CRI Analysis of Massachusetts House Bill 2686*
(repeal of Bottle Bill with penny fee on beverage containers for 3 years)
April 2018

Executive Summary

House Bill 2686*, “An Act Improving Recycling in the Commonwealth” would repeal the existing beverage container deposit law (the “bottle bill”), and in its place would impose a 1-cent fee on all carbonated and non-carbonated beverages. Collected revenues would be put into a “Municipal Recycling Enhancement Fund” (the Fund), with funding to be used for recycling and litter programs. The bill sunsets this fee after three years.

By repealing the Commonwealth’s beverage container deposit law, H.2686 would be a step backwards for recycling, which is contrary to the bills’ stated intent. Our analysis shows that H.2686 in particular would:

- Decrease recycling and increase landfiling
- Decrease revenue for the Commonwealth
- Have net increased costs for municipalities and taxpayers
- Increase litter throughout the Commonwealth
- Increase the use of energy and the production of greenhouse gases
- Eliminate 670 redemption center jobs, and possibly others in various recycling industries

In addition, H.2686 would financially result in a big give-away to local and multi-national beverage companies at the expense of municipalities, small and large businesses in the state, the Commonwealth of Massachusetts itself, and local charities. The financial benefits of a new recycling fund are temporary and do not come close to compensating municipalities, businesses and the Commonwealth for their losses. The losses to municipalities, businesses, the Commonwealth and charities would continue indefinitely, while the beverage companies would make payments into the recycling fund for only 3 years.

CRI has conducted a thorough financial analysis of H.2686 (appended to this document) and has clearly outlined which stakeholders will be short- and long-term winners under this bill, and which stakeholders will be losers.

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* S.2686 is substantially similar to previous bills S.1865 and H.1744 (90th session), and H.646 (89th session).
The Massachusetts Beverage Container Deposit Law: Salient Facts

The Beverage Container Deposit Law, or “Bottle Bill,” places a nickel deposit on carbonated beverages sold in the state: beer and malt beverages, carbonated soft drinks, and sparkling water. In 2017, the deposit applied to 2.1 billion bottles and cans, out of an estimated 4.7 billion total beverage containers sold. In other words, only 44% of all beverages sold have a deposit. Not subject to deposit is the other 56% of the market: 2.6 billion units of non-sparkling water, energy & sports drinks, fruit & vegetable drinks, iced teas & coffees, wine & spirits, and milk & milk substitutes.

Since its inception in 1983, the bottle bill has recycled an estimated 48 billion glass and plastic bottles and aluminum cans, with an average redemption rate of 70%, a high of 87% in 1995, and rates in the mid-60s more recently, as Figure 1 shows.

The MA DEP reported that in 2017, 1.2 billion containers were redeemed, out of 2.1 billion sold, yielding a 56.8% redemption rate. CRI estimates that these redeemed containers, plus the small amount of deposit containers recycled at curbside, amount to about 11,000 tons of aluminum, 11,000 tons of plastic, and 78,000 tons of glass. As Figure 2 shows, however, the breakdown of materials recycled is very different when measured in units (bottles and cans) versus tons. In units, 57% of the total is aluminum, and only 23% is glass, whereas by weight glass comprises more than three quarters of the total (78%). If the deposit law were repealed, glass would quickly overwhelm municipal curbside recycling programs.
Financial Implications: Winners and Losers

WINNER: The Beverage Industry: CRI has calculated that H.2686 would save the beverage industry (distributors and bottlers) $120 million in the first 10 years. Initially after a repeal, the industry would save $31 million per year by no longer having to pay deposit-program handling fees, and an additional $11.9 million a year by no longer having to pay other collection and processing costs related to container collection. They would also lose an estimated $17.4 million in annual scrap revenues, and they would have to pay almost $45 million into the Fund for three years, resulting in net temporary losses of $19 million per year for 3 years. After required payments into the Fund terminated in 3 years, however, the industry would experience net savings of more than $25 million per year, resulting in a net total savings of $120 million over 10 years.

Note that all the savings accrue to the beer and soda manufacturers and distributors, because they are covered under the current law. The new 3-year fees, on the other hand, will be split roughly 50/50, with beer and soda manufacturers responsible for paying half, and distributors of non-carbonated beverages responsible for the other half of fees. This is because non-carbonated beverages (excluding milk and milk substitutes) comprise about 50% of market share in terms of units sold.

WINNER: Recipients of New “Municipal Recycling Enhancement Fund”: The proposed new recycling and litter abatement fund would receive an estimated $45 million per year, or $134 million over three years. While this sounds encouraging, it must be noted that it is unknown how these funds would be distributed, or who the recipients of these funds would be. The list of potentially eligible entities, from municipalities and MRFs (materials recovery facilities) to large entertainment venues to groups providing recycling public education, to various state agencies, makes it very uncertain who will receive the funding. It appears that the funds will be “governed” and funding decisions made by appointees, not state employees, and H.2686 offers no criteria for appropriate uses of funding or appropriate grantees. The new Solid Waste Management Board would be dominated by beverage distributors and wholesalers, who would be given 5 of the 11 seats on the board, and there are no protections against conflicts of interest in the bill. The “new” funding is insufficient to pay for recycling of “bottle bill” materials as the following sections of this report demonstrate. In Delaware, which H.2686 looks to for inspiration, the Recycling Fund failed to live up to expectations in terms of funding for municipal recycling, as the inset box below (“The Delaware Experience”) explains.

Also bear in mind that Massachusetts already had a recycling fund—the Clean Environment Fund—that was funded through unclaimed deposit escheats, but all that funding was ultimately swept into the General Fund and is no longer available for dedicated recycling programs or for litter abatement.
The Delaware Experience: how did the anticipated $22 million in funding turn into only $8 million in actual grant funding?

In Delaware, which H.2686 looks to for inspiration, there were a host of unmet expectations after the law went into effect and the funding raised was disbursed:

- Only 64% of the anticipated recycling grant funding was raised by the non-refundable fees;
- Only 15% of the anticipated funding was ultimately granted to public and non-profit entities. Municipalities received only $2.5 million in grant funding;
- Only 15 of 57 cities in Delaware received funding through this program;
- The remainder of grants, about $4.6 million, were given to waste haulers and other commercial entities; $1 million was used by the State of Delaware for administration; and
- $5 million in dedicated recycling funding was diverted to the State’s General Fund.

By the time the Delaware beverage fee program had sunset, only $8 million, or 36% of projected grant funding, had been distributed to grant recipients. If similar conditions transpire in Massachusetts, and after the DEP uses 5% of collected funds administratively, CRI estimates that only $27 million of the projected $45 million raised annually will ultimately be awarded as grants to promote recycling. If the Commonwealth of Massachusetts claims the same level of proceeds for a sweep into the General Fund as Delaware did, this would reduce available funding to grant recipients by as much as $16 million per year.

**LOSER: Municipalities**: Our analysis shows that Massachusetts cities and towns would lose about $58 million over a 10-year period if H.2686 passes. Most of the material now recycled through the deposit program would be collected by municipalities: either for recycling, or for trash disposal. Some municipal waste management employees think that a bottle bill repeal would be a boon to their recycling programs by making more valuable aluminum cans available to them—material that is currently being handled by distributors in the deposit system. But our analysis shows that under a deposit repeal, this material would represent more of a new liability than a new asset, because:

- **Recycling rates will be lower** under curbside programs than under a deposit system, resulting in a lower tonnage of collected recyclable beverage containers in total. In 2017, about 64% of the carbonated beverage containers sold in Massachusetts were recycled: 57% through the deposit system, and about 7% through curbside. But CRI evidence gathered from existing non-bottle bill states throughout the United States (see Figure 3) shows that the mostly likely recycling rates under a bottle bill repeal will be about 46% for aluminum, 18% for PET plastic, and 12% for glass. This contrasts with the approximately 64% of deposit bottles and cans recycled in Massachusetts today, and the average of 72% of deposit bottles and cans recycled in the nation’s 10 deposit states.
• **Lower quality PET plastic scrap**: Single-stream curbside material is contaminated, and of a lower quality than clean, separated deposit program material, and it commands lower per-ton scrap revenues. Curbside PET plastic currently sells for $180/ton, compared to deposit PET at $240/ton. Under the deposit system, beverage distributors pay to collect and process the PET, while under curbside, municipalities pay about $855 per ton to collect and process PET, for a net cost—or loss—of $675 per ton. Therefore, municipalities collecting additional PET at curbside will incur **$1.2 million in new net costs** just to process PET formerly recycled through the deposit system. They may also have a difficult time getting collected bales of PET to market at any price, due to the Chinese government’s new “National Sword” policy severely restricting the import of contaminated recyclables, announced in November 2017.

• **Curbside glass is a much bigger problem** in Massachusetts. There has long been a gulf between the scrap value of glass bottles collected through the deposit system (approximately $20 per ton) and the value of the same glass collected through single stream curbside (a negative scrap value of –$20 per ton). In March 2018, the Ardagh glass bottle manufacturing plant in Milton, MA, closed its doors, leaving multiple cities and towns without an outlet for their curbside glass. In the short term, most municipalities must stockpile or landfill glass; the Department of Environmental Protection has issued waivers to its ban on disposing of glass. In the longer term, some municipalities may invest in crushing equipment in order to turn their glass into aggregate for roadbeds and other bulk uses. Such crushing would present an additional processing cost, and would yield a product that does not have similar energy-saving benefits as recycling glass into bottles or fiberglass.

• **Deposit glass**, on the other hand, is managed by beverage distributors, and is required to be recycled. Deposit glass is of a much higher quality: free of contaminants and necessitating less processing, and can still be marketed comparatively easily.

• **Aluminum**: under a repeal, aluminum would be of lower quality. As in other states without a container deposit law, residents would cash in some of their aluminum cans at scrap yards rather than using their curbside programs.

• **Municipalities would incur increased collection and disposal costs** for the higher volumes of beverage container trash generated under a deposit repeal.

• **Litter**: municipalities would also have to deal with more beverage container litter, which will increase their litter collection costs. CRI has estimated that the existing bottle bill saves taxpayers and businesses $4.2 million annually in avoided litter cleanup costs.
When all these factors are taken together, we estimate that municipalities could gain about $8 million in scrap revenue per year, which is not enough to make up for their additional collection, processing, and disposal costs\(^6\) of more than $18 million per year. For three years, these additional costs might be offset by grants from the Fund, depending on who receives the grants, but when the Fund sunsets after three years, municipalities would see a net cost increase of more than $10 million annually. These $10 million—or more than $58 million over 10 years—would be new costs to cities and towns. In other words, under a bottle bill repeal, cities and towns are a loser.

**LOSER: The Commonwealth of Massachusetts:** According to the MA Department of Revenue, $45.5 million in unclaimed deposit revenue was remitted to the Commonwealth in 2017. If the bottle bill were to be repealed, unclaimed deposits would disappear as a revenue source: a loss of more than **$455 million over a 10-year period.** H.2686 provides no replacement for these lost funds.

**LOSER: Redemption Center Owners and Employees:** Under a bottle bill repeal, redemption centers across the Commonwealth would close, and an estimated 670 jobs would be lost. Massachusetts’ redemption centers would lose almost $13 million in handling fees, and retailers would lose nearly $18 million in handling fees every year. About one third of deposit containers are returned to 159 redemption centers across Massachusetts. These small businesses employ an average of 4 employees each—including many that are developmentally disabled. Were the bottle bill to be repealed, and the redemption centers would close and the 670 people they employ would lose their jobs.\(^7\)

**LOSER: The Environment:** The environment also stands to suffer if the bottle bill is repealed. CRI estimates that in 2017, almost 90 thousand tons of aluminum, plastic, and glass carbonated beverage containers were redeemed and recycled through the deposit program. This was accomplished via the 56.8%% redemption rate. Additionally, CRI estimates that about 7% of containers sold were recycled through existing curbside programs, or more than 11 thousand tons, for a total of 100,000 tons. As previously noted, however, CRI estimates that under the elimination of the deposit system, the recycling rates for aluminum, plastic, and glass could drop to 46%, 18%, and 12% respectively, generating about 25,000 tons of material collected for recycling per year: **an annual loss of almost 75,000 tons that had previously been recycled, and would become trash.** Even that is an optimistic scenario, due to the market-based challenges now facing single-stream PET plastic and glass bottles. The actual amount recycled under a repeal is likely to be significantly lower due to material contamination, sorting and processing losses, and downcycling into aggregate applications.

The 75,000 tons of new bottle and can trash represents not just additional material clogging up landfills and incinerators across the Commonwealth—containers that used to be recycled—but additional beverage container litter. As previously mentioned, we estimate that the current deposit system saves $4.2 million annually in avoided litter cleanup costs.
There are also energy and greenhouse gas impacts from the loss of 75,000 tons of recyclables. When glass, aluminum, and plastic containers are wasted rather than recycled, they must be replaced with containers made from 100% virgin materials, whose manufacture requires tremendous amounts of energy, and generates CO$_2$ and other potent greenhouse gases. CRI estimates that the energy squandered in replacing these wasted containers could supply the total residential energy needs of about 10 thousand Massachusetts homes for a year. We further estimate that about 56 thousand tons of greenhouse gas emissions would be generated by replacing 75,000 tons of newly-wasted bottles and cans with new containers made from virgin materials. This is equivalent to the annual emissions from almost 11,000 passenger cars.

It is sometimes said that car and truck travel for recycling of beverage containers is a negative impact, but that reasoning fails to account for the greenhouse gas savings from recycling.

Beverage containers make up about 5.5% of the waste stream by weight (USEPA). But measuring waste quantities by weight is a relic of the past and ignores more relevant environmental criteria. When measured by greenhouse gases that can be saved by recycling, beverage containers make up about 20% of the waste stream (Valiente, SW&R, 2000). It is therefore extremely important to recycle beverage containers, and to make the materials into industrial feedstock.

The forgoing should make it clear that with a bottle bill repeal, the environment will be a loser.

**Massachusetts Could Lose its Leadership in Recycling**

As Figure 4 shows, Massachusetts’ deposit program recycled 371 beverage containers per capita in 2015, compared to an average of in non-deposit states (226). The Massachusetts deposit program is successful, and the proposed changes would unnecessarily dismantle it.

The deposit program could be improved upon in three ways:

1) Raise the deposit to a dime to provide consumers with a more meaningful incentive to recycle (Michigan and Oregon both have a dime deposit)
2) Place a deposit on non-carbonated beverages—and wine and spirits—to improve quality and marketability, and to reduce the financial burden on municipalities
3) Periodically raise the handling fee to maintain redemption center viability and efficiency

Such measures would increase the success of an already-successful program.
Worldwide Trend: More Beverage Containers Placed on Deposit

There are more than 50 container deposit programs worldwide. Since the year 2000, there have been 20 new and expanded deposit laws around the world. Container deposit programs have been expanded to include more beverage types, like water, in California, New York, Connecticut and Oregon. In Ontario, Canada, wine and liquor were added to their program in 2007. Hawaii and Germany both started new comprehensive deposit programs in 2005. 2011 brought new programs to Fiji, Guam, the Northern Territory of Australia, Turks & Caicos, and Lithuania implemented their container deposit law in 2015. In 2016, Western Australia, New South Wales, and Queensland all passed deposit legislation. Scotland and Latvia announced intent to implement deposits in late 2017. In March 2018, the United Kingdom became the most recent country to announce a beverage container deposit law. This system will reach 67 million people, making it the second-largest deposit system in the world after Germany.

As Table 1 shows, 14 countries have introduced deposits to almost 175 million people since 2005. The worldwide trend is clearly to bring more and more beverage containers under deposit programs because of their success.

### Table 1. New Container Deposit Laws Enacted for 174 Million People Since 2005

<table>
<thead>
<tr>
<th>Region</th>
<th>Year</th>
<th>Population (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croatia</td>
<td>2005</td>
<td>4.2</td>
</tr>
<tr>
<td>Estonia</td>
<td>2005</td>
<td>1.3</td>
</tr>
<tr>
<td>Germany</td>
<td>2005</td>
<td>80.7</td>
</tr>
<tr>
<td>Hawaii</td>
<td>2005</td>
<td>1.4</td>
</tr>
<tr>
<td>Fiji</td>
<td>2011</td>
<td>0.9</td>
</tr>
<tr>
<td>Guam</td>
<td>2011</td>
<td>0.2</td>
</tr>
<tr>
<td>Northern Territory of Australia</td>
<td>2011</td>
<td>0.2</td>
</tr>
<tr>
<td>Turks and Caicos</td>
<td>2011</td>
<td>0.0</td>
</tr>
<tr>
<td>Lithuania</td>
<td>2015</td>
<td>2.9</td>
</tr>
<tr>
<td>New South Wales, Australia</td>
<td>2017</td>
<td>7.6</td>
</tr>
<tr>
<td>Queensland, Australia</td>
<td>2018</td>
<td>4.6</td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>2018</td>
<td>0.4</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2018</td>
<td>66.6</td>
</tr>
<tr>
<td>Western Australia</td>
<td>2019</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>174</strong></td>
</tr>
</tbody>
</table>

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About the Container Recycling Institute (CRI)

CRI is a nonprofit organization and a leading authority on the economic and environmental impacts of used beverage containers and other consumer-product packaging. Its mission is to make North America a global model for the collection and quality recycling of packaging materials. We do this by producing authoritative research and education on policies and practices that increase recovery and reuse; by creating and maintaining a database of information on containers and packaging; by studying container and packaging reuse and recycling options, including deposit systems; and by creating and sponsoring national networks for mutual progress. CRI envisions a world where no material is wasted, and the environment is protected. It succeeds because companies and people collaborate to create a strong, sustainable domestic economy.


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## APPENDIX A.

**WINNERS AND LOSERS: A FINANCIAL ANALYSIS OF H.2686**

*H.2686 is substantially similar to previous bills S.1865 and H.1744 (90th session), and H.646 (89th session)/S.1865 and H.1744 (a repeal of the Bottle Bill with a penny fee on beverage containers for 3 years)**

<table>
<thead>
<tr>
<th>Annual costs/savings, unless otherwise noted</th>
<th>Who Wins?</th>
<th>Who Loses?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Handling Fees Paid by Beverage Distributors to Redemption Centers and Retailers (a)</strong></td>
<td>Material Recovery Facilities (MRFs)</td>
<td>$30,856,593</td>
</tr>
<tr>
<td></td>
<td>Beverage Companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New Recycling Fund: Non-Municipal Grant Recipients</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Municipalities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redemption Centers &amp; Retailers (j)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commonwealth of Massachusetts (k)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Charities</td>
<td></td>
</tr>
<tr>
<td><strong>Payments to New Recycling- and Litter-Related Grant Fund (b)</strong></td>
<td>MRFs, or the companies that own them, may be eligible for grant funding.</td>
<td>($44,554,668)</td>
</tr>
<tr>
<td><strong>Unclaimed Deposits (c)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Collection, Processing, Disposal (d)</strong></td>
<td>MRFs would receive some portion of containers removed from the bottle bill program, as well as processing fees and scrap revenues.</td>
<td>$11,945,682</td>
</tr>
<tr>
<td><strong>Sale of Scrap (e)</strong></td>
<td></td>
<td>($17,443,809)</td>
</tr>
<tr>
<td><strong>Deposit Refund (f)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annual Total Per Stakeholder: 1st 3 years (g)</strong></td>
<td>($19,196,201)</td>
<td>$30,774,940</td>
</tr>
<tr>
<td><strong>3-Year Total Per Stakeholder (h)</strong></td>
<td>($57,588,604)</td>
<td>$92,324,821</td>
</tr>
<tr>
<td><strong>Annual Savings/(Costs) After 3 Years (i)</strong></td>
<td>$25,358,467</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total Savings/(Costs) for the First 10 Years</strong></td>
<td>$119,920,662</td>
<td>$0</td>
</tr>
</tbody>
</table>

**See next page for notes, sources, and assumptions.**

Prepared by the Container Recycling Institute, April 2018.
Notes, sources, and assumptions for
WINNERS AND LOSERS: A FINANCIAL ANALYSIS OF H.2686*
(repeal of Bottle Bill with penny fee on beverage containers for 3 years)

* H.2686 is substantially similar to previous bills S.1865 and H.1744 (90th session), and H.646 (89th session).

(a) Based on 2.1 billion containers sold in 2015 (MA DEP) x 56.8% redemption rate; 33% are redeemed at redemption centers with handling fee of 3.25 cents, and 67% are redeemed at retail stores with a handling fee of 2.25 cents.

(b) Payments to new recycling/litter fund estimated at one cent per container x 4.5 billion containers sold (derived from DEP data for 2017 carbonated sales, scaled up by CRI for new non-carbonated beverages). Municipalities would receive some portion of grants, but private companies may also be eligible for grant funding. In this analysis, CRI has used grant funding allocation results from Delaware's beverage fee program to estimate that 31% of grant funding will go to municipalities, and 69% would be awarded to other entities. Payments expire after three years.

(c) Unredeemed deposits for 2017 reported by DEP. These are the property of the Commonwealth.

(d) Who wins/Beverage companies: assumes 2017 carbonated beverage sales, $0.01/unit collection & processing cost for deposit material, times the 2017 redemption rate (56.8%). For municipalities: tipping fees and MRF processing fees are on a per-ton basis. "Collection, processing and disposal" is estimated as follows: disposal costs are $80 collection and $70 disposal, for a total of $150 per ton. Who loses/Municipalities: "collection & processing" costs are estimated at $89 per ton for glass plus $8/ton to crush, $854 per ton for PET, and $746 per ton for aluminum, before scrap sales, based on the Ontario Blue Box Program Pay-In-Model Fee Calculations (for 2017).

(e) Sale of scrap material: beverage containers had a 56.8% return rate in the deposit program (2017), but in the absence of a deposit system, would have return rates of 12-46% in curbside and other recycling programs. The scrap value of curbside glass is negative, and $20/ton in deposit programs. PET prices are $240/ton for deposit material, but only $180/ton for curbside material. Aluminum currently has a value of approximately $1,420/ton for deposit cans and $1,200 for curbside cans.

Scrap revenues and collection, processing, and disposal costs: Under the existing bottle bill, beverage companies (bottlers and distributors) retain the revenues from the annual sale of almost 90 thousand tons of scrap material returned through the deposit system: aluminum cans, and plastic and glass bottles. At the current redemption rate of 56.8% and at current market prices, CRI estimates that this material has a scrap value of about $17 million. Under a repeal, beverage companies would lose this scrap revenue (although their net costs would go down because they no longer would have to pay handling fees). All of the material now recycled through the deposit program would be collected by municipalities, for recycling or trash disposal. With lower anticipated container recycling rates than under a deposit system, municipalities would gain about $8 million in scrap revenue: far less than the $17 million the beverage companies would be losing, and still not enough to make up for their additional collection, processing, and disposal costs: or about $18 million per year. For three years, these additional costs would probably be offset by grants from the Fund, but when the Fund sunsets after 3 years, municipalities would see a net cost increase of almost $10 million annually.
**Additional trash created:** CRI estimates that in 2017, almost 90 thousand tons of aluminum, plastic, and glass were redeemed and recycled through the deposit program, and an additional 11 thousand tons of beverage containers were recycled at curbside. With the elimination of the deposit system, CRI estimates that the recycling rates for carbonated beverages in aluminum, plastic, and glass will drop to 46%, 18%, and 12% respectively, generating approximately 25,250 tons of material collected for recycling: a loss of almost **75,000 tons** that had previously been recycled, and is now trash. Even that is an optimistic scenario, because it is well known that deposit material is of a much higher quality than material that comes through single-stream recycling and MRF processing; so the actual amount recycled under a repeal will be significantly lower due to material contamination, and sorting and processing losses.

(f) Deposit refunds: 1.2 billion carbonated containers were reported redeemed in 2017. We assume charities return 5% of all containers redeemed. With a 5¢ deposit, this is $3 million annually.

(g) Sum of all the above cells in each column.

(h) Annual total x 3.

(i) For the beverage companies: the sum of avoided annual handling fees; collection, processing, and disposal costs; unredeemed deposits and the sale of scrap material. Recycling fund fees would sunset after 3 years. For all other stakeholders: equal to the sum of annual costs/savings.

(j) Data from: "Massachusetts Container Deposit Return System: 2016 Employment and Economic Impacts in the Commonwealth." Industrial Economics, Inc., for the Container Recycling Institute, March 2017. Redemption centers are dependent on handling fees to offset their operating costs. With a bottle bill repeal, they will go out of business.

(k) From Massachusetts Department of Environmental Protection via Department of Revenue.

**ENDNOTES**

1 Data from 1991-2017: MA Department of the Environment; data from 1983-1990: CRI estimates based on trends. The decline in redemption rates is largely attributable to the decline in value of the nickel deposit.

2 CRI also estimates that an additional 7% of deposit containers sold are recycled through curbside recycling programs, based on recycling and redemption data gathered in California.

3 Sales and redemption figures in total are from Massachusetts Department of Environmental Protection; the breakdown by beverage and material type is derived from the "2015 Beverage Market Data Analysis," the Container Recycling Institute, 2017.

4 https://resource-recycling.com/plastics/2017/12/06/china-envions-years-national-swords/


6 For example, in the Province of Ontario, Canada, the curbside recycling program for packaging and printed paper is partially paid for by industry, and they have developed a set of peer-reviewed activity-based-costing statistics. Their cost model for 2017 shows that aluminum generates net revenues of $209 per ton, while glass has a net cost of around $75 per ton, and PET is the most expensive, at a net cost of $648 per ton. (These statistics are published on the Stewardship Ontario website.)


10 https://www.mirror.co.uk/news/politics/landmark-plastic-bottle-deposit-scheme-12263373