

UNDERSTANDING ICI WASTE MANAGEMENT IN ONTARIO: SUCCESSSES, FAILURES AND THE PATH FORWARD

August 31, 2022

Partners in Project Green

AGENDA

1. Growing focus on waste (political and legislative)
2. Ontario regulatory context
3. Current generation and management of ICI waste
4. Barriers & Opportunities

GROWING FOCUS ON WASTE



10,000 tonnes per year is estimated to be entering the Great Lakes.

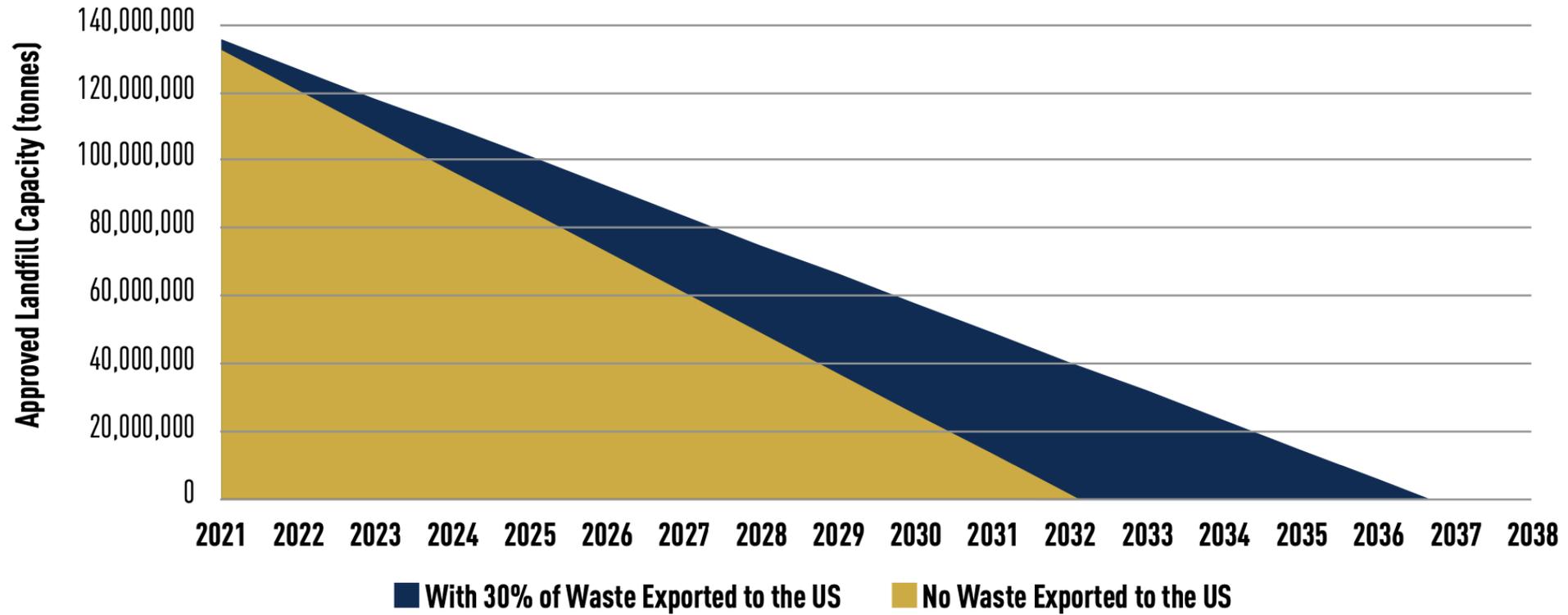


China's tough new recycling standards leaving Canadian municipalities in a bind
Globe and Mail - Jan 8, 2018

China's policy change on accepting recyclables has Calgary exploring new markets
CTV News Calgary, Jan 18, 2018



ONTARIO DISPOSAL CAPACITY



POLITICAL ATTENTION

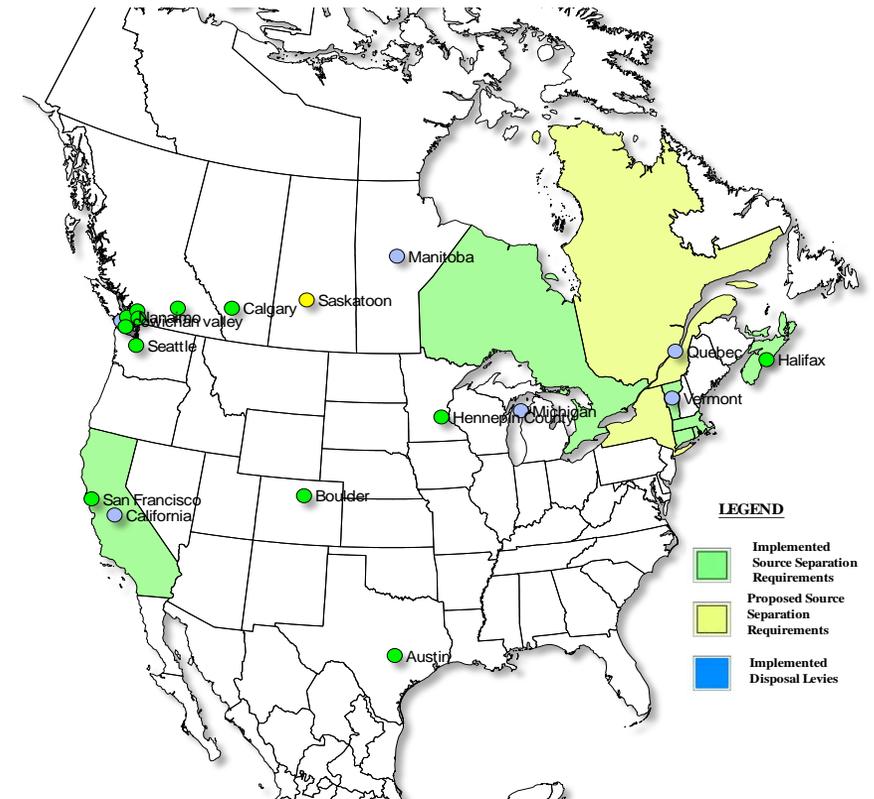


| Conservatives | Greens | Liberals | NDP |
|---|---|--|---|
| <ul style="list-style-type: none"> • Ban export of plastic waste • Work with international partners to address plastic pollution • Work to increase recovery with P/T using technology to convert plastic to chemical & fuel • Support improved EV battery recycling • Introduce renewable natural gas mandate | <ul style="list-style-type: none"> • 50% recycled content in plastic packaging by 2030 • EPR for fishing gear • Targets for for refillable beverage containers • Adjust procurement practice & support municipalities that adopt equivalent or better reuse standards • Ban non-essential, single-use plastics this year & expand the list of items to be banned. • Ratify Basel Ban Amendment & strengthen rules for plastic waste trade • Support the development of a food waste strategy | <ul style="list-style-type: none"> • 50% recycled content in plastic packaging by 2030 • Ban certain single-use plastics by 2030 • Improve beverage recycling • Improved standards for labelling • Right to repair for appliances • Strengthen public procurement to prioritize reusable and recyclable products • Work on EPR with P/T including establishing a federal public registry • No-Waste Food Fund • Global leader for battery recycling & reuse | <ul style="list-style-type: none"> • Ban export of plastic waste • Right to repair for electronics • Ban on certain single-use plastics immediately • Help municipalities improve waste and recycling systems • National food waste strategy • Improved standards for labelling |

REGULATORY/POLICY INITIATIVES — CANADA AND THE U.S.

Growing action by all levels of government on organic waste:

- Source separation requirements / bans;
- Disposal levies



EPR POLICY RENEWAL & EXPANSION IN CANADA



| | |
|-------------------------|--|
| BC | <ul style="list-style-type: none"> Printed Paper and Packaging (PPP) – include single-use products (SUP), packaging-like products starting Jan. 1 , 2023, empowered municipalities to ban SUPs New materials - consulting on EV batteries; mattresses; more electronics; moderately hazardous products (e.g., sharps, pressurized cylinders) Evaluating ICI PPP |
| AB | <ul style="list-style-type: none"> PPP/SUP – consulting / government passed bill that enables EPR (December 2021) HSP – consulting EEE – pilot |
| SK | <ul style="list-style-type: none"> PPP/SUP – consulting New materials – considering construction and demolition materials; furniture, textiles and carpets; appliances; and mercury-containing lamps and products |
| MB | <ul style="list-style-type: none"> PPP/SUP – consulting |
| ON | <ul style="list-style-type: none"> PPP/SUP – transition July 2023-2025 |
| QC | <ul style="list-style-type: none"> PPP/SUP – draft regulation posted – includes ICI New materials - agricultural plastics, fuel cylinders, pharmaceutical products |
| NB | <ul style="list-style-type: none"> PPP/SUP – new regulation passed |
| NS | <ul style="list-style-type: none"> PPP/SUP – consulting / bill introduced October 2021 |
| YK | <ul style="list-style-type: none"> PPP/SUP – consulting |
| CCME Initiatives | <ul style="list-style-type: none"> Guidance on common product categories and definitions; Performance standards to guide reuse and recycling programs; Options to encourage innovation and reduce costs; and Clear measurement, monitoring and verification approaches. |



ONTARIO'S REGULATORY CONTEXT

REGULATION OF ICI ENTITIES IN ONTARIO

- The Province has two regulations under the Environmental Protection Act related to waste reduction and diversion by ICI waste generators
 - the **Waste Audit Regulation** (O. Reg. 102/94), which requires large establishments) that meet size thresholds to take an inventory of their waste and make a plan to reduce waste; and
 - the **Source Separation Regulation** (O. Reg 103/94), which requires these establishments (plus multi-residential buildings) to separately collect specified materials to be recycled or reused.
- Province also passed the Food & Organic Waste Policy Statement in 2018 that requires ICI entities and municipal governments over a certain size and waste generation to meet certain requirements



| | IC&I Subsector | Retail Shopping Establishment | Retail Shopping Complex | Large Construction Project | Large Demolition Project | Office Building | Restaurant | Hotel and Motel | Hospital | Educational Institution | Large Manufacturing Establishment | Multi-Unit Residential Building |
|--------------------------------------|---|--|---|---|---|---|---|---|---|---|-----------------------------------|--|
| O.R. 102 | "Trigger" Criteria | • Floor area ≥ 10 000 m ² AND • Owner is responsible for waste mgmt. (i.e. not complexed) | • Floor area ≥ 10 000 m ² | • Total floor area ≥ 2 000 m ² | • Total floor area ≥ 2 000 m ² | • Total floor area used for offices ≥ 2 000 m ² | • Exemptions apply | • > 75 units | • Class A, B & F Facilities Reg.964 | • > 350 person enrollment in any of the last 3 years | • Exemptions apply | • Not identified in O.R. 102 |
| | Waste Audit | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | |
| | Waste Reduction Plan | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | |
| O.R. 103 | "Trigger" Criteria | • As above AND • Located in a municipality with > 5000 population | • As above AND • Located in a municipality with > 5000 population | • As above | • As above | • As above AND • Located in a municipality with > 5000 population | • As above AND • Located in a municipality with > 5000 population | • As above AND • Located in a municipality with > 5000 population | • As above AND • Located in a municipality with > 5000 population | • As above AND • Located in a municipality with > 5000 population | • As above | • > 6 units AND • Located in a municipality with > 5000 population |
| | Materials For Separation: | | | | | | | | | | | |
| | Aluminum (Including Food or Beverage Cans) | √ | √ | | | √ | √ | √ | √ | √ | √ | √ |
| | Cardboard (corrugated) | √ | √ | √ | | √ | √ | √ | √ | √ | √ | |
| | Fine Paper | √ | √ | | | √ | √ | √ | √ | √ | √ | |
| | Glass Bottles and Jars | √ | √ | | | √ | √ | √ | √ | √ | √ | √ |
| | Newsprint | √ | √ | | | √ | √ | √ | √ | √ | √ | √ |
| | Steel Food or Beverage Cans | √ | √ | | | √ | √ | √ | √ | √ | √ | √ |
| | Brick and Portland Cement Concrete | | | √ | √ | | | | | | | |
| | Drywall (unpainted) | | | √ | √ | | | | | | | |
| | Steel | | | √ | √ | | | | | | √ | |
| | Wood (unpainted, untreated and unlaminated) | | | √ | √ | | | | | | √ | |
| | Polyethylene Terephthalate Bottles | | | | | | √ | √ | | | | √ |
| | Polyethylene Containers | | | | | | | | | | √ | |
| Polyethylene Film | | | | | | | | | | √ | | |
| Polystyrene Foam | | | | | | | | | | √ | | |
| Polystyrene Trays, Reels, and Spools | | | | | | | | | | √ | | |



For Member Use Only

*Ont. Reg. 102/94 Waste Audits & Waste Reduction Work Plans
Ont. Reg. 103/94 Industrial, Commercial & Institutional Source Separation Programs*

FOOD & ORGANIC WASTE POLICY STATEMENT - DIVERSION REQUIREMENTS FOR COMMERCIAL & INSTITUTIONAL ENTITIES

| | Multi-residential buildings with 6 or more units | All commercial buildings subject to O.Reg 103/94 that generate more than 300/kg week | All commercial buildings not subject to O.Reg 103/94 that generate more than 300/kg week | All commercial buildings subject to O.Reg 103/94 that generate less than 300/kg week | Educational institutions and hospitals subject to O. Reg 103/94 that generate more than 150 kg |
|--------------|---|--|--|--|--|
| Shall | <ul style="list-style-type: none"> • 50% target by 2025 | <ul style="list-style-type: none"> • 70% target by 2025 | <ul style="list-style-type: none"> • 50% target by 2025 | <ul style="list-style-type: none"> • 50% target by 2025 | <ul style="list-style-type: none"> • 70% target by 2025 |
| | <ul style="list-style-type: none"> • Source separation or equivalent | | | | |

AUDITOR GENERAL VALUE FOR MONEY AUDIT

- ICI waste regulations have not been effective in improving waste performance across the regulated ICI sector:
 - Applies to less than 2% of all ICI entities (other 98% of businesses have no obligations)
 - Applies to about 40% of the waste generated by these larger entities (i.e., hasn't been updated since 1994 so excludes common materials like coffee cups and most plastics)
 - Only required to operate a recycling program and make 'reasonable efforts' to collect and divert materials
 - 88% of entities inspected had implemented a recycling program as required – however diversion results based on a sample varied from 6% to 90%
 - Site visits found many compliant entities were operating poorly performing recycling programs with heavy contamination in the recycling stream
 - Establishments often do not make efforts to ensure their materials are recycled; in half of the cases examined recyclables were taken to facilities that disposed of recyclables as garbage



Office of the Auditor General of Ontario

Value-for-Money Audit:
Non-Hazardous
Waste Reduction
and Diversion in the
Industrial, Commercial
and Institutional
(IC&I) Sector



November 2021

MADE-IN-ONTARIO ENVIRONMENT PLAN

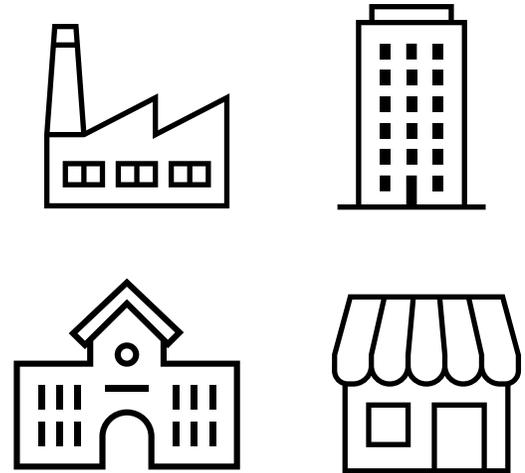
- Next Steps:
 - Consult on the Industrial, Commercial and Institutional waste reform framework to improve the current waste diversion activities within this sector.
 - Consult on a proposal to phase out food and organic waste from landfills by 2030 that will focus on building processing capacity in the province.
 - Provide guidance to educate the public and key stakeholders about reducing and diverting food and organic waste.
 - Work with partners to conduct audits to identify materials that could be recovered and recycled rather than sent to landfills. Audits would help identify new materials that could be designated under producer responsibility in an effort to recover high-volume resource streams to increase diversion and phase out these items from being sent to the landfill.



CURRENT MANAGEMENT OF ICI MATERIALS

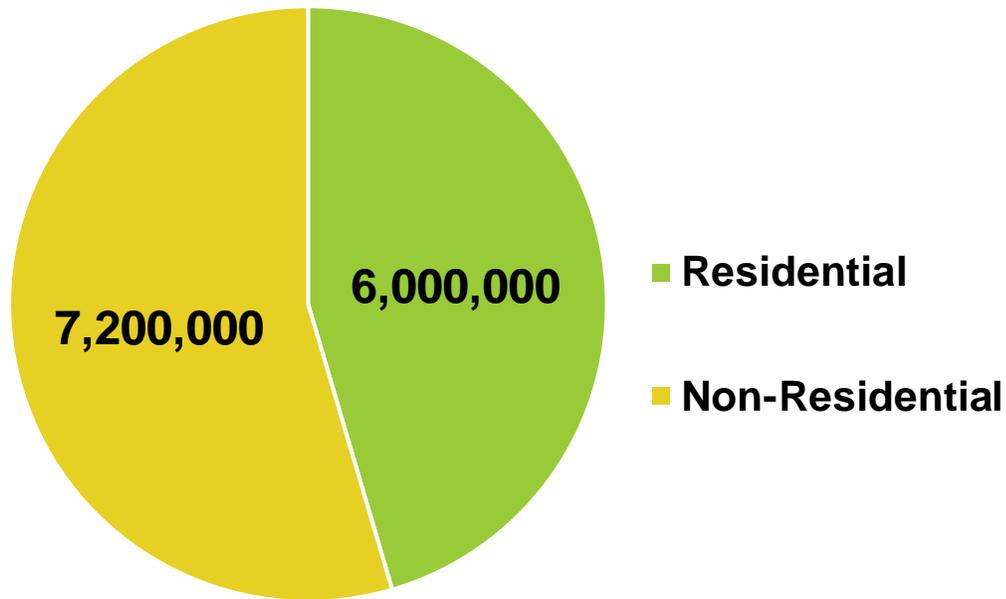
CONTEXT

- Industrial, commercial and institutional (ICI) waste is often referred to as waste generated from non-residential
- Residential waste is general considered more homogenous (materials, sizes, quantities)
- Activities of ICI entities vary widely
- As a result, ICI waste tends to be more heterogenous (materials, sizes, quantities) and often requires much different servicing

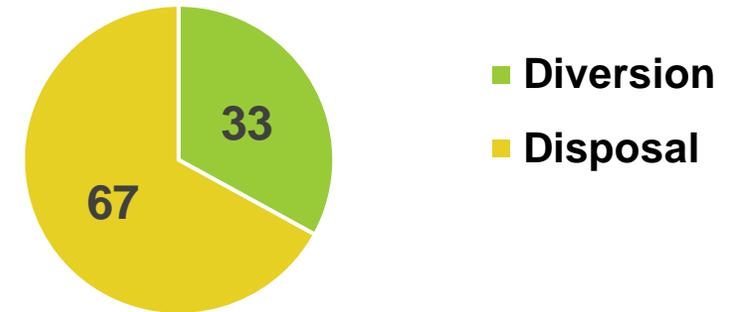


OVERVIEW

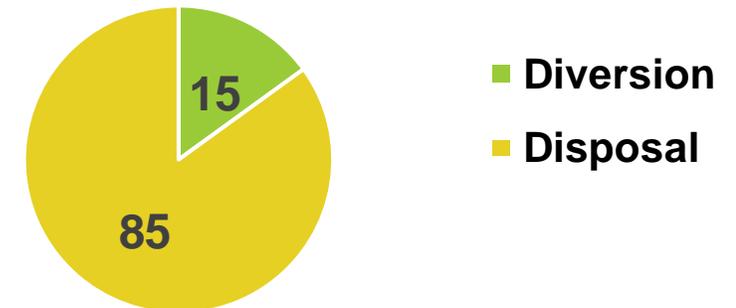
Ontario Waste Generation (tonnes)*



Ontario Residential Waste Diversion (%)**



Ontario Non-Residential Waste Diversion (%)



*Based on the most recent data from Statistics Canada (2018)

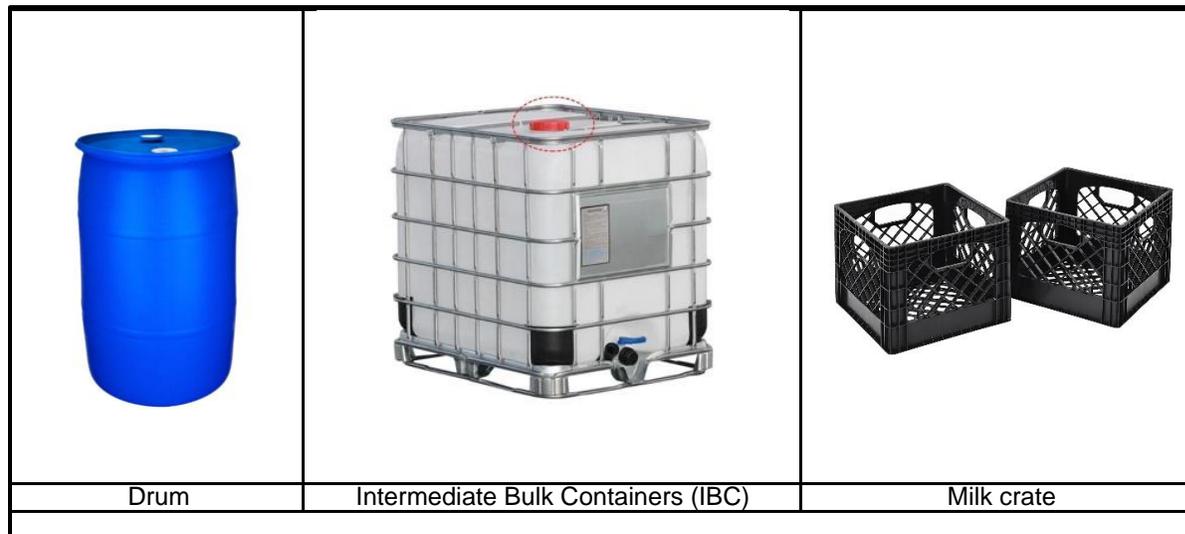
** Ontario's Datacall puts residential diversion at ~50%

DATA DEFICIENCIES

- Activities are currently not well tracked
- Statistics Canada is the main public source
 - Lag in publication means it is 2 year old data
 - Lacks specificity
 - Excludes non-traditional waste management activities (B2B diversion, long-haul transporters)
- The Ontario Waste Management Association has started trying to better track overall waste management – Statistics Canada likely significantly underestimating disposal and diversion

POSITIVES

- There are well-functioning systems for both reuse and recycling
- Some ICI entities benefit from economies of scale and are generating non-contaminated materials with strong end markets



STUDY FOR ECCC ON ICI ORGANIC WASTE

- Purpose of this study was to provide a better understanding of:
 - How food and organic waste is being managed by the Canadian ICI sector;
 - The economic conditions related to how it is collected and processed by ICI sub-sectors and by province/territory;
 - Policies and regulatory initiatives aimed at improving the diversion of ICI organic waste; and
 - New and emerging ICI organic waste collection and processing technologies applicable to the ICI sectors.



Overview of Organics Diversion Requirements and Practices for the Canadian Industrial, Commercial and Institutional Sector

Final Report

Prepared for:
Environment and Climate Change Canada

Prepared by:
AET Group Inc.

531 Wellington St. North
Kitchener ON N2H 5L6
T (519) 576-9723
F (519) 570-9589
www.aet58.com

March, 31, 2021

AET File No. ENV_WC-C202



SCOPE OF ECCC STUDY

This study focused on the following waste streams:

- “Food wastes”
- “Other organic wastes” that were considered, where data was available, included leaf and yard waste, compostable products and packaging, diapers, and soiled paper products.

Disposal and diversion

- Does not include rendering, animal feed, food donation, or by-products

CHARACTERIZATION OF WASTE GENERATED BY ICI SUBSECTORS

- 421 waste audits gathered
- Most from 2019 onwards
- More than 75% of waste audit results were from Ontario, with the balance from the West (BC, AB, SK, MB)
- Data was normalized to a full-time equivalent (FTE) (i.e., staff) and, when data was available, to the square footage of the facility
- Normalization useful to help compare different facility types on an ‘apples to apples basis’

| NAICS Codes - 2 digit | NAICS Codes- Other Details | Facility Types | Number of Waste Audits | Facilities with a Food and Organic Waste Diversion Program (%) |
|---|---------------------------------------|-------------------------------------|------------------------|--|
| Manufacturing- 31-33 | 311 Food Manufacturing | Manufacturing (food processing) | 20 | 75% |
| | | Manufacturing (non-food processing) | 56 | 38% |
| Trade- 41, 44-45 | 44-45 Retail Trade | Malls and Retail | 56 | 79% |
| | 445 Food and Beverage Stores | Grocery Stores | 9 | 0% |
| Information and Cultural Services -51, Finance, Insurance, Real Estate and Leasing- 52-53, Professional, Scientific and Technical Services, Business, Building and Support Services- 55-56, Other Services- 81, Public Administration- 91 | | Offices | 163 | 71% |
| Educational Services- 61 | 6111 Elementary and Secondary Schools | Elementary Schools | 11 | 27% |
| | 6111 Elementary and Secondary Schools | Secondary Schools | 13 | 38% |
| | 6112 Colleges, 6113 Universities | Post-Secondary Schools | 28 | 71% |
| Health Care and Social Assistance- 62 | 621 Hospitals | Hospitals | 18 | 61% |
| Arts, entertainment and recreation- 71 | | Recreation centres, arenas, zoo | 4 | 75% |
| Accommodation and food services- 72 | 721 Accommodation services | Hotels | 18 | 56% |
| | 722 Food services and drinking places | Restaurants | 25 | 32% |
| Total | | | 421 | 61% |

 minimum

NAICS= North American Industry Classification System

 maximum

CHARACTERIZATION OF WASTE GENERATED BY ICI SUBSECTORS

Overview of Average Food and Organic Waste Percentages, by Sector

| NAICS Code | Facility Types | Total Waste Disposed | | | Total Waste Generated |
|---------------|-------------------------------------|----------------------|---------------------|--------|------------------------------|
| | | Food waste | Other organic waste | Total | Total Food and Organic Waste |
| 31-33 | Manufacturing (food processing) | 20.03% | 6.44% | 26.47% | 48.85% |
| | Manufacturing (non-food processing) | 9.68% | 11.38% | 21.06% | 5.94% |
| 41, 44-45 | Malls and Retail | 21.36% | 11.19% | 33.05% | 34.55% |
| | Grocery Stores | 43.01% | 5.22% | 48.23% | no data |
| 51-56, 81, 91 | Offices | 12.98% | 4.61% | 18.30% | 26.17% |
| 61 | Elementary Schools | 41.68% | 18.64% | 60.32% | 39.51% |
| | Secondary Schools | 40.33% | 10.55% | 50.88% | 37.75% |
| | Post-Secondary Schools | 31.65% | 10.85% | 43.57% | 35.99% |
| 62 | Hospitals | 14.10% | 7.14% | 21.24% | 23.20% |
| 71 | Arts, Entertainment, Recreation | 25.58% | 14.23% | 39.81% | 36.66% |
| 72 | Hotels | 44.13% | 5.65% | 49.78% | no data |
| | Restaurants | 49.60% | 5.63% | 55.23% | 49.81% |

Total waste disposed= to landfill or incineration

minimum

maximum

CHARACTERIZATION OF WASTE GENERATED BY ICI SUBSECTORS

Overview of Food and Organic Waste Generation, by normalizing factors

| NAICS Code | Facility Types | Total Waste Disposed | Food waste disposed | Other organic waste disposed | Total food and organic waste disposed | Food and Organic Waste diverted | Food and organic waste disposed | Food and organic waste diverted |
|---------------|-------------------------------------|----------------------|---------------------|------------------------------|---------------------------------------|---------------------------------|---------------------------------|---------------------------------|
| | | kg/FTE/year | | | | | kg/ft ² /yr | |
| 31-33 | Manufacturing (food processing) | 1,338 | 367 | 118 | 485 | 3,632 | 0.18 | 2.52 |
| | Manufacturing (non-food processing) | 622 | 28 | 32 | 60 | 10 | 0.13 | 0.02 |
| 41, 44-45 | Malls and Retail | 358 | 39 | 21 | 61 | 8 | 0.16 | 0.12 |
| | Grocery Stores | 1,747 | 757 | 92 | 849 | no data** | 0.93 | no data |
| 51-56, 81, 91 | Offices | 62 | 7 | 2 | 10 | 11 | 0.03 | 0.05 |
| 61* | Elementary Schools | 14 | 6 | 3 | 9 | 1 | 0.05 | no data |
| | Secondary Schools | 24 | 10 | 3 | 13 | 12 | no data | no data |
| | Post-Secondary Schools | 26 | 8 | 3 | 11 | 7 | 0.13 | 0.14 |
| 62 | Hospitals | 321 | 31 | 16 | 46 | 33 | 0.14 | 0.08 |
| 71 | Arts, Entertainment, Recreation | 615 | 130 | 72 | 202 | 126 | 0.14 | 0.18 |
| 72 | Hotels | 930 | 419 | 54 | 472 | 206 | 0.50 | 1.07 |
| | Restaurants | 1,515 | 890 | 101 | 991 | no data | 6.50 | 3.81 |

Kg/FTE/year= kg disposed/diverted by full time staff, unless otherwise noted

Kg/ft²/yr= kg disposed/diverted per square foot

minimum

maximum

*number of students was used as the FTE;

** no data means there was no data received with waste audit results

EXISTING ICI ORGANIC WASTE COLLECTION BUSINESS STRUCTURE IN CANADA

- Able to collect comprehensive data from across the country and provide good quality insights into the various steps and costs associated with managing ICI food and organic waste.
- Five primary cost components
 1. Collection;
 2. Transfer;
 3. Pre-processing (if necessary);
 4. Final processing including compost and digestate management; and
 5. Contamination/disposal.

COLLECTION COSTS



- Container Type
- Collection Equipment & Method
- Collection Location
- Routes & Frequency
- Diversion Requirements
- Proximity
- Other Variables (e.g., fuel)

| Waste Stream | Container | Average Cost | Cost Range |
|-------------------------------|-----------------|--------------------------------------|---|
| ICI Source Separated Organics | 32 gallon totes | \$18.00 / tote (\$180.00 / tonne) | \$13.00 - \$20.00 / tote (\$130.00 - \$200.00 / tonne) |
| ICI Source Separated Organics | 2-4 yard bins | \$160.00 / tonne | \$150.00 - \$175.00 / tonne |
| Liquified Food Waste | storage tanks | \$60.00 / tonne | \$50.00 - \$60.00 / tonne |

ORGANIC WASTE TRANSFER & PRE-PROCESSING

- Can be higher transfer costs for organics than mixed waste
- Pre-processing facilities used to remove inert contaminants and create a more consistent feedstock
- De-packaging costs impacted by ease / difficulty to de-pack materials

| Waste Stream | Facility | Average Cost | Range |
|-------------------------------|------------------|----------------|------------------------------|
| ICI Source Separated Organics | Transfer Station | \$18.00 /tonne | \$10.00 - \$30.00 / tonne |

| Waste Stream | Facility | Average Cost | Range |
|-------------------------------|-------------------------|---|------------------------------|
| ICI Source Separated Organics | Pre-Processing Facility | \$40.00 /tonne | \$20.00 - \$70.00 / tonne |
| De-packaging Organics | Pre-Processing Facility | varies based on difficulty to de-package | \$60.00 - \$150.00 |

ORGANIC WASTE PROCESSING & COMPOST / DIGESTATE MANAGEMENT

| Waste Stream | Processor | Average Cost | Range |
|--|----------------------------------|-----------------|----------------------------|
| Pre-Processed Slurry/ Fats, Oils & Greases (FOG) | Anaerobic Digestion | \$25.00 / tonne | \$20.00 - \$60.00 / tonne |
| ICI Source Separated Organics | Composting / Anaerobic Digestion | \$110.00 /tonne | \$75.00 - \$150.00 / tonne |
| Clean Food Processing Waste | Composting / Anaerobic Digestion | \$55.00 / tonne | \$20.00 - \$60.00 / tonne |

| Facility | Material | Average Revenue | Range |
|---------------------|--------------------------------------|-----------------|-----------------------|
| Compost Facility | Compost | \$0 - \$15.00 | \$0 - \$30.00 / tonne |
| Anaerobic Digestion | Digestate | \$0 | \$0 - \$30.00 / tonne |
| Anaerobic Digestion | Energy (e.g., Renewable Natural Gas) | \$23-25/GJ | \$23-25/GJ |

COST OF DISPOSAL

Landfill tipping fees are impacted by several broad factors:

- Scale of the operation (i.e., larger landfills take advantage of economies of scale);
- Landfill design and operational considerations (e.g., design and construction);
- Environmental requirements (e.g., post-closure requirements, leachate / methane control);
- Waste type and amount of material received;
- Capacity replacement costs (e.g., new cells, landfill gas capture systems); and
- The addition of a regulated disposal levy (e.g., Manitoba and Quebec).

*Note Ontario landfill fees are substantially lower than other jurisdictions

| Waste | Facility | Average Tipping Fees | Range |
|--|-------------------------------|----------------------|----------------------------|
| ICI Mixed Waste | Landfill | >\$100 / tonne | \$30.00 - \$150.00 / tonne |
| Pre-Processed Slurry/ Fats, Oils & Greases (FOG) | Anaerobic Digestion | \$25.00 / tonne | \$20.00 - \$60.00 / tonne |
| ICI Source Separated Organics | Compost / Anaerobic Digestion | \$110.00 /tonne | \$75.00 - \$150.00 / tonne |
| Clean Food Processing Waste | Compost / Anaerobic Digestion | \$55.00 / tonne | \$20.00 - \$60.00 / tonne |



BARRIERS AND OPPORTUNITIES

BARRIERS & OPPORTUNITIES

- Costs (in-house, transportation, processing, end markets)
- Information Gaps
- Economies of Scale (large vs small, geographic, generation)
- Policy Impacts (EPR, deposit, tariffs)
- Storage and Space
- Conditions for Service Providers (contamination, end markets, standards, approvals, inconsistency of policy approaches / uncertainty)

THANK YOU & QUESTIONS

Peter Hargreave

Policy Integrity Inc.

phargreave@policyintegrity.ca

905-741-2171

www.policyintegrity.ca