Impacts of Increasing Vermont's Bottle Bill Scope and Deposit Value

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Version Control Table

Version	Date	Author	Description
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Contents

1.0 Introduction

Since 1973, Vermont has had a deposit refund system (DRS), also known as a bottle bill, on select beverage containers. This DRS system places a deposit on beverage containers that consumers pay when purchasing beverages; they receive the deposit back when they return their empty beverage containers to redemption centers.

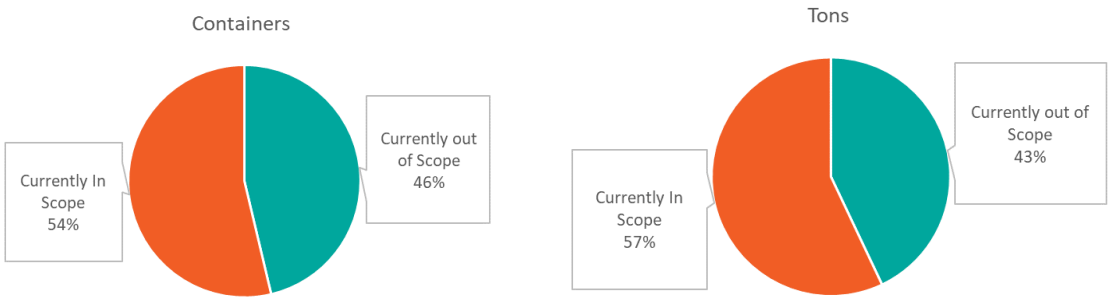
At its inception, the Vermont bottle bill covered beer, carbonated soft drinks and mixed wine drinks. In 1991, liquor was added to the list of covered beverages. No additional beverage types have been added since.

The deposit value is 15 cents for liquor and 5 cents for all other in-scope containers.[1] The deposit value has not changed since the program inception. If the 5-cent level of deposit was pegged to inflation in 1973, today the deposit would be 30 cents.[2]

Both the devalued deposit and the limited scope of the program, specifically the omission of wine and water, is limiting the program's effectiveness in Vermont.

Figure 1-1 shows the number of containers in and out of scope, both by number and weight as a percentage of all beverage containers sold into Vermont. 270 million beverage containers sold in Vermont are currently not covered by the DRS, which equates to 19,000 tons, much of which is going to landfill.

Figure 1-1: Number of Beverage Containers in Scope and Out of Scope



Source: Eunomia calculations and CRI BMDA Data

Other states in the US with deposit systems have increased their deposit values to 10 cents and have subsequently seen redemption rates rise to over 90%. In comparison, Vermont's

[1] http://www.bottlebill.org/index.php/vermont-history

[2] United States Bureau of Labor Statistics Inflation Calculator, https://data.bls.gov/cgi-bin/cpicalc.pl?cost1=0.05&year1=197301&year2=201912

redemption rate is approximately 75%.[3] Between 2017 and 2018, Oregon expanded its bottle bill scope and increased its deposit value from 5 to 10 cents and subsequently saw its redemption rate rise from 73.3% to 90%.[4]

Members of the Vermont General Assembly are in the process of evaluating policies that will address packaging, and plastics specifically. DRSs are being seen globally as the only reliable measure to reduce the impact of single use plastics bottles, and to ensure that high grade material is available for brands to meet their minimum recycling content commitments. In 2010, 36 countries and states had container deposit laws, affecting 279 million people. By 2019, 58 container deposit laws were in place, affecting 612 million people. For these reasons, Vermont is considering the potential of both increasing the level of deposit on beverage containers and expanding the scope of beverages that are covered.[5] A comprehensive bottle bill should ideally be expanded to include non-sparkling water, sports drinks, energy drinks, fruit and vegetable beverages, ready to drink tea & coffee and wine. 250 million beverages are sold into Vermont in plastics bottles, currently only 50 million are covered by the current DRS; 200 million plastic bottles are currently out of scope.

This paper considers the environmental and financial impacts of changing the program under three different scenarios:

- Scenario 1 – No change in scope, deposit increase to 10 cents;
- Scenario 2 – Expanded scope, deposit remains at 5 cents;
- Scenario 3 – Expanded scope and deposit increase to 10 cents.

Sections 2.0 and 3.0 provide an overview of the key findings with Appendix A.1.0 detailing the cost benefit analysis carried out.

2.0 Analysis of Impacts

The overarching impacts of broadening the scope and/or increasing the deposit of Vermont's DRS will be as follows:

- *Environmental Benefit*: Containers will move from the trash, litter and curbside recycling streams into the deposit system. Proportionally, more material will move from the trash stream than from the recycling stream, because there are currently

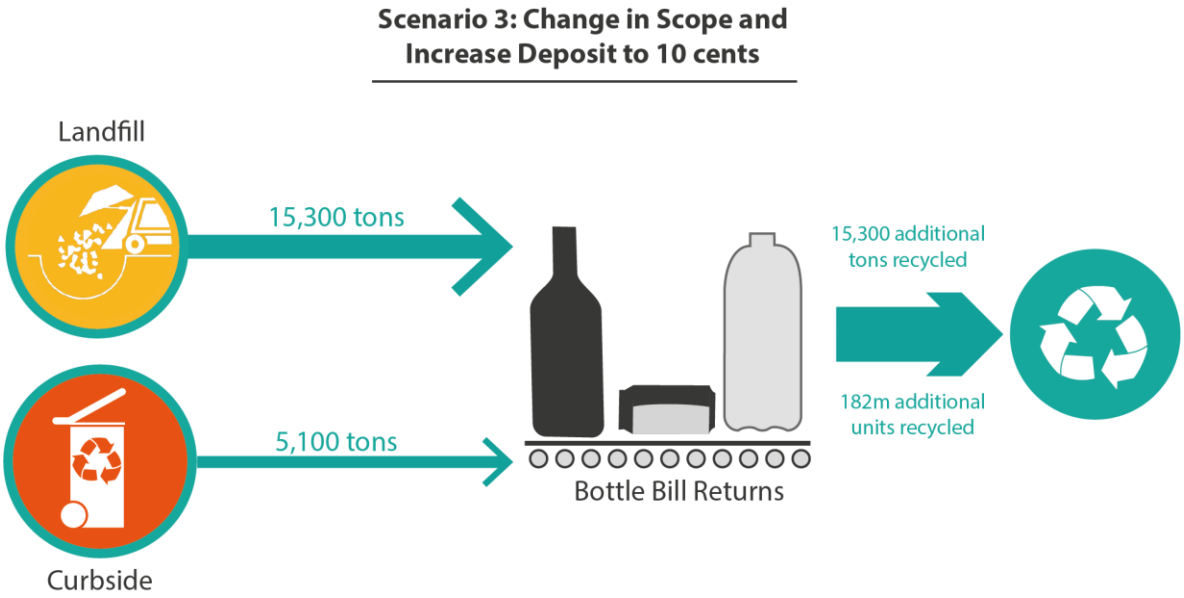
[3] http://www.bottlebill.org/index.php/current-and-proposed-laws/usa/vermont

[4] OBRC Quarterly Report: Q1 2019, 2019. https://www.obrc.com/Content/Reports/OBRC%20Quarterly%20Report%20Q1%202019.pdf

[5] https://addisonindependent.com/thursday-november-21-2019

more containers in the trash than in the recycling stream with the potential to be captured by the DRS. Additionally, there will always be a proportion of containers that continue to be recycled through the curbside system as a result of consumer choice. Recycling more containers, thereby diverting them from landfill, will help maintain the life of Vermont's landfill and also reduce greenhouse gas emissions associated with both avoided waste to landfill as well as that associated with the replacement of virgin material with recycled material in the production of goods. Figure 2-1 illustrates the tonnage of material that will be taken out of the landfill as well as that which will likely move from curbside programs into the deposit system under Scenario 3. The diagram shows that if the deposit is increased to 10 cents and the scope is broadened to its maximum[6] there will be an estimated 397m additional containers recycled. This equates to an additional 15,300 tons of material that would be recycled increasing Vermont's diversion rate by 3%. The same diagram is provided for scenario 1 and 2 in Appendix A.2.0

Figure 2-1: Overview of Environmental Benefits Resulting from Increasing the Deposit Value and Expanding the Scope.



- *Financial loss*: A decrease in material, specifically PET and aluminum collected at the curbside, will result in less material being tipped and processed at the state's two main single-stream MRFs. The impact of this change will be a loss in tipping fee revenue and material income due to less PET and aluminum being available to sell.

[6] Excluding milk and dairy based beverages and wellness and functional drinks

- *Financial benefits*:
    - Expanding the scope of the DRS to include wine will reduce the amount of glass that needs to be managed at the MRFs. Glass in 2019 was costing CSWD almost $6[7] per ton to be sent to the glass aggregator. This cost is in addition to the processing costs. The cost to Casella is somewhat less, however there is still a cost.
    - Reduced landfill costs, resulting from less waste being sent to landfill. Because containers will be removed from the trash stream, haulers will be collecting less trash, therefore sending less to landfill, saving on landfill tipping fees.
    - Under scenarios 2 and 3, despite more containers being recycled due to the scope increase (Scenario 2) and deposit increase (Scenario 3), the value of the unclaimed deposits, which supports the State's clean water program will increase.

The benefits and cost impacts on different stakeholders, and ultimately the householder, cannot be 100% predicted; however, in a market-driven environment, our experience is that that the following occurs:

- MRF losses: MRF operators have three options to recover tipping fee and material losses:
    - Reduce operating costs – this is likely to be difficult, because there will always be a fixed cost for operating the plant and the quantity of material that would be removed as a part of an amended DRS is between 2-6% (depending on the scenario) of the total tonnage processed.
    - Attempt to fill the loss in tonnage (and therefore revenue) through other sources. This might be difficult in the relatively small Vermont market.
    - Pass through the increased cost to haulers using the facility via an increase in the tipping fee. We have assumed this is what would happen in our modelling.
- Landfill savings: Haulers will have reduced landfill costs due to less material collected in the trash and subsequently disposed in the landfill. If increases in MRF processing costs are passed on to customers, landfill savings should also be passed on. You

[7] Please note that CSWD is temporarily paying $115/ton but expects to be reverting back to 2019 recycler in the near future. VTRANS is also looking at making it MRF output an approved material that it will list for contractors to use which will possibly allow CSWD to charge for the material but this is a medium term solution and is not the equivalent of bottle to bottle recycling that is possible from glass collected through a DRS system.

would hope this would be the case when the MRF operator and the hauler are the same company, as is the case for some of Casella's customers in Vermont.

Taking the losses in MRF revenue and the disposal savings together, Figure 2-2 shows the net system changes across each of the alternative scenarios. In Scenario 3, CSWD and Casella will see a combined loss in revenue of $945,000 resulting from reduced tipping fees and material revenue. The saving in landfill costs to haulers on the other side will be an estimated $1,791,000. This provides a net system benefit of $847,600.

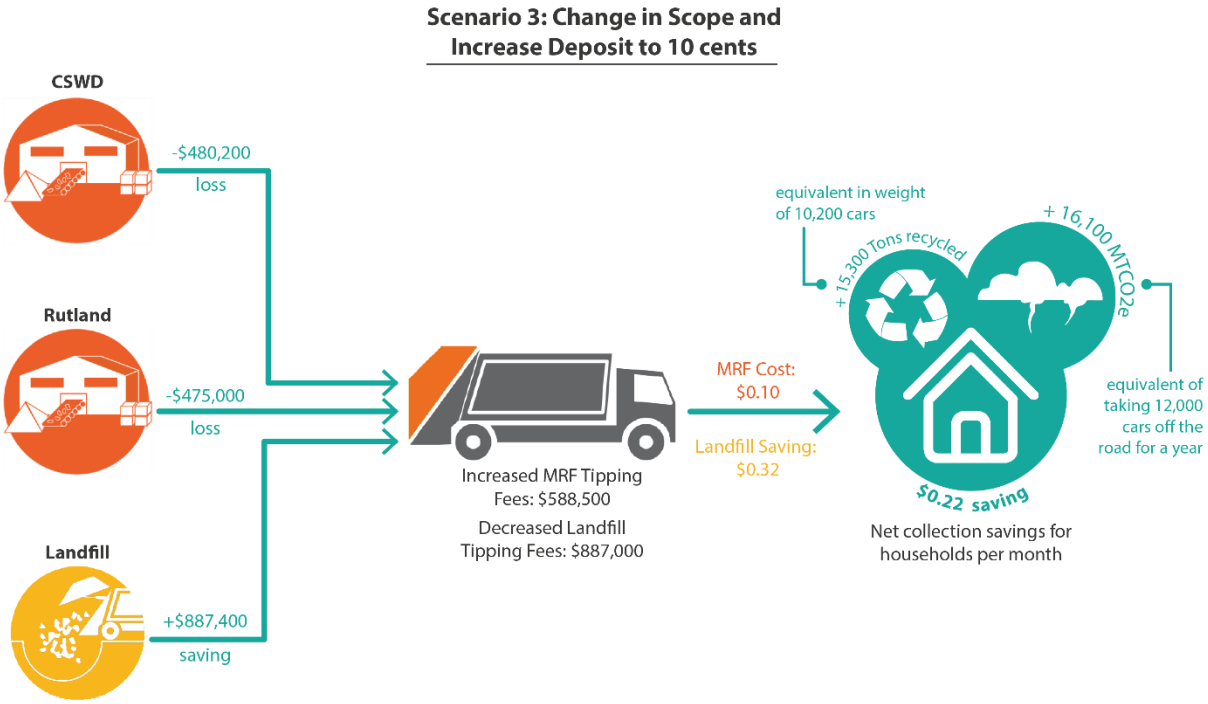
Figure 2-2: Industry System Cost Changes across Scenarios

Source: Eunomia Modelling

In the system infographic in Figure 2-3, we present all losses and benefits for Scenario 3. The equivalent diagrams for Scenarios 1 and 2 are provided in Appendix A.2.0. In the infographic, we assume all MRF losses are passed through to the haulers via an increase in tipping fees, and that this increase is ultimately passed through to the householder. The extent to which this increase will be passed onto the householder will in part be conditional on the amount of competition in the market and the ability for haulers to increase prices and still retain their customers. We also assume that any landfill savings are passed through from the hauler to individual households. The diagram shows that the net benefit of Scenario 3 if both MRF losses and landfill savings are passed onto the householder would be a 22 cents per month saving. If the savings resulting from reduced landfill costs are not passed on to the household by the hauler then the estimated additional cost to the

householder would be 7 cents per month. The graphic also shows that an estimated 15,300 additional tons of material would be recycled, equivalent in weight to 10,200 cars, plus a further reduction in GHG emissions of 16,100 metric tonnes of CO_2e.[8]

Figure 2-3: Costs, Savings and Benefits



3.0 Findings

The analysis of the environmental and financial impacts of each scenario (described more fully in Appendix A.1.0) results in the following environmental and financial impacts (also shown in Figure 3-1:

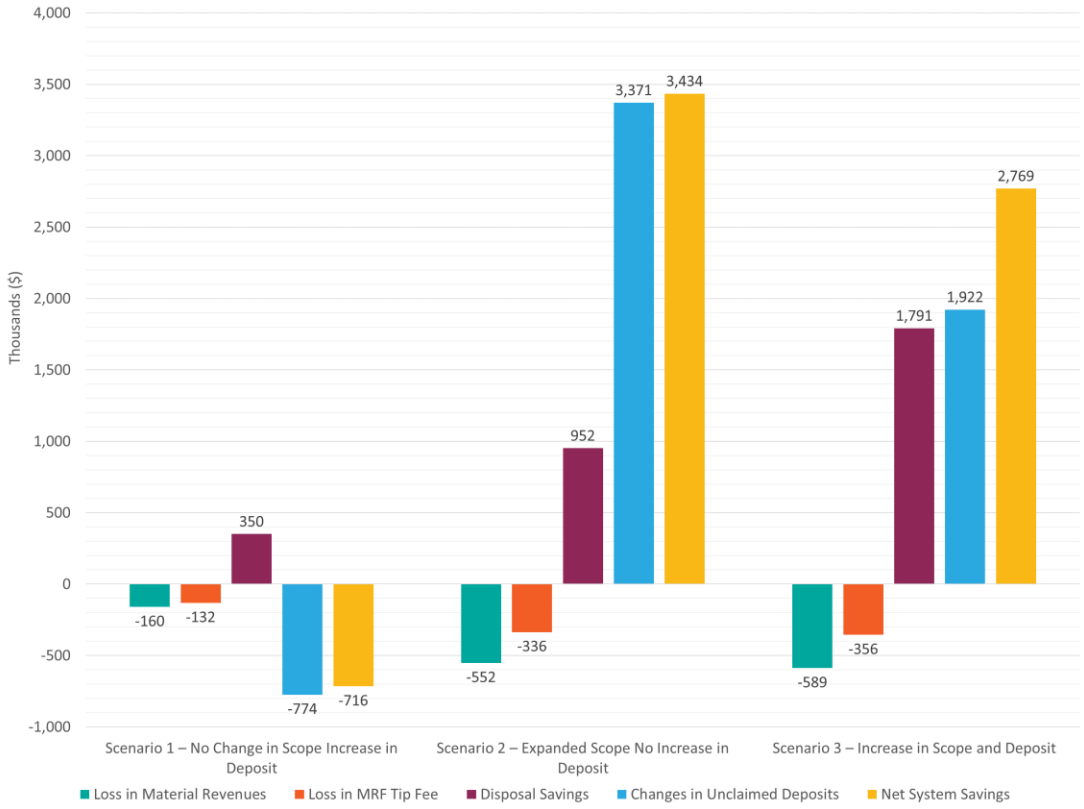
- Scenario 1:
  - Environmental:
    - 3,350 tons of additional material, equivalent to the weight of 2,200 cars, would be captured for recycling;
    - GHG savings would increase to 54,100 metric tonnes of CO_2e from 48,400 metric tonnes of CO_2e.

[8] Eunomia Modelling

    - Financial Impact:
        - MRFs could lose approximately $291,000 in revenue;
        - Haulers would pay approximately $353,000 less in landfill disposal fees;
        - The value of the unredeemed deposits decreases from $4 million to $3.1 million;
        - If MRF costs and landfill savings were passed through to the householder, the total cost to households would decrease by over $150,000 a year, a saving of approximately 5 cents per household per month;
        - Net whole system financial loss of $716,000.
- Scenario 2:
    - Environmental benefit
        - 10,100 tons of additional material, or equivalent to the weight of 6,700 cars, would be captured for recycling from the landfill;
        - GHG savings would increase to 57,400 metric tonnes of CO_2e from 48,400 metric tons of CO_2e.
    - Financial Impacts
        - MRFs would lose approximately $888,000 in revenue;
        - Haulers would pay approximately $952,000 less in disposal fees;
        - The value of the unredeemed deposits increases from $4 million to $7.3m;
        - If MRF costs and landfill savings were passed through to the householder; total cost to households would decrease by over $366,000 a year, a saving of approximately 11-12 cents per household per month;
        - Net whole system financial benefit $3,434,000 (including unclaimed deposits).
- Scenario 3:
    - Environmental Benefits
        - 15,300 tons of additional material, or equivalent to the weight of 10,200 cars, would be captured for recycling;
        - GHG savings would increase to 64,500 metric tonnes of CO_2e from 48,400 metric tonnes of CO_2e.
    - Financial Impacts
        - MRFs would lose approximately $944,000 in revenues;
        - Haulers would pay approximately $1.7 million less in disposal fees;
        - If MRF costs and landfill savings were passed through to the householder, total costs to households would decrease by over $688,300 a year, a saving of approximately 22-23 cents per household per month;

- The value of the unredeemed deposits increases from $4 million to $5.8 million.
- Net system financial benefit of $2,796,000 (including unclaimed deposits)

Figure 3-1: Whole System Financial Impacts



Source: Eunomia modelling

Appendix

A.1.0 Cost Benefit Assessment

A.1.1 Modelled Scenarios

The three future scenarios modelled are provided alongside the current system in Table A 1, below. This assessment sets out to examine the costs, benefits and other implications on various stakeholders of each scenario compared to the current system.

Table A 1: Scenario Designs

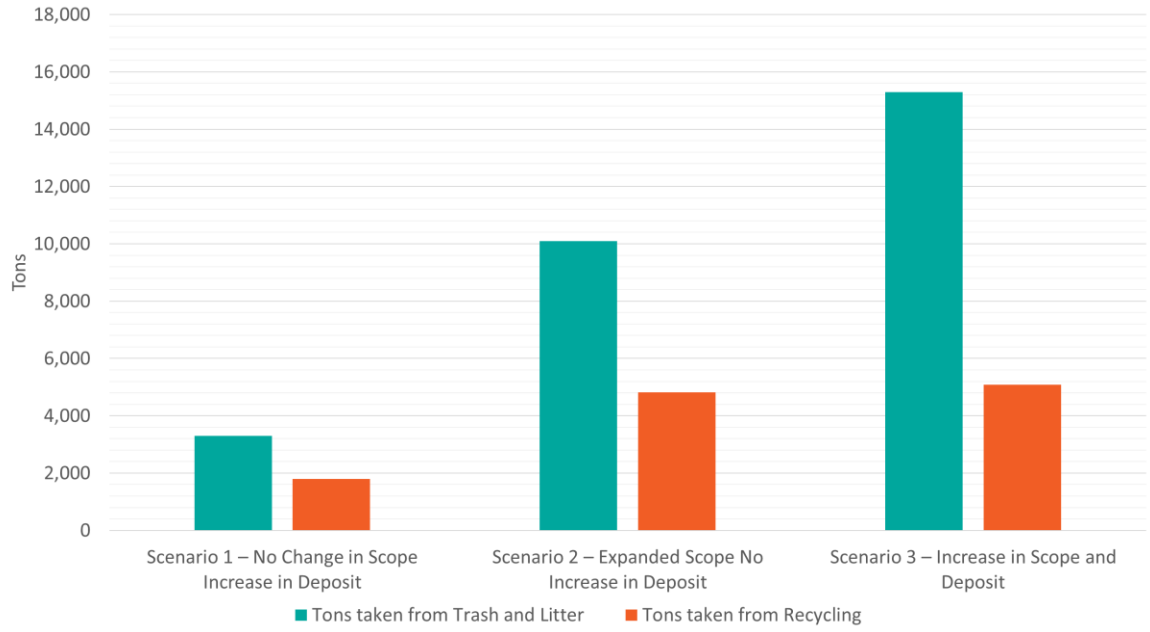
	Current Scenario	Scenario 1 – No Change in Scope Increase in Deposit	Scenario 2 – Expanded Scope No Increase in Deposit	Scenario 3 – Increase in Scope and Deposit
Deposit Level (Cents)	5	10	5	10
Redemption Rate	75%	90%	75%	90%
Beverages Covered	Carbonated Soft Drinks, Beer, Domestic Sparkling Water, Spirits	Carbonated Soft Drinks, Beer, Domestic Sparkling Water, Spirits	Carbonated Soft Drinks, Beer and Hard Cider, Domestic Sparkling Water, Spirits, Domestic Non-Sparkling Water, Sports Drinks, Energy Drinks, Fruit & Vegetable Drinks, Ready to Drink Tea & Coffee, Wine	Carbonated Soft Drinks, Beer and Hard Cider, Domestic Sparkling Water, Spirits, Domestic Non-Sparkling Water, Sports Drinks, Energy Drinks, Fruit & Vegetable Drinks, Ready to Drink Tea & Coffee, Wine
Containers Covered	Aluminum, PET, Glass	Aluminum, PET, Glass	Aluminum, PET, Glass, Cartons, Aseptic	Aluminum, PET, Glass, Cartons, Aseptic

A.1.2 Material Flow Changes

When the scope is expanded and the level of deposit increased, containers will move from the trash, litter and curbside systems into the DRS. This change in flow is due to households having an increased incentive to return their beverage containers to recover their deposit under the new bottle bill scenarios.

A 1 below shows the additional tons from each waste stream that are redeemed under each alternative scenario.

A 1: Flow of Tons into DRS System



Source: Eunomia Modelling

The tonnage and container impacts under each scenario are as flows:

- Scenario 1:
  - Around 3,350 tons will come from trash and litter
  - Almost 2,000 tons will come from the recycling stream
  - A total of 38,000 tons (1.8b units) will be captured for recycling
- Scenario 2:
  - 10,100 tons will come from trash and litter
  - 4,000 tons will come from the recycling stream
  - A total of 33,500 tons (2.1b units) of material will be captured for recycling
- Scenario 3:
  - 15,300 tons will come from trash and litter
  - 5,100 will come from recycling
  - A total of 50,600 tons (2.4b units) of material will be captured for recycling

A.1.3 Impacts Summary

A.1.3.1 Environmental

Recycling Rate

The additional tons of each material that will be diverted from landfill and recycled as a result of changes to the DRS under each alternative scenario are shown in Table A 2 below:

Table A 2: Additional Tons Diverted from Landfill by Material

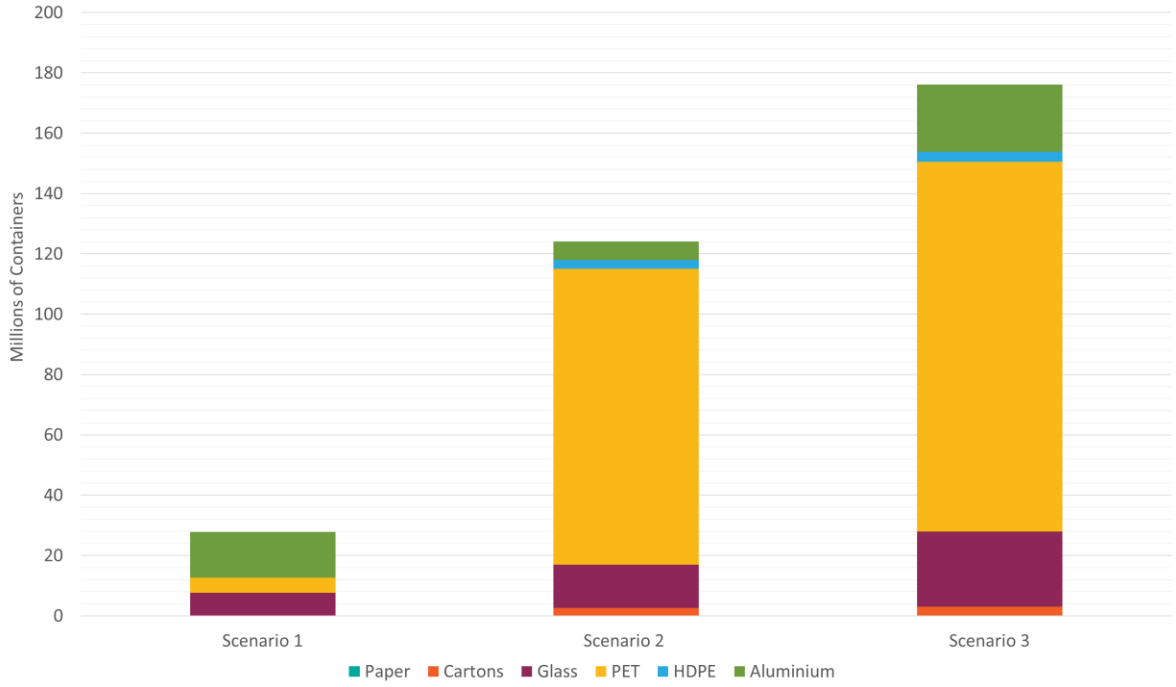
	Scenario 1 – No Change in Scope Increase in Deposit	Scenario 2 – Expanded Scope No Increase in Deposit	Scenario 3 – Increase in Scope and Deposit
Paper	0	0	0
Cartons	0	60	70
Glass	2,800	5,250	9,100
PET	230	3,520	4,400
HDPE	0	160	190
Aluminum	320	130	470
Total	**3,350**	**9,120**	**14,230**

Source: Eunomia Modelling

Depending on the scenario, the increase of diverted tons would result in a 1 to 3 percentage point increase in the state's diversion rate. Additionally, as outlined in Section A.1.3.2, less material will be littered.

A 2 below shows the number of additional beverage containers that are diverted from the landfill every year for each scenario, compared to the current system. As the figure shows, nearly 100 million more containers are diverted by expanding the bottle bill scope than would be diverted by only increasing the level of deposit (i.e the difference between scenarios 1 and 2). Under Scenario 3, 180 million additional containers will be collected for recycling, 120 million of these containers would be plastic bottles.

A 2: Number of Additional Containers Diverted from Landfill Under Each Scenario



Source: Eunomia Modelling

Although glass has the most weight diverted from landfill under the alternative scenarios, PET bottles account for the greatest amount of volume diverted from landfills.

Greenhouse Gas Emission

Increasing the number of containers redeemed under a DRS system results in fewer container tons being sent to landfills, and can reduce the number of containers that are littered.

Beverage containers which are not recycled cause GHG emissions for two main reasons:

- Some containers release GHG, such as methane, as they decompose in the landfill, however more importantly
- GHG emissions are also produced as a result of extracting and using virgin material to create new containers. Using virgin material, as opposed to recycled material, releases more GHG per ton of product made.[9] Therefore, the material in landfills could have saved GHG emissions by being used in the production of new product

[9] EPA WARM Model v15

replacing virgin material. Deposit systems provide high quality material that can be used in a circular way to produce new beverage containers.

The current bottle bill, and each subsequent alternative scenario, captures and recycles beverage containers that would have otherwise be disposed at landfills via the trash stream. As a result, GHG emissions are avoided for that material for the aforementioned reasons. These savings are in addition to the avoided GHG emissions that the curbside recycling system delivers.

Table A 3 below shows the environmental benefits of the current and alternative scenarios, in terms of both tons recycled and the corresponding GHG emission reductions.

Table A 3: Environmental Benefits under Alternative Scenarios

	Containers Recycled through Deposit System (tons)	Containers Recycled through Curbside (Tons)	Total GHGe Savings ($MTCO_2e$) from Recycling Containers
Current Scenario	24,700	11,000	48,400
Scenario 1 – No Change in Scope Increase in Deposit	29,400	9,200	54,100
Scenario 2 – Expanded Scope No Increase in Deposit	38,000	6,200	57,400
Scenario 3 – Increase in Scope and Deposit	45,500	4,800	64,500

Source: Eunomia Modelling and EPA WARM Model v15[10]

A.1.3.2 Litter

DRS programs have been shown to reduce container litter by as much 75%[11]. The European Commission, in its Single Use Plastic Directive developed to address terrestrial and marine litter, specifically lists DRSs as a means of ensuring 90% of plastic bottles that are sold are collected for recycling.

Raising the level of deposit and increasing the scope of the current Vermont bottle bill is likely to decrease the number of beverage containers littered by as much as 66%.[12] That is approximately 13 million fewer containers littered under Scenario 3. A reduction of

[10] Note a small percentage has been taken off the total containers redeemed for conservative GHG savings to account for minor contamination

[11] Eunomia 2018, Modernizing Connecticut's Bottle Bill

[12] Eunomia Modelling based on comparing littering rates for non-deposit containers and then used separate littering rates for in scope containers to assess the likely reduction

beverage container litter has implications for reduced cleanup costs, as well as the potential to reduce marine litter.[13]

A summary of these effects can be found in Table A 4.

Table A 4: Effects on Litter

	Total Tons of Containers Littered	Reduction in Litter (tons)	Reduction in Number of Containers Littered	% Decrease in Litter from Current
Current Scenario	1,510			
Scenario 1 – No Change in Scope Increase in Deposit	1,470	-40	550k	-2%
Scenario 2 – Expanded Scope No Increase in Deposit	580	-930	12m	-62%
Scenario 3 – Increase in Scope and Deposit	520	-990	13m	-66%

Source: Eunomia Modelling

A.1.3.3 Financial

Material Recovery Facilities Cost Impact

Vermont has two main single stream MRFs, CSWD and the Rutland Casella MRF. MRFs rely on two main sources of revenue to cover their operating costs: tipping fees paid by the waste haulers and material sales revenue of the MRFs' sorted recyclables.

Table A 5 summarizes the per ton tipping fee and material revenue for each MRF for the two-single stream MRFs in the state. It can be seen that while PET and aluminum result in an income, there is a cost for managing glass and this fluctuates according to market conditions and material quality.

[13] Comparison of litter rates in non- deposit regions compared to deposit regions, data drawn from Zero Waste Scotland (2013) *Scotland's Litter Problem, Quantifying the Scale and Cost of Litter and Flytipping*, July 2013, http://www.zerowastescotland.org.uk/sites/default/files/Scotland's%20Litter%20Problem%20-%20Full%20Final%20Report.pdf

Table A 5: Current Assumed Revenue per Ton

MRF	Tipping Fee	PET	Alu	Glass	HDPE Colored	HDPE Natural
Casella	$110	$324[14]	$1,224[15]	-$20[16]	$337[17]	$703[18]
CSWD	$65[19]	$324	$1,224	$-5.84[20]	$337	$703

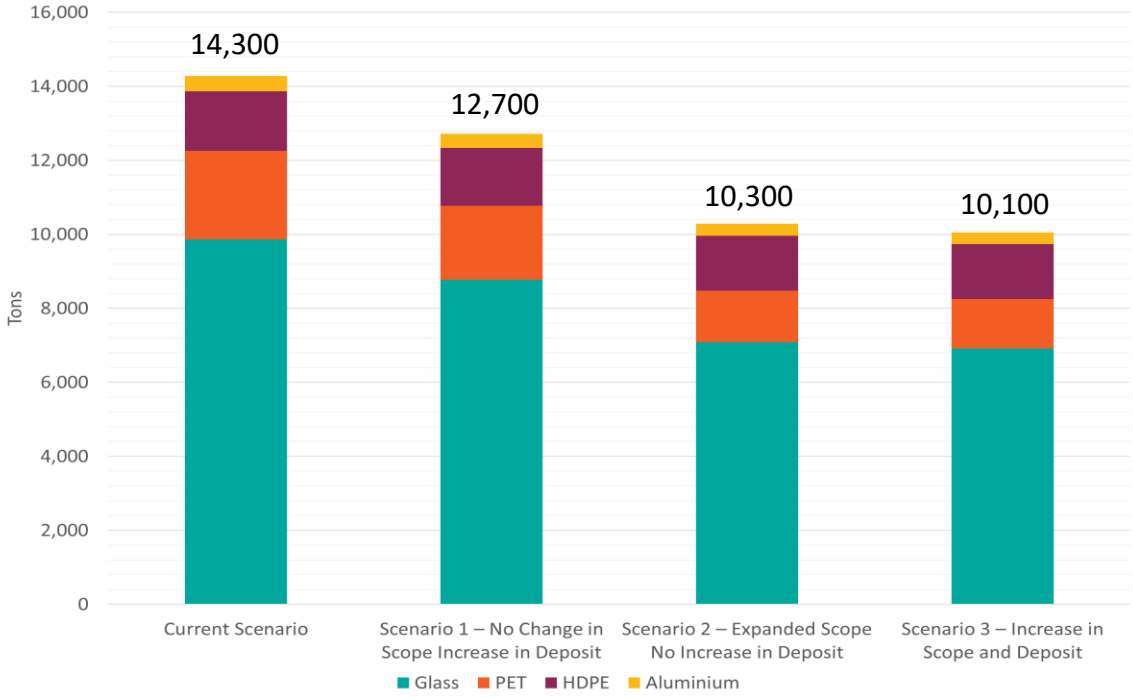
Source: Data received from CSWD and Casella

After accounting for valuable material being taken out of the PET stream as a result of changes to the DRS, we calculate future plastic material value per ton to fall to $257 per ton under Scenario 2, and $247 per ton under Scenario 3.

A 3 below shows the tons of glass, PET, HDPE and aluminum that is currently and will be processed by the two MRFs under each scenario. Under Scenario 1 there will be a reduction in processing tons of 1,600 tons, compared to Scenario 3, which will reduce the amount of material processed through both MRFs by 4,300 tons - approximately just under 6% of the total amount currently processed through the MRFs.

[14] Provided by CSWD, assumed the same for Casella as was not provided
[15] Provided by CSWD, assumed the same for Casella as was not provided
[16] Budgeted by CSWD, assumed the same for Casella as was not provided
[17] Provided by CSWD, assumed same for Casella as was not provided
[18] Provided by CSWD, assumed same for Casella as was not provided
[19] Believed to be the rate that will be introduced shortly
[20] Report from Seven Days https://www.sevendaysvt.com/vermont/glass-action-a-burlington-startup-aims-to-turn-recyclables-into-building-material/Content?oid=29525125,

A 3: Tons of Beverage Container Material Processed at Vermont MRFs Under Each Scenario



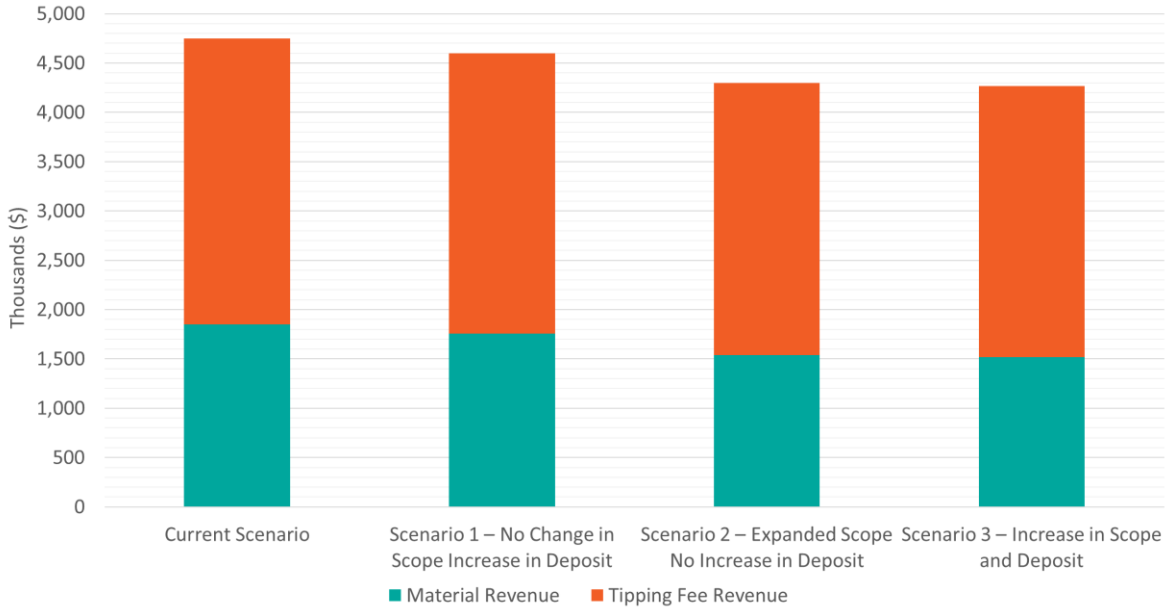
Source: Eunomia Modelling

The reduced quantity of material processed will reduce material revenue associated with PET and aluminum, as these two materials have high values on the recycled material market. However, there will also be savings for the MRFs associated with not having to process and market glass. A 4 below shows the anticipated overall revenue reduction at the CSWD MRF and A 5 shows the same at Casella's MRF in Rutland.

The calculated revenue loss for CSWD resulting from Scenario 3 is expected to be approximately $480,176 (10% of current total revenue). If CSWD wanted to recover the revenue loss, they would have to increase tipping fees by between $2.30 (scenario 1) - $11.30 (scenario 3) per ton.

Overall, expanding the scope of the bottle bill and increasing the deposit level (Scenario 3) would lead to a reduction in revenue of around 10%.

A 4: Total CSWD MRF Revenue Under each Scenario

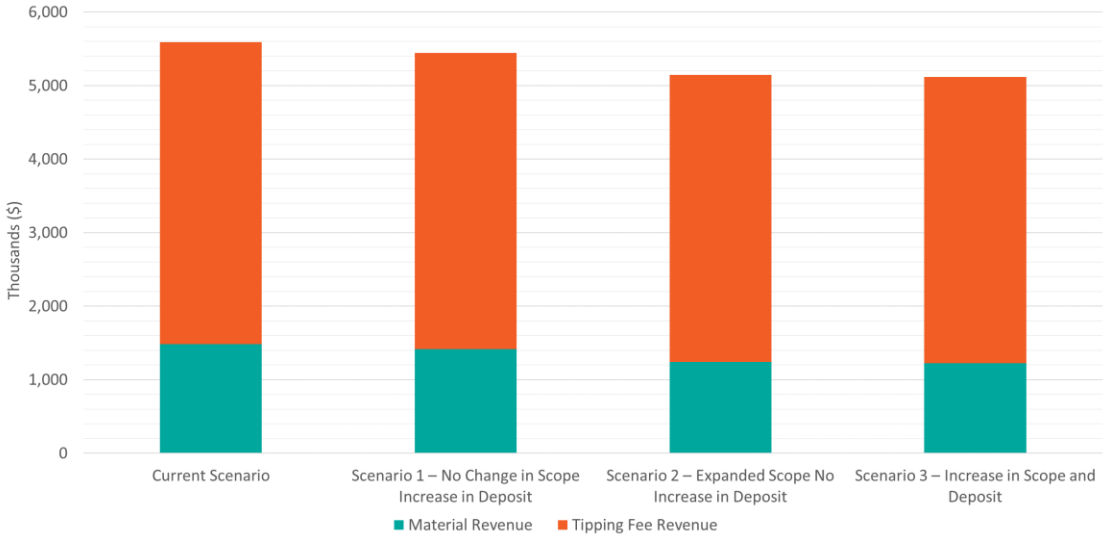


Source: Eunomia Modelling and CSWD Data

A 5 below shows the overall changes in revenue to the Casella MRF under each scenario.

Casella is expected to lose approximately $475,000 in revenue, 4.5% of current total revenue. This is less than for CSWD, because their tipping fees are higher. It would have to increase tipping fees by between $4.10 (Scenario 1) - $13.40 (Scenario 3) per ton to recover losses in revenue resulting from changes to the bottle bill.

A 5: Total Casella Rutland MRF Revenue under each Scenario



Source: Eunomia Modelling

Under Scenario 3, Casella would see a revenue decrease of around 10%.

When MRFs lose material and revenue they can either a) make operational efficiencies to reduce impact; b) seek to replace the lost tons with new tonnage from out sources; or c) pass through their costs to haulers in the form of tipping fee increases.[21] If the Vermont MRFs pass through these costs to the haulers, the impact on the tipping fee per ton for each scenario at the CSWD and Casella MRFs would be:

- CSWD:
  - Scenario 1: $65 - $68 (5% Increase);
  - Scenario 2: $65 - $75 (16% Increase);
  - Scenario 3: $65 - $76 (17% Increase).
- Casella:
  - Scenario 1: $110 - $114 (4% Increase);
  - Scenario 2: $110 - $123 (10% Increase);
  - Scenario 3: $110 - $124 (11% Increase).

The increase in tipping fees appear as a range, as MRFs will not necessarily increase their fees to the exact amount needed to cover costs, but the upper bound of the range represents that possibility.

The impact of MRFs passing through the additional costs to haulers and potentially, ultimately households is discussed in Section A.1.5.

Landfill Savings

Currently, Vermont sends 379,000 tons of MSW to landfills for disposal.[22] Redeemed material under an expanded bottle bill will be primarily drawn from the trash stream, as that stream has the greatest amount of the material currently. By modernizing its bottle bill, Vermont could avoid sending between 2,000 and 15,000 tons of containers to landfill from the residential sector. This relates to disposal cost savings of between $353,000 and $1.7 million per year.

A 6 displays the comparative number of tons of material sent to landfills in Vermont across each of the study scenarios, as well as the cost of sending that material to landfills.[23]

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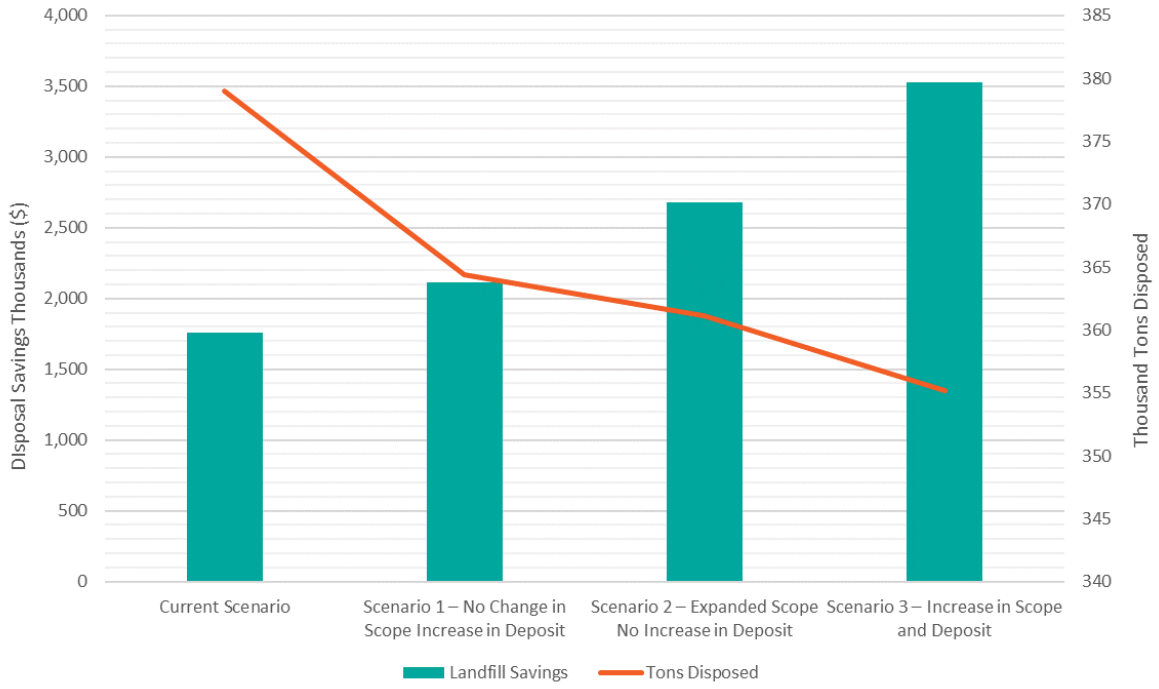
[21] In order to keep revenues constant with lower average material sales value and lower throughput tonnages, MRFs can resort to increasing their tipping fee cost per ton to make up the difference.
2020 Recycling Partnership State of Curbside Recycling in 2020,
https://recyclingpartnership.org/stateofcurbside/

[22] 2018 Vermont DEC Diversion and Disposal Report
https://dec.vermont.gov/sites/dec/files/wmp/SolidWaste/Documents/2018%20Diversion%20and%20Disposal%20Report.pdf

[23] 2018 Vermont DEC Diversion and Disposal Report
https://dec.vermont.gov/sites/dec/files/wmp/SolidWaste/Documents/2018%20Diversion%20and%20Disposal%20Report.pdf

A landfill tipping fee of $120 per ton is assumed for modelling. This is based on current costs at the Coventry Landfill.[24]

A 6: Changes in Disposal Savings and Total Tons Disposed



Source: Eunomia Modelling and Vermont DEC Data

As the deposit level and the scope of the DRS increase, tons of material disposed at landfill fall between 1 and 4 percent, depending on the scenario. As a result, total disposal costs fall by the same percentage.

The reduction in the number of tons that are disposed at landfills resulting from changes to the bottle bill will reduce costs on haulers, as they will effectively not be collecting this material from households, as well as not disposing of it at landfills – thereby paying fewer landfill fees. While haulers may see the tipping fees, they must pay at MRFs increase, they will also be paying less in landfill costs. Appendix A.1.6 assesses the net impact of increases in MRF processing costs versus savings in landfill costs.

[24] Interview with Kimberly Crosby of Casella Waste Systems, January 16th, 2020

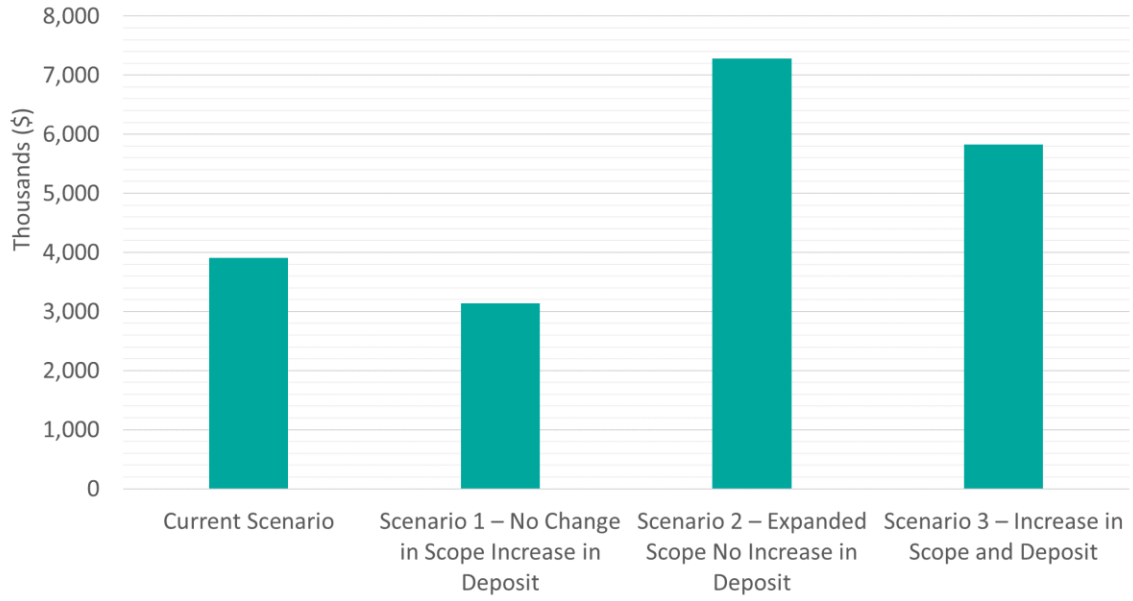
A.1.4 Unclaimed Deposits

As of Oct 1st, 2019, all unredeemed deposits are the property of the State of Vermont, to be used for clean water programs.[25] Therefore, changes in the level of deposit and redemption rates will have effects on the amount of unredeemed deposits available for these programs.

The change in value of unredeemed deposits under each scenario is shown in A 7 below.

Under Scenario 1, there is no scope change, but the deposit increases. As such, we predict the redemption rate to increase from 75% to 90%, which is seen by programs in Oregon and Michigan that have a 10 cent deposit. This results in less unclaimed deposits. Under Scenario 2, the scope increases so there are more containers in the DRS; however, the deposit does not increase, and as such, the redemption rate remains at 75%, which means there are significantly more unclaimed deposits. Finally, in Scenario 3, more containers are part of the DRS and the deposit increases thereby increasing redemption rates to 90% these factors combined result in the value of the unclaimed deposits being less that under Scenario 2 however still significantly higher than it is currently, at almost $6 million compared to the current $4 million.

A 7: Value ($) of Unclaimed Deposits Across Scenarios



Source: Eunomia Modelling and Vermont DEC Data

A.1.5 Households

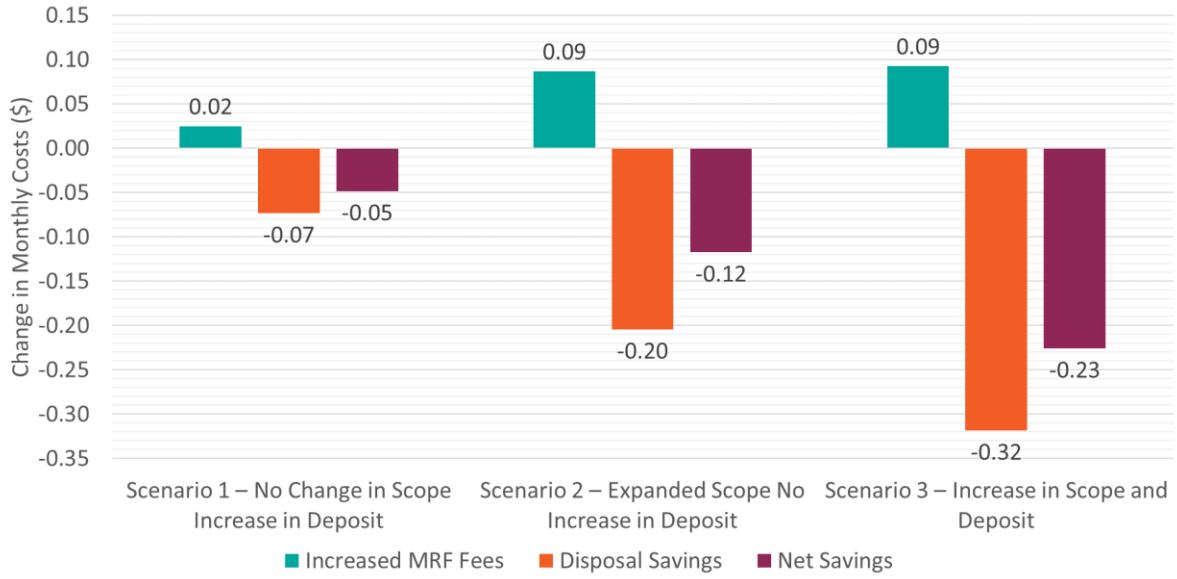
Households rates are based on the cost for collection plus MRF processing and landfill tipping fees. If both MRF tipping fee increases and landfill costs decreases are passed from the hauler to the household through a change in rate there is a net benefit to the household under each scenario as seen in A 8 (CSWD MRF) and A 9 (Casella Rutland MRF).

Under each future scenario, the net change in waste collection system costs for households is negative, signifying that if haulers were to pass the additional costs and savings they receive as a result of the bottle bill onto households, then households would be better off financially. This is due, in most part, to landfill disposal rates being higher than MRF tipping fees, as well as the fact that more tons would be drawn from the trash stream than the curbside recycling stream. If the landfill savings are not passed through to the households, then the potential cost impact on household rates would be between 7 and 30 cents per month.

A 8: $ Changes in Monthly Household Collection Rates for Household whose Hauler uses the CSWD MRF

Source: Eunomia Modelling

A 9: Changes in Monthly Household Collection Rates for a Household whose Hauler used the Casella Rutland MRF



Source: Eunomia Modelling

A.1.6 Summary

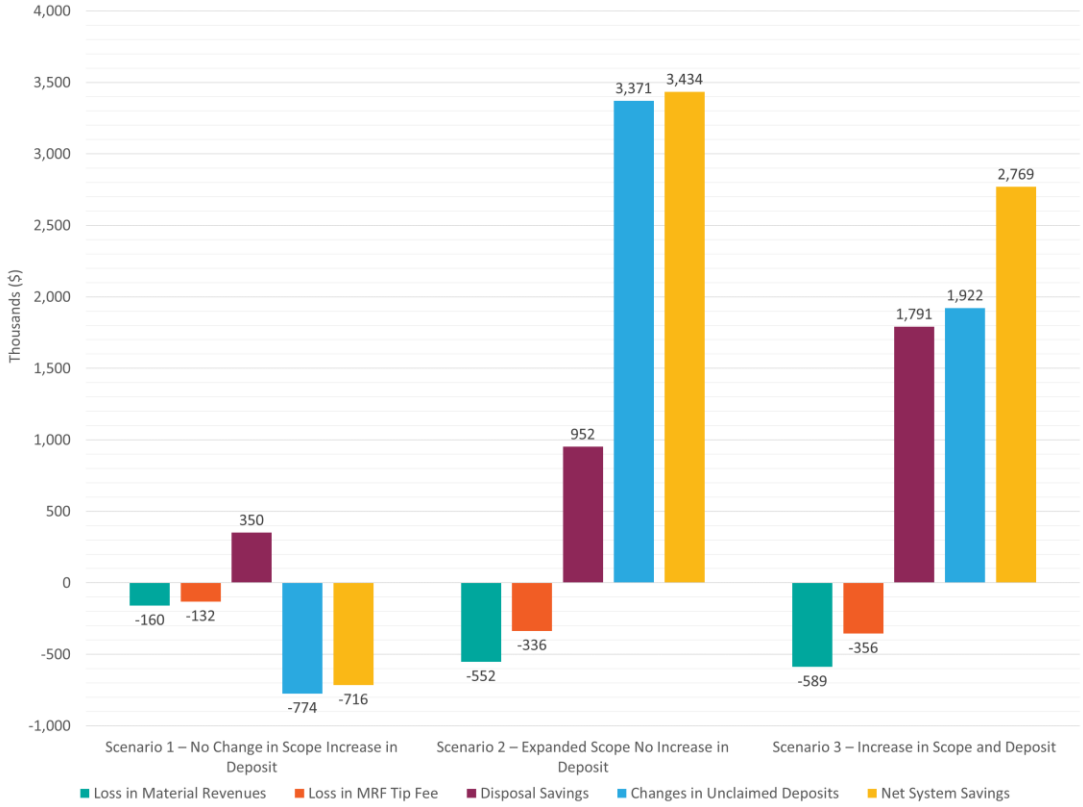
When taking into account the costs and savings of the waste management system, the alternative scenarios provide a net cost benefit. A summary of the system costs and savings can be found in A 10 below. While there are greater savings in Scenario 2 than Scenario 1, they are close due to the large number of PET tons that would be removed from MRFs under Scenario 2.

A 10: Summary of Cost Changes to Industry

Source: Eunomia Modelling

Expanding the scope of the Vermont bottle bill, as well as increasing the level of deposit on the containers, yields a net savings across the waste management system. When taking into account the changes in unclaimed deposits, the savings rise for Scenarios 2 and 3, but Scenario 1 becomes a cost, as seen in A 11.

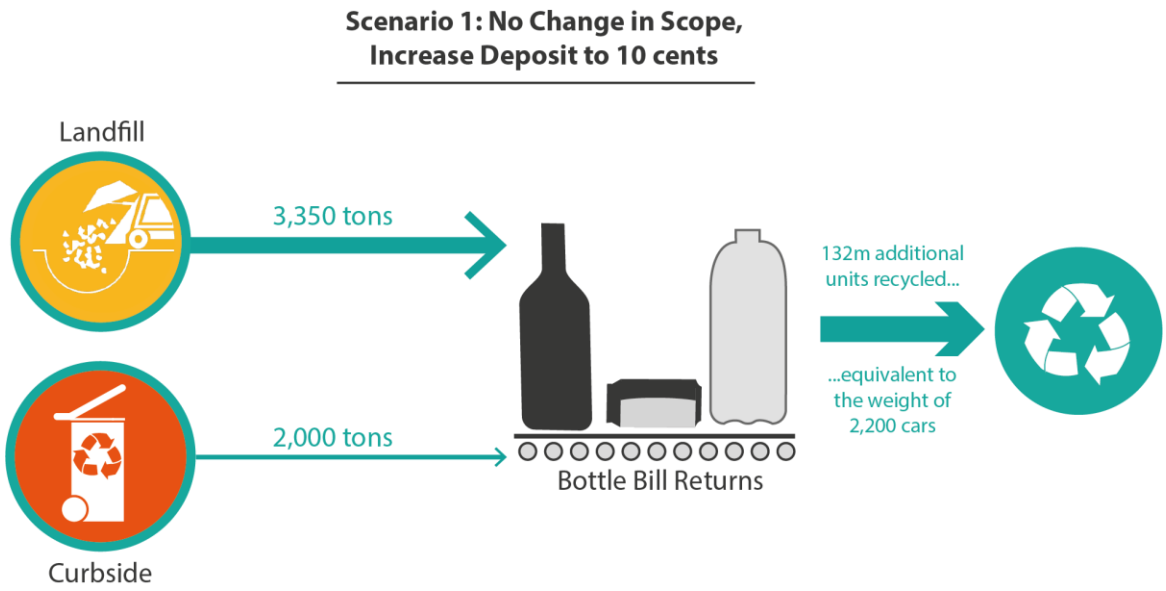
A 11: Cost Changes Including Unclaimed Deposits

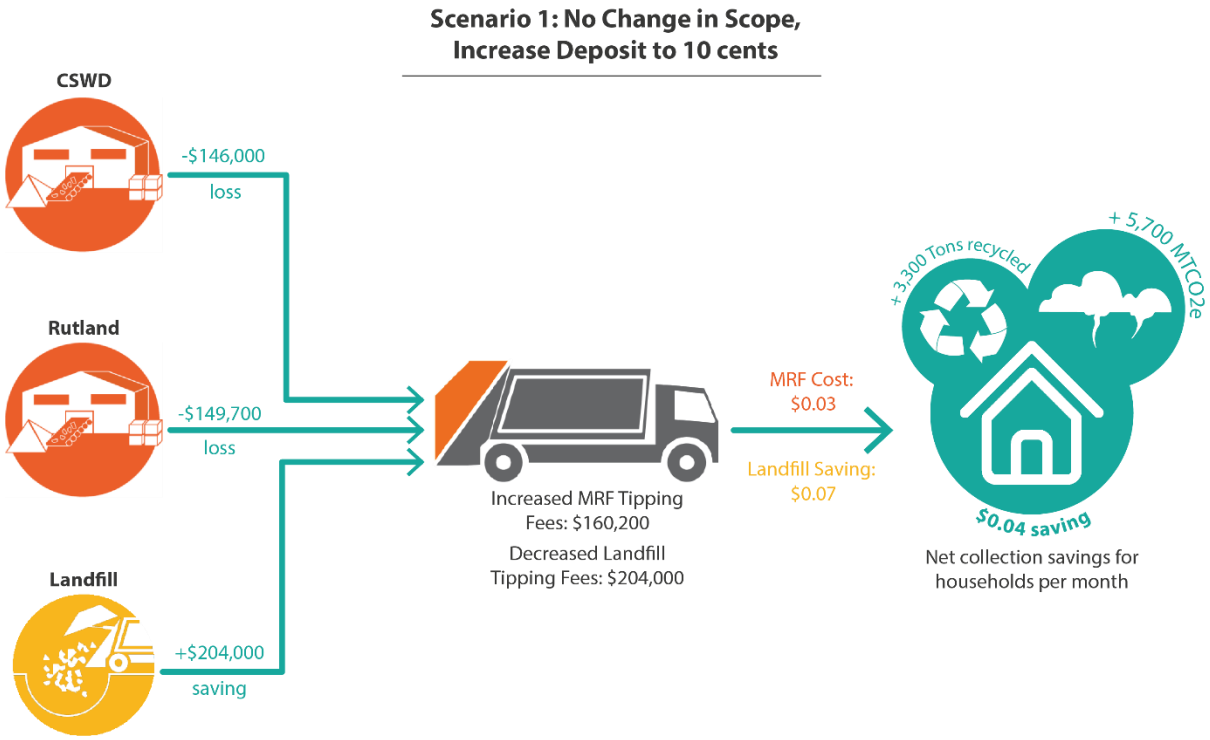


Source: Eunomia modelling

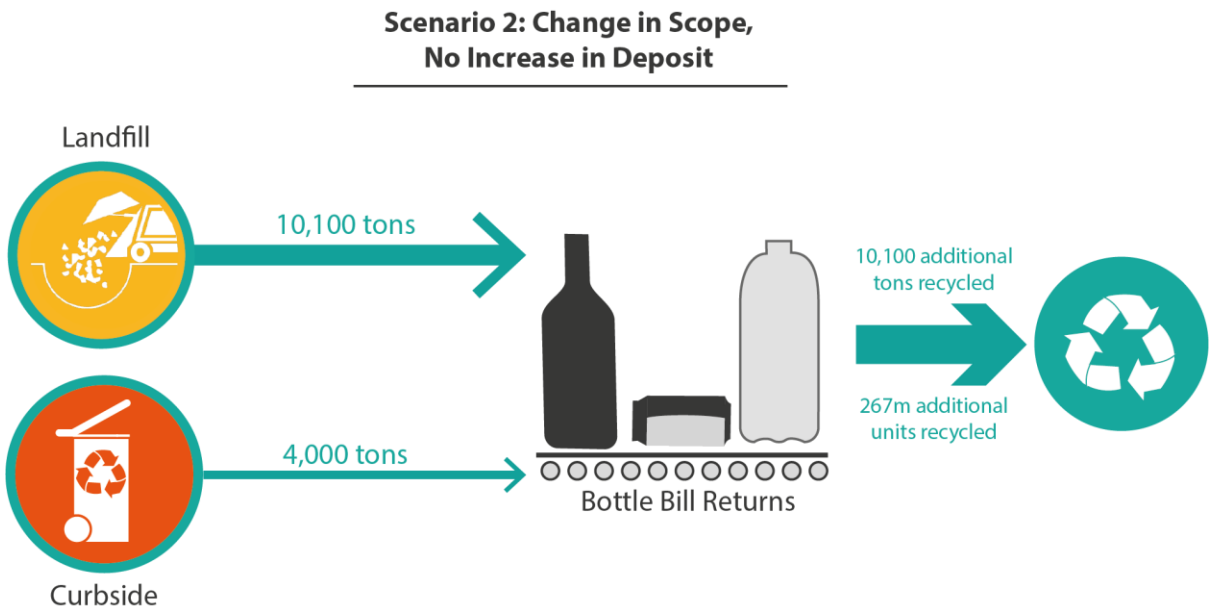
A.2.0 Scenarios 1 and 2 System Cost Benefit Diagrams

A.2.1 Scenario 1 Graphics





Scenario 2 Graphics



Scenario 2: Change in Scope, No Increase in Deposit