Part 6: Economic and Environmental Benefits of Reusing and Recycling Beverage Containers

ECONOMIC BENEFITS

In addition to the direct financial costs and revenues, DRSs for beverage containers have indirect costs and benefits, most of which are seldom accounted for. Indirect costs may include, for example, the costs incurred by consumers (e.g. time, gas money) to return their containers to a collection depot. There are also the costs incurred by municipalities for waste disposal and litter abatement. Although sometimes difficult to quantify, these costs and benefits must be considered if we are to understand the "full picture" of beverage container recycling costs in Canada. The paragraphs that follow provide a brief overview of the indirect economic and social impacts of beverage container deposit-return programs.

Job creation

In 2011, the Container Recycling Institute released a report entitled *Returning to Work: Understanding the Domestic Jobs Impacts from Different Methods of Recycling Beverage Containers.* Among other things, the report showed that DRSs for beverage containers create significantly more – 11 to 38 times more – jobs than curbside recycling.[174]

One of the main reasons for this is the relatively greater amount of material entering and leaving the system; the recovery rate for beverage containers in provinces with a DRS is 83%, compared to the average 49% in provinces with curbside recycling only. Consequently, DRSs require more workers to collect, sort, and transport the containers to materials recycling facilities (MRF) or secondary processors. In fact, ton for ton, DRSs require 1.5 to 4.0 times as many employees to carry out these tasks than curbside systems (depending on whether the curbside system is manual or automated).[175]

Together, The Beer Store (TBS) deposit-system and the Ontario Deposit-Return Program (ODRP) are responsible for creating approximately 500 direct jobs.[176] The province of Nova Scotia has generated similar economic benefits; according to a 2016 economic impact study, its deposit-return program for beverage containers creates approximately 700 jobs and $24.8 million in salaries and wages.[177]

DRSs also create 'indirect' jobs – jobs created from businesses in the region that supply goods and services to the recycling business. For example, in addition to the 500 jobs directly attributable to recovering beverage containers, TBS's deposit-system and the ODRP created more than 300 jobs at external companies, such as Owens-Illinois. In Montreal, Owen Illinois' glass bottle factory employs over 320 people in highly skilled jobs.[178] Collectively, these employees are paid $31 million in wages and benefits annually[179].

There are induced jobs that are created as a result of introducing a DRS. These jobs come from the purchases made by employees from the collection or processing business (the direct jobs), who spend their income on goods and services in the region.[180]

Economic Growth

Besides job creation, DRSs generate "spin-off" activity in the wider economy. Gross Domestic Product (GDP) is the most common indicator used to measure economic activity. It is estimated that Nova Scotia's deposit-return program contributes approximately $32.7 million to GDP each year (and over $496 million since the program began).[181]

Cost Savings to Municipalities

The main argument put forward by opponents of DRS is that these programs harm municipalities by diverting recyclables with the most value away from the municipal recycling stream, resulting in a reduction of the cost-effectiveness of municipal curbside systems. To support this argument, evidence is provided to show loss of material revenues as well as the reduced industry contributions from EPR schemes for packaging where they exist. However, one of the key elements missing in the majority of these analyses is the savings resulting from the reduced or avoided costs of collection, treatment, and disposal by the municipal waste management system.

The primary driver of municipal recycling costs is the volume of collected waste. This is due to the fact that the most expensive component of the municipal waste management system has to do with the frequency of waste collection, which is determined by the time it takes for garbage bins to fill up. Given their high volume to weight ratio, beverage containers cause bins to fill up quickly, and therefore demand more frequent collection.

Another element missing from most of these studies is the savings resulting from the reduced costs of litter pick-up. It is important to note that estimating savings from litter reduction requires knowledge of the contribution of beverage packaging to total litter. This, in turn, depends on which metric is used to measure the contribution of beverage containers to total litter. If "count" is used as an indicator, then beverage containers constitute only a small proportion of total litter. However, when measured in terms of volume, beverage containers contribute significantly to litter. Other important factors to consider when estimating the savings from deposit-return programs in terms of litter reduction are: estimated return rates (influenced by deposit level), ease of return (convenience), and whether litter is picked up by local authority contractors or is being left as uncollected litter[182].

Earlier this year, CM Consulting, in association with the Reloop Platform (www.reloopplatform.eu), set off on a task to compile all of the research done on the subject over the years. What we found was compelling, and sufficiently closes the case that container deposit systems are good—not bad—for municipalities. The following table presents a compilation of 20 studies that examined the quantifiable costs and benefits to municipalities of implementing (or expanding) a DRS for beverage containers. It is noteworthy that, although different in scope, location, author and year, each study reported significant net cost savings to municipalities.

TABLE 14 SUMMARY OF STUDIES ON IMPACT OF DEPOSIT-RETURN PROGRAMS ON MUNICIPAL BUDGETS

	Study Title, Author and Year	Summary of Findings
1	**Summary Review of the Impacts of Container Deposit Schemes on Kerbside Recycling and Local Government in Australia**[183], MRA Consulting Group (prepared for Container Deposit System Operators (CDSO)), 2016	• Reduced landfill gate fees: $10.1M/year ($5,465 per 1,000 pop.[184]) • Increased material value: $23M/year to $62M/year (NSW only) • Reduced collection costs: undetermined • Reduced litter collection costs: $59M/year ($31,922 per 1,000 pop.)
2	**The Incentive to Recycle: The Case for a Container Deposit System in New Zealand**[185], Envision New Zealand Ltd., 2015	• Refuse transport/disposal savings: significant but undetermined • Refuse collection savings: $26.7M/year to $40.1M/year ($5,918 to $8,887 per 1,000 pop.[186]) • Reduced litter control costs: undetermined • Reduced kerbside collection costs: up to $19.26/household/year
3	**A Scottish Deposit Refund System**[187], Eunomia Research & Consulting (prepared for Zero Waste Scotland), 2015	Net annual savings (from reduced collection and disposal costs) of: • £5M for local authority kerbside services (£931 per 1,000 pop.[188]) • £7M for reduced litter (£1,303 per 1,000 pop.)
4	**Cost Benefit Study of a Tasmanian Container Deposit System**[189], Marsden Jacob Associates (prepared for the Department of Primary Industries, Parks, Water and the Environment (DPIPWE)), 2014	From 2014/15 to 2034/35, a CDS would benefit local government by $28M NPV (Net Present Value) ($54,139 per 1,000 pop.[190]) through the receipt of refunds on collected material & avoidance of some costs associated with existing kerbside recycling (undetermined).
5	**Cost-Benefit Analysis of a Recycling Refund System in Minnesota**[191], Reclay StewardEdge (prepared for Minnesota Pollution Control Agency (MPCA)), 2014	Estimated net annual savings for local governments: • $5.6M ($0.27/household/month) ($1,027 per 1,000 pop.[192]) • Undermined savings from reduced litter clean-up costs
6	**Executive Summary: Implementing a Deposit and Return Scheme in Catalonia - Economic Opportunities for Municipalities**[193], Retorna, 2014	• Reduced collection costs: €12M/year (€1,598 per 1,000 pop.[194]) to €33M/year (€4,395 per 1,000 pop.) • Reduced treatment costs: final treatment (€6,029,686, or €803 per 1,000 pop.); Waste Disposal Tax (€607,170, or €81 per 1,000 pop.); OFMSW (€565,042, €75 per 1,000 pop.) • Return of the waste disposal tax/collection fee: €1,105,523 (€147 per 1,000 pop.) • Reduced street cleaning costs: €13,175,737/year (€1,755 per 1,000 pop.) • Reduced beach cleaning costs: €580,481/year (€77 per 1,000 pop.)
7	**An Assessment of the Potential Financial Impacts of a Container Deposit System on Local Government in Tasmania**[195], Equilibrium (prepared for the Local Government Association of Tasmania), 2013	• Reduced collection costs: $257,000/year ($1.31/service/year) ($497 per 1,000 pop.[196]) • Reduced processing costs: $340,000/year ($1.73/service/year or $8.70/tonne) ($657 per 1,000 pop.), • Improved material value: $750,000/year ($1,450 per 1,000 pop.) • Net savings: $1.3M/year ($2,514 per 1,000 pop.), up to $26.8M ($51,819 per 1,000 pop.) over 20 years • Reduced litter management costs: $160,000/year

	Study Title, Author and Year	Summary of Findings
8	**Executive Summary: Report on the Temporary Implementation of a Deposit and Refund Scheme in Cadaques[197]**, Retorna, 2013	• Reduced collection costs: €24,242/year (€8,536 per 1,000 pop.[198]) to €35,372/year (€12,455 per 1,000 pop.) • Reduction in compensation by Ecoembes: €1,240/year (€437 per 1,000 pop.) to €1,766/year (€622 per 1,000 pop.) (This would be offset by the reduction in collection costs). • Reduced maintenance costs: €1,742/year (€613 per 1,000 pop.) to €2,420/year (€852 per 1,000 pop.) • Net savings: €23,000/year to €33,605/year (€8,099 to €11,833 per 1,000 pop.)
9	**Comparison of System Costs and Materials Recovery Rates: Implementation of Universal Single Stream Recycling With and Without Beverage Container Deposits – Draft Report[199]**, DSM Environmental (prepared for Vermont Agency of Natural Resources), 2013	• Estimated value of litter reduction: $815,000 to $1.2M ($1,301 to $1,917 per 1,000 pop.[200]) • Avoided disposal savings: $11.1M to $11.3M ($17,730 to $18,050 per 1,000 pop.)
10	**The Impacts (Cost/Benefits) of the Introduction of a Container Deposit/Refund System (CDS) on recycling and councils[201]**, Mike Ritchie & Associates (prepared for Local Government Association of NSW), 2012	• Recycling savings: $9 to $24/household • Potential savings for local governments: $23M/year to $62M/year ($3,010 to $8,115 per 1,000 pop.[202])
11	**Understanding the Impacts of Expanding Vermont's Beverage Container Program[203]**, CM Consulting (prepared for Vermont Public Research Interest Group (VPIRG)), 2012	• Increased material revenues: $2.3M ($3,674 per 1,000 pop.[204]) • Reduced garbage, recycling, and litter management costs: beyond the scope of this study, however, materials management in Vermont is estimated to cost $90/ton to $108/ton for disposal and $1,200/ton to $2,300/ton for litter collection.
12	**Examining the Cost of Introducing a Deposit Refund System in Spain[205]**, Eunomia Research & Consulting (prepared for Retorna), 2012	• Total savings to municipality: €57M/year to €93M/year (€1,237 to €2,019 per 1,000 pop. [206]). 76% to 81% of these savings are derived from the reduction in costs associated with residual waste collection; ~20% come from reduced litter collection costs; and <1% come from reduced puntos limpios.
13	**Packaging Impacts Consultation Regulation Impact Statement[207]**, Standing Council on Environment and Water 2011	Over 20 years, a CDS is estimated to result in: • Avoided collection, transport and recycling costs: $2.72 billion ($112,933 per 1,000 pop.[208]) • Other avoided costs (landfill and litter clean up): $247M ($10,255 per 1,000 pop.)
14	**Turning Rubbish into Community Money: The Benefits of a 10cent Deposit on Drink Containers in Victoria[209]**, Office of Colleen Hartland MLC, 2011	• Reduced recycling/MRF processing costs: $6,577,919 ($1,102 per 1,000 pop.[210]) • Reduced waste costs (landfill gate fee and levy): $5,070,851 ($850 per 1,000 pop.) • Reduced litter collection costs: $8.8M ($1,475 per 1,000 pop.) • Net savings: $32,625,183/year ($5,468 per 1,000 pop.)
15	**Have We Got the Bottle? Implementing a Deposit Refund Scheme in the UK[211]**, Eunomia Research & Consulting (prepared for the Campaign to Protect Rural England), 2010	'Complementary' DRS scenario: • Reduced recycling collection costs: £129M/year (£1,982 per 1,000 pop.[212]) • Reduced bringsite costs: £3M/year (£46 per 1,000 pop.) • Reduced Household Waste Recycling Centers (HWRC) costs: £1M/year (£15 per 1,000 pop.) • Reduced litter collection costs: £27M/year (£415 per 1,000 pop.) • Net savings: £159M/year (£2,443 per 1,000 pop.) (£7/household/year)

	Study Title, Author and Year	Summary of Findings
		'Parallel' DRS scenario: • Reduced collection, treatment and disposal costs: £143M/year (£2,198 per 1,000 pop.)
16	**Analysis of the Impact of an Expanded Bottle Bill on Municipal Refuse and Recycling Costs and Revenues**[213], DSM Environmental (prepared for Massachusetts Department of Environmental Protection (MassDEP)), 2009	• Avoided collection costs: $4,214,071/year to $5,033,112/year ($620 to $741 per 1,000 pop.[214]) • Avoided disposal costs: $482,372/year to $2,334,863/year ($71 to $344 per 1,000 pop.) • Reduced litter clean-up costs: $536,772 ($79 per 1,000 pop.) (distributed between state and local litter collection efforts; no data available on what this distribution is) • Net savings: $3,797,011/year to $6,468,544/year ($559 to $952 per 1,000 pop.)
17	**Analysis of Beverage Container Redemption System Options to Increase Municipal Recycling in Rhode Island**[215], DSM Environmental (prepared for Rhode Island Resource Recovery Corporation), 2009	• Reduction in municipal material revenues: $1.4M/year ($1,325 per 1,000 pop.[216]) statewide • Reduced litter collection costs: $267,500/year ($253 per 1,000 pop.) • Reduced disposal costs: $870,000/year ($824 per 1,000 pop.) • Reduced collection costs: $1.3M/year ($1,231 per 1,000 pop.) • Net savings: $1,037,500/year ($982 per 1,000 pop.)
18	**Beverage Container Investigation**[217], BDA Group (prepared for the EPHC Beverage Container Working Group), 2009	• Deposits collected by local government: $78M/year to $147M/year ($3,239 to $6,103 per 1,000 pop.[218]) • Kerbside savings: $24M/year to $25M/year ($996 to $1038 per 1,000 pop.) • Landfill cost savings: $13M/year to $17M/year ($540 to $706 per 1,000 pop.) • Landfill levy savings: $7M/year to $9M/year ($291 to $374 per 1,000 pop.) • Material values lost by local government: $47M/year to $48M/year ($1,951 to $1,993 per 1,000 pop.) • Net savings: $75M/year ($3,114 per 1,000 pop.) to $150M/year ($6,228 per 1,000 pop.), depending on level of deposit ($0.10 or $0.20/container)
19	**City of Toronto Staff Report: Amendments to Processing Fees Due to LCBO Deposit Return Program**[219], City of Toronto General Manager, Solid Waste Management Services (prepared for Public Works and Infrastructure Committee), 2008	The implementation of a DRS resulted in: • Reduced processing costs: $657,700 ($236 per 1,000 pop.[220]) in 2007 and $869,975 ($312 per 1,000 pop.) in 2008 • Reduced glass disposal costs: $490,000 ($176 per 1,000 pop.) in 2007 and $393,250 ($141 per 1,000 pop.) in 2008 • Net savings: $447,989 ($161 per 1,000 pop.) in 2007 and $381,126 ($137 per 1,000 pop.) in 2008
20	**Economic & Environmental Benefits of a Deposit System for Beverage Containers in the State of Washington**[221], Jeffrey Morris (Sound Resource Management Group), Bill Smith (City of Tacoma), and Rick Hlavka (Green Solutions) (prepared for City of Tacoma Solid Waste Management), 2005	• Reduced garbage collection costs: $78,150 ($381 per 1,000 pop.[222]) • Reduced disposal costs: $150,500 ($734 per 1,000 pop.) • Reduced recycling collection costs: $69,400 ($338 per 1,000 pop.) • Reduced litter costs: $34,300 ($167 per 1,000 pop.) • Loss of market revenues for recycling programs: $68,300 (333 per 1,000 pop.) • Net savings: $264,050 ($1,287 per 1,000 pop.)

Non-Quantifiable Benefits

There are also non-quantifiable benefits associated with litter reduction that should be monetized and included in the overall analysis of cost savings. This includes, for example, the value that people place on a litter-free environment, which can be measured by the amount people are "willing to pay" for a reduction in litter. In the United Kingdom, this is estimated to be €1,248 million (CAD $2.17 million) per annum.[223]

Charities and Community Organizations

Beverage container DRSs play an important role in the fundraising initiatives of many not-for-profit organizations (e.g. schools, community groups, youth groups) and charities.

In Ontario, for example, TBS (in partnership with United Food and Commercial Workers Local 12R24) holds an annual fundraiser to collect money for leukemia and blood cancer research. Each May, TBS invites customers to donate a portion of their empty bottles (or cash), with 100% of the proceeds going directly to The Leukemia and Lymphoma Society of Canada. In 2014 and 2015, over $3.4 million was collected through the Returns for Leukemia Bottle Drive, and over $11 million total since the fundraiser began 10 years ago.[224]

In BC, Encorp Pacific developed the Return-It School program, which encourages students, teachers, and parents to recycle and collect beverage containers. Participating schools keep all the deposit refunds earned from the Encorp containers they collect, which can be used for various school fundraising opportunities. In 2013, some schools collected more than $10,000.[225] The results of a pilot program that ran in the Burnaby School District suggest that the average elementary school can raise approximately $50 to $100 a month.[226]

Supplemental Income for Low/No Income Individuals

In provinces that have them, there are many people who use the DRS as a means to earn and/or supplement their income. For instance, the daily processing of 55,000+ beverage containers supports 700 to 750 residents in Vancouver's inner city community year-round.[227] Most of these people are economically disadvantaged and, in many cases, disengaged from the workforce. Without revenue from the deposits, many would have difficulty meeting their basic needs.

ENVIRONMENTAL BENEFITS

Historically, measuring the performance of recycling efforts has been restricted to weight-based data, such as total kilograms collected for recycling. Today, a growing number of system operators are beginning to focus on new aspects of program performance, such as the amount of GHG emissions avoided from reuse and recycling, or the amount of energy saved from not having to produce new products from virgin materials. These new measurements provide a much more comprehensive understanding of the environmental impacts of beverage container diversion.

For example, a recent study conducted by Gardner Pinfold[228] on the environmental impacts of Nova Scotia's beverage container program found that recycling beverage containers in

Nova Scotia would save 7,600m^3 in landfill space in 2016. The total amount of landfill space saved since 1997, when the program began, is estimated at over 129,000m^3 -- equivalent to 52 Olympic-sized pools. Given that landfill space is at a premium these days, this is a particularly relevant indicator for measuring the environmental benefits of beverage container recycling programs. With regards to energy savings, the study found that if electricity were used to manufacture new containers, then 208 million KW are saved, which is equivalent to taking more than 18,500 Nova Scotia homes off the grid.

In addition to the study above, Environment Canada and the US Environmental Protection Agency (EPA) have undertaken extensive life-cycle analyses to measure the inputs and outputs, from cradle to grave, of various materials. The results of these studies can be applied to beverage container diversion to quantify the environmental benefits associated with container recycling in each province. Results are summarized in the table below.

TABLE 15 ENVIRONMENTAL BENEFITS REALIZED FROM RECYCLING BEVERAGE CONTAINERS IN CANADA (2014)

Province	Avoided emissions (MTCO2e)	Equivalent number of cars taken off the road.	Total GJs saved	Avoided crude oil extraction (in barrels)	Value of crude oil saved (based on $98.97/barrel) (avg price in 2014, US EIA)
British Columbia	159,395	33,557	2,388,311	387,084	38,309,750
Alberta	183,234	38,576	2,954,884	478,911	47,397,866
Saskatchewan	40,167	8,456	688,559	111,598	11,044,846
Manitoba	15,720	3,310	583,670	94,598	9,362,364
Ontario	382,744	80,578	5,979,656	969,150	95,916,779
Quebec	278,339	58,598	4,363,988	707,291	70,000,636
New Brunswick	29,759	6,265	449,549	72,860	7,210,995
Nova Scotia	35,085	7,386	623,214	101,007	9,996,676
Newfoundland	20,529	4,322	373,338	60,509	5,988,537
Prince Edward Island	4,924	1,037	111,709	18,105	1,791,862
Yukon	136	29	3,005	487	48,209
Northwest Territories	2,345	494	38,729	6,277	621,232
TOTAL	**1,152,377**	**242,606**	**18,558,611**	**3,007,879**	**297,689,753**

Note: Some tonnage information from some provinces is not available in this report. Therefore, provincial totals should not be compared with each other.

CM Consulting calculated the total avoided emissions (and equivalent cars off the road) by multiplying the tonnage recovered by container type with an emissions reduction factor for each material type. CM Consulting also calculated the total avoided energy used (and equivalent barrels of oil avoided) by multiplying the tonnage recovered by container type with an energy savings factor for each material type.

The calculations used to produce Table16 are available in Appendix B of this report. To receive a copy of Appendix B and of all the associated supporting data for this section, please contact us at jason@cmconsultinginc.com.

Notes:

- All tonnage data are based on reported tonnes by program and container types.
- Refillable bottles tonnage is calculated as follows: average container weight of 263 grams multiplied by the number of units recovered. This number is then multiplied by 14/15, which represents an average of 15 individual trips per refillable bottle. For the remaining 15th trip (the last trip), it is assumed that the glass is being recycled.
- Energy saving factors were taken from the following report: *Determination of the Impact of Waste Management Activities on Greenhouse Gas Emissions: 2005 Update—Final Report*, Environment Canada & Natural Resources Canada, October 2005.
- Emissions reduction factors from https://www.epa.gov/warm/versions-waste-reduction-model-warm#WARM%20Tool%20V14 accessed July 6, 2016.
- A typical passenger vehicle emits about 4.75 metric tons of GHGs per year <Source: www.epa.gov/cleanenergy/energy-resources/calculator.html (accessed June, 2016).
- One barrel of crude oil is equal to about 6.1 GJ of energy (1 barrel of crude = 5.848 Mbtu = 6.17 GJ). <Source: www.oregon.gov/energy/cons/pages/industry/ecf.aspx>
- The average value of a barrel of crude oil in 2014 was $98.97 according to the US Energy Information Administration <Source: www.eia.gov/todayinenergy/detail.cfm?id=9530>