regu20190528min.pdf

[33] Dog waste collection vancouver.ca/parks-recreation-culture/dog-waste-collection.aspx

[34] 83% diversion rate achieved in 2023. The diversion rate includes waste from City offices owned by the City (i.e. does not include office space leased by the City in buildings with multiple tenants), community centres, Park Board buildings, engineering works yards, fire halls, police buildings and libraries in buildings owned by the City.

[35] Including: 2 international, 6 federal, 2 Canadian Council of Ministers of the Environment, 12 provincial, 4 EPR steward, 3 regional, and 1 standards organization.

[36] Metro Vancouver 2022 Biennial Report Integrated Solid Waste and Resource Management Plan https://metrovancouver.org/services/solid-waste/Documents/draft-iswrmp-biennial-report-2022.pdf

[37] Waste composition studies are conducted at a point in time and may not be representative of the whole year, since composition can fluctuate seasonally.

[38] The City conducts solid waste composition studies every two to three years.

[39] SF garbage composition is taken from City of Vancouver studies conducted in 2018 and 2021, and Metro Vancouver full studies conducted in 2016, 2020 and 2022. SF green bin composition is taken from City of Vancouver studies conducted in 2018, 2021 and 2023. MF, ICI and DO/SL garbage composition is taken from Metro Vancouver full studies conducted in 2016, 2018, 2020, 2021 and 2022. C&D garbage composition is taken from Metro Vancouver C&D studies conducted in 2015, 2018 and 2022. 2015 C&D waste composition results are assumed to be representative of 2016, and have been used for the 2016 calculations. (This allows for calculating the composition of Vancouver's garbage from all sectors in 2016, 2018 and 2022.)

[40] Figure 5 displays a Vancouver recycling rate of 65% in 2022. Staff assume Vancouver's recycling rate is the same as the region's because data is not available to calculate a Vancouver-specific recycling rate. In 2022, the region reported that 65% of all waste generated was recycled (includes organics recycling and recycling of building materials).

[41] 2022 Construction and Demolition Waste Composition Study https://metrovancouver.org/services/solid-waste/Documents/construction-demolition-waste-composition-study-2022.pdf