



EVALUATION OF FINANCIAL IMPACTS OF RECYCLING REFUND POLICY OPTIONS ON MRF OPERATIONS

PREPARED FOR THE CAN MANUFACTURERS INSTITUTE | DECEMBER 2023

Photo by [Jonathan Chng](#) on [Unsplash](#)



Managing change
in a resource-
constrained world.



ORGANICS
MANAGEMENT



WASTE
RECOVERY



GLOBAL CORPORATE
SUSTAINABILITY

since 1986



BACKGROUND

The Can Manufacturers Institute (CMI) seeks to understand the impact of recycling refund programs (also known as beverage container deposits or bottle bills) on the operating costs and revenues of material recovery facilities (MRFs) and their customers (e.g., municipalities). Furthermore, CMI seeks to evaluate the relative benefits of different policy mechanisms to compensate MRFs and offset any losses.

This analysis is based on a model MRF. It is important to understand that MRF operations are highly variable. While this analysis provides data that is directionally valid, there are many factors that may influence the financial impact of recycling refunds on MRFs and their customers. Policy should consider these variations and err on the side of higher levels of compensation in the early stages of program implementation to reduce the likelihood of financial disruption.



ACKNOWLEDGEMENTS

This analysis draws on the results of a study, *The Impact of Beverage Container Deposits on Municipal Recycling Processing Costs*, completed by RRS for the National Waste and Recycling Association (NWRA) in 2022. To maintain consistency among these analyses, the facility size and core methodology used in the NWRA study for evaluating MRF cost and revenue impacts was kept constant, although key factors (e.g., commodity revenues, processing fees) were updated.

Eureka Recycling supported the project by reviewing the model and the assumptions. While the model is not based on Eureka's operations, their understanding of MRF operations provided an important "reality check" to this effort.

The NWRA study recommended policy mechanisms be developed to offset the impact of recycling refund programs on MRFs. This study evaluates policy options to achieve that objective.

KEY TAKEAWAYS

- Recycling refund programs impact MRF costs and revenues, including reduced commodity revenue, reduced processing revenue, and variable cost savings
 - With the assumed revenue share of 80% to the MRF Customer (e.g., municipalities) and 20% to the MRF, commodity revenue losses have a greater impact on MRF customers than on MRFs.
 - The processing revenue impact is a loss to the MRF and a savings to the MRF customers; it has the effect of shifting more of the financial impact to the MRF.
 - Variable cost savings are expected to be realized by the MRF
- The financial impact of recycling refund programs on MRFs can be offset by revenue from the recycling refund program.
 - Two options to provide resources to MRFs were evaluated:
 - Sharing with MRFs recycling refund program scrap revenue.
 - Paying MRFs the deposit value for a portion of the beverage containers they continue to process
 - For each option, the analysis identified the “break even” point where revenue from the recycling refund program would fully offset financial impacts to the model MRF. Note that the model MRF was designed through a project with NWRA to be representative of “typical” MRF operations. However, given the variability in MRF operations, the break even point may be substantially higher than the model. The average break even point of the five and ten cent deposit scenarios were:
 - ~18% of the deposit program scrap value if MRFs continue to market (and retain revenue from) the materials they process, or ~25% if MRFs do not market processed beverage containers.
 - ~30% of the recycling refund value for the beverage containers that continue to flow through the MRF if the MRF continues to market (and retain revenue from) the materials they process, or ~46% if the MRFs do not market processed beverage containers.

METHODOLOGY

- Base Deposit Scenarios Evaluated

	BEVERAGES INCLUDED	DEPOSIT AMOUNT
Scenario 1	All beverages (excluding milk)	\$0.05
Scenario 2	All beverages (excluding milk)	\$0.10

- Key Assumptions:

- Aluminum, Glass and PET beverage containers included
- HDPE and Carton beverage containers, which primarily contain milk, are excluded
- Redemption rates based on Reclay StewardEdge - Recycling Refund System Cost-Benefit Analysis - 2014
- \$0.05 deposit yields 76.5 percent of the \$0.10 deposit redemption rate
- Study only evaluates MRF impacts, not at impacts on collection costs, waste disposal savings, etc.

METHODOLOGY

• MRF Financial Impact Mitigation Options Evaluated

	DESCRIPTION	VARIATIONS
Option 1	MRFs share in a portion of the total scrap value of the redeemed beverage containers	<ul style="list-style-type: none">• 5% of scrap value• 10% of scrap value• Break even point
Option 2	MRFs are paid a portion of the deposit value for the beverage containers placed in the recycling system	<ul style="list-style-type: none">• 80% of deposit value• 60% of deposit value• Break even point

- Key Assumptions:

- MRFs market and receive revenue from the beverage containers they process
- Material recovered through the deposit system is sold at a premium

• Alternate Assumption Analysis

- MRFs do not market and receive revenue from the beverage containers they process

- Alternate modeled due to uncertainty in how MRF processed beverage material will be handled
- Scenario is undesirable to MRFs as producing beverage only commodities is very challenging or impractical

EXECUTIVE SUMMARY (NATIONAL ANALYSIS)

Deposit Program Impact on Recycling Rates

MATERIAL	NON-DEPOSIT SCENARIO	SCENARIO 1 <i>ALL BEVERAGE, \$0.05</i>	SCENARIO 2 <i>ALL BEVERAGE, \$0.10</i>
PET Beverage Containers	29%	65%	77%
Glass Beverage Containers	40%	73%	83%
Aluminum Beverage Containers	50%	81%	91%

Estimated Impact of Deposits on Model MRF and MRF Customers

	SCENARIO 1 <i>ALL BEVERAGE, \$0.05</i>	SCENARIO 2 <i>ALL BEVERAGE, \$0.10</i>
Total Net Impact/Ton Processed	(\$14.50)	(\$19.70)
Total Net Impact	(\$1,157,900)	(\$1,495,200)

- Largest impacts are related to commodity and processing revenue

MRF Financial Impact Mitigation Options Analysis

BREAK EVEN	SCENARIO 1 <i>ALL BEVERAGE, \$0.05</i>	SCENARIO 2 <i>ALL BEVERAGE, \$0.10</i>
Break Even % Scrap Value	18%	18%
Break Even % Deposit Value	26%	34%

- Scrap Value: MRFs share in a portion of the total scrap value of the redeemed beverage containers
- Deposit Value: MRFs are paid a portion of the deposit value for the beverage containers placed in the recycling system
- Both options provide an avenue to keep the system whole as the deposit program is initiated.

EXECUTIVE SUMMARY (MINNESOTA ANALYSIS)

Deposit Program Impact on Recycling Rates

MATERIAL	NON-DEPOSIT SCENARIO	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
PET Beverage Containers	29%	65%	77%
Glass Beverage Containers	40%	73%	83%
Aluminum Beverage Containers	50%	81%	91%

Estimated Impact of Deposits on Model MRF and MRF Customers

	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
Total Net Impact/Ton Processed	(\$20.20)	(\$27.80)
Total Net Impact	(\$1,600,400)	(\$2,085,500)

- Largest impacts are related to commodity and processing revenue

MRF Financial Impact Mitigation Options Analysis

BREAK EVEN	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
Break Even % Scrap Value	22%	22%
Break Even % Deposit Value	31%	43%

- Scrap Value: MRFs share in a portion of the total scrap value of the redeemed beverage containers
- Deposit Value: MRFs are paid a portion of the deposit value for the beverage containers placed in the recycling system
- Both options provide an avenue to keep the system whole as the deposit program is initiated.



COMPARISON OF NATIONAL AND MINNESOTA RESULTS

- Reasons Minnesota was chosen for analysis.
 - Eureka, a Minnesota-based MRF, was involved in supporting the research.
 - Minnesota had recycling refund bills introduced in 2023 (HF 3200/SF 3260) and is likely to have recycling refund bills considered again in 2024.
- The differences are driven by three factors.
 - Commodity revenue
 - National and MN differ due to a composition difference (see slides 16 and 31)
 - Commodity prices are the same for the both analyses
 - This is the main driver of the net impact difference between National and Minnesota analyses
 - Processing revenue
 - Processing fees are different, National = \$100/ton, MN = \$115/ton (see slides 19 and 34)
 - Variable costs
 - Sorter wages are different, \$17.36/hr National and \$19.14/hr MN (not directly shown but reflected on slides 20 and 35)
 - Based on Bureau of Labor Statistics data



MRF COST & REVENUE IMPACTS (NATIONAL)



OVERVIEW OF MRF COST AND REVENUE IMPACTS OF RECYCLING REFUND PROGRAMS

- Commodity revenue reduced due to loss of key commodities
- Processing revenue is reduced due to fewer tons processed
- Variable cost savings result from fewer tons processed



MODEL ASSUMPTIONS FOR MRF COST AND REVENUE IMPACT

- U.S. MRF, sized at 93,600 TPY, serving a community of ~1.25M people
- Equipment run time and labor cost are reduced with fewer processed tons
- Measurable direct variable cost savings were calculated for each material
 - Indirect impacts cannot be modeled without additional testing / measurement
- Revenue impact assumes 5-year average commodity value
- All tables are populated with rounded values and may not sum or multiply to given totals.
 - Per ton impacts are rounded to the nearest \$0.10
 - Tonnages are rounded to the nearest 10 tons
 - Impacts are rounded to the nearest \$100

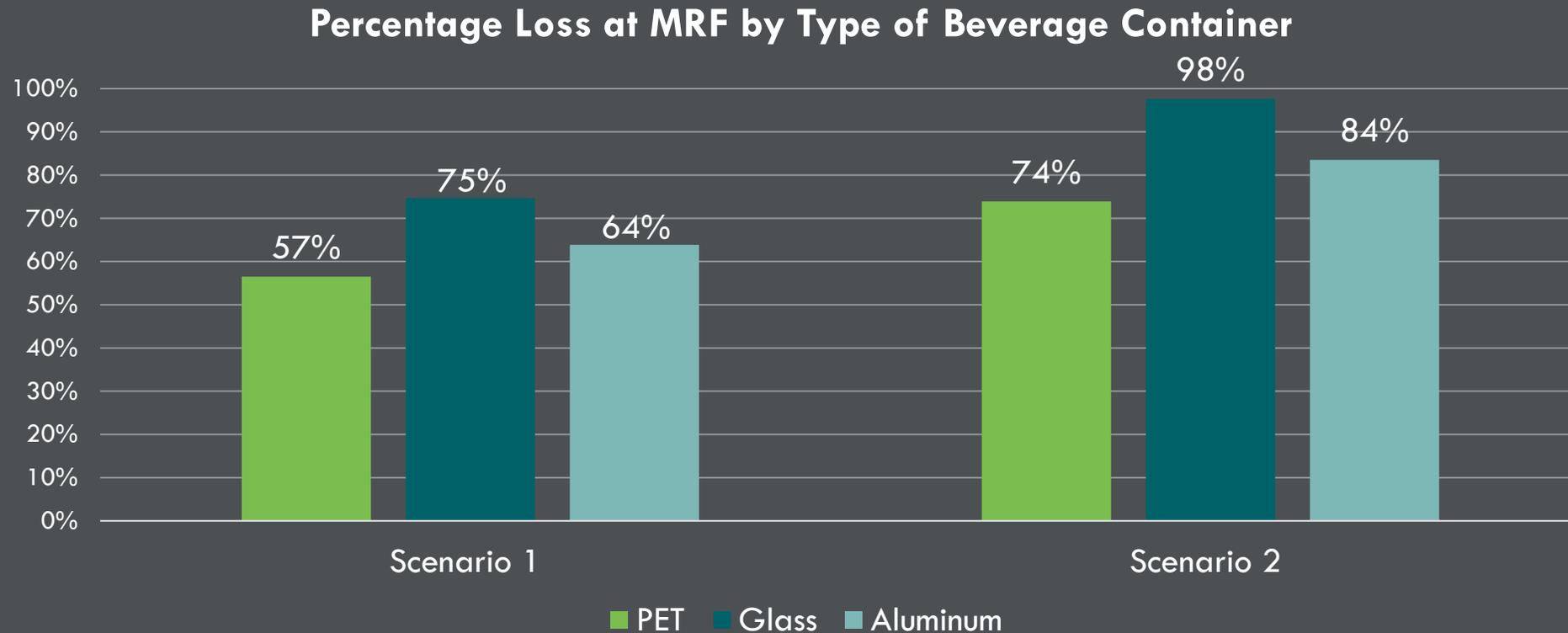
DEPOSIT PROGRAM IMPACT ON BEVERAGE CONTAINER RECYCLING RATES

MATERIAL	NON-DEPOSIT SCENARIO	SCENARIO 1 <i>ALL BEVERAGE, \$0.05</i>	SCENARIO 2 <i>ALL BEVERAGE, \$0.10</i>
PET Beverage Containers	29%	65%	77%
Glass Beverage Containers	40%	73%	83%
Aluminum Beverage Containers	50%	81%	91%

Recycling rates include both material recycled through MRFs and captured through deposit systems.

PERCENT OF BEVERAGE CONTAINERS MOVED FROM MRFS TO DEPOSITS

When a beverage container deposit system is implemented, material that was previously recycled at curbside will instead be redeemed for the deposit. The amount of each MRF beverage container stream that is redirected (from the MRF to the deposit system) in the modeled system is presented below.



AVERAGE COMMODITY REVENUE (ACR) OF MRF TON

MATERIAL	PRICE/TON (JUL. 2023)	PRICE/TON (5-YEAR AVG.) BEFORE DEPOSIT	PRICE/TON (5-YEAR AVG.) AFTER DEPOSIT	PRICE/TON (DEPOSIT)	PRE-DEPOSIT COMPOSITION	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
SRPN	\$35	\$49	\$49		5.1%	6.0%	6.3%
Mixed Paper	\$10	\$25	\$25		20.3%	23.7%	25.0%
OCC	\$46	\$79	\$79		23.3%	27.2%	28.7%
Glass (Beverage)	(\$24)	(\$23)	(\$23)	\$25	15.1%	4.5%	0.4%
Glass (Non-Beverage)	(\$24)	(\$23)	(\$23)		2.9%	3.4%	3.6%
Aluminum (Beverage)	\$1,397	\$1,307	\$1,307	\$1,307	1.5%	0.6%	0.3%
Aluminum (Non-Beverage)	\$1,397	\$1,307	\$1,307		0.4%	0.5%	0.5%
Steel Cans	\$196	\$170	\$170		1.9%	2.2%	2.3%
PET (Beverage)	\$223	\$304	\$266	\$544	3.9%	2.0%	1.3%
PET (Non-Beverage)	\$223	\$304	\$266		1.3%	1.5%	1.6%
Natural HDPE	\$1,165	\$1,094	\$1,094		1.3%	1.5%	1.6%
Colored HDPE	\$217	\$372	\$372		1.8%	2.1%	2.2%
Mixed Plastics	\$16	\$6	\$6		2.8%	3.3%	3.4%
Carton/Aseptic	\$3	\$17	\$17		0.4%	0.5%	0.5%
Residue	(\$60)	(\$60)	(\$60)		18.0%	21.0%	22.2%
ACR of MRF Ton (Jul. 2023)					\$61	\$53	\$50
ACR of MRF Ton (5-yr avg.)					\$76	\$68	\$66

TONS OF MATERIALS REMOVED FROM MODEL MRF (93,600 TPY)

When a beverage container deposit system is implemented, material that was previously recycled at curbside will instead be redeemed for the deposit. The amount of each MRF beverage container stream that is redirected (from the MRF to the deposit system) in the modeled system is presented below.

	SCENARIO 1 <i>ALL BEVERAGE, \$0.05</i>	SCENARIO 2 <i>ALL BEVERAGE, \$0.10</i>
PET Beverage Containers	2,060	2,700
Glass Beverage Containers	10,520	13,760
Aluminum Beverage Containers	900	1,170
Total	13,480	17,630

IMPACT OF DEPOSITS ON MODEL MRF COMMODITY REVENUE (PER TON PROCESSED)

	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
All Remaining MRF PET	(\$1.30)	(\$1.10)
PET Beverage Containers	(\$7.80)	(\$10.80)
Glass Beverage Containers	\$3.10	\$4.20
Aluminum Beverage Containers	(\$14.60)	(\$20.20)
Revenue Loss Total	(\$20.70)	(\$27.80)
Revenue Loss MRF (20%)	(\$4.10)	(\$5.60)
Revenue Loss MRF Customer (80%)	(\$16.60)	(\$22.30)

- All remaining MRF PET has a lower commodity value because of a higher proportion of PET thermoforms.
- Analysis assumes a MRF customer/MRF revenue split of 80%/20%
- This arrangement is typical of MRF contracts and shows how commodity revenue losses have a greater impact on MRF customers (e.g., local governments) than on MRFs

IMPACT OF DEPOSITS ON MODEL MRF PROCESSING REVENUE (PER TON PROCESSED)

	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
Reduced Tonnage at MRF	13,480	17,630
Processing Fee Per Ton	\$100.00	\$100.00
Revenue Loss MRF	(\$16.80)	(\$23.20)
Processing Savings MRF Customer	\$16.80	\$23.20

- A processing revenue loss to the MRF is a savings to MRF customers as the deposit system now manages those tons.
- In the net impact, processing is a wash, but it shifts more of the impact on the MRF.

IMPACT OF DEPOSIT SYSTEMS ON MODEL MRF VARIABLE COSTS (PER TON PROCESSED)

	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
Labor Cost Savings Per Ton	\$4.30	\$6.00
PET Beverage Containers	\$1.10	\$1.30
Glass Beverage Containers	\$0.00	\$0.00
Aluminum Beverage Containers	\$0.80	\$0.90
Variable Cost Savings	\$6.30	\$8.10

- Variable cost savings reflect direct labor, equipment, and plant variables for each material and are assumed to be entirely realized by the MRF.
- Most of the savings comes from reduced labor due to fewer processed tons. This will vary widely depending on actual MRF staffing, processing bottle necks, and level of automation.

ESTIMATED IMPACT OF DEPOSITS ON MODEL MRF AND MRF CUSTOMERS

	MRF IMPACT		MRF CUSTOMER IMPACT		TOTAL IMPACT	
	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
Commodity Revenue	(\$4.10)	(\$5.60)	(\$16.60)	(\$22.30)	(\$20.70)	(\$27.80)
Processing Revenue	(\$16.80)	(\$23.20)	\$16.80	\$23.20	\$0.00	\$0.00
Variable Cost	\$6.30	\$8.10	-	-	\$6.30	\$8.10
Net Impact/Ton	(\$14.70)	(\$20.60)	\$0.30	\$1.00	(\$14.50)	(\$19.70)
Tonnage Basis	80,120	75,970	80,120	75,970	80,120	75,970
Net Impact	(\$1,178,400)	(\$1,567,600)	\$20,500	\$72,400	(\$1,157,900)	(\$1,495,200)

Assumes MRF designed for 93,600 TPY (before deposit) serves community of ~1.25m people in 473,000 households.

CHANGE IN NET IMPACT BETWEEN SCENARIO WHERE MRFS MARKET THE MATERIAL AND ALTERNATIVE SCENARIO WHERE MRFS DO NOT MARKET THE MATERIAL

	<i>MRF IMPACT</i>		<i>MRF CUSTOMER IMPACT</i>		<i>TOTAL IMPACT</i>	
	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
Commodity Revenue Change	(\$2.40)	(\$1.30)	(\$9.50)	(\$5.30)	(\$11.90)	(\$6.60)
Processing Revenue Change	-	-	-	-	-	-
Variable Cost Change	-	-	-	-	-	-
Net Impact/Ton Change	(\$2.40)	(\$1.30)	(\$9.50)	(\$5.30)	(\$11.90)	(\$6.60)
Tonnage Basis	80,120	75,970	80,120	75,970	80,120	75,970
Net Impact Change	(\$191,100)	(\$100,300)	(\$764,200)	(\$401,300)	(\$955,300)	(\$501,700)
Net Impact Total	(\$1,369,400)	(\$1,668,000)	(\$743,800)	(\$328,900)	(\$2,113,200)	(\$1,996,900)

- Only commodity revenue losses increase, analysis does not account for the effort to produce beverage only commodities.
- As stated previously, commodity revenue losses have a greater impact on MRF customers.
- Net Impact Total is calculated by adding the Net Impact calculated for the scenario where the MRFs market the material and the Net Impact Change going from that scenario to one where the MRFs do not market the material.

DISPOSAL COST SAVINGS FOR AREA SERVED BY MODEL MRF

	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
Reduced Tonnage in Disposal	17,180	22,460
Landfill Tipping Fee Per Ton*	\$60.34	\$60.34
Disposal Cost Savings	\$1,036,600	\$1,355,500

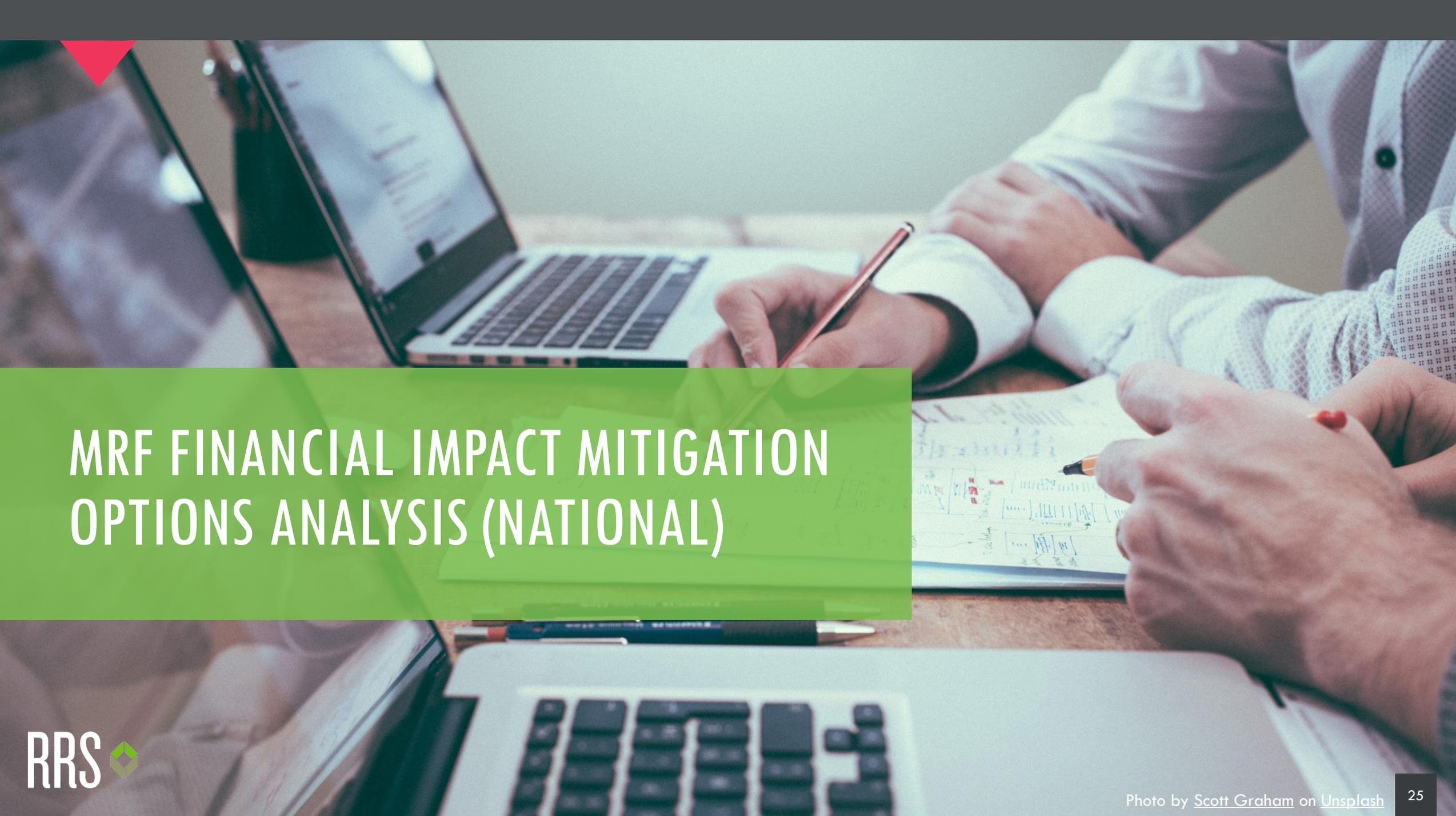
* EREF Analysis of MSW Landfill Tipping Fees - 2022

- Recycling Refund programs lead to a reduction in disposal costs as consumers return containers for recycling instead of throwing them in the trash.
- These savings are realized by whoever pays for disposal in the system (i.e., municipalities, haulers, ratepayers)
- These estimates are provided for context, but do not affect the financial impact of recycling refunds on MRFs and their customers.



OTHER IMPACTS OF BEVERAGE CONTAINER DEPOSITS

- Reduction in litter and marine debris and related clean up costs
 - Studies have found fewer beverage containers littered in states / jurisdictions with beverage container deposits
- Higher value materials more likely to be circular
 - Materials collected through deposit programs typically yield a price premium over materials processed at MRFs, reflecting higher quality / lower contamination
 - Deposit program materials are more likely to be recycled into new beverage containers

A photograph of a business meeting. In the foreground, a person's hands are visible, one holding a red pen and the other pointing at a document with a blue pen. The document contains a flowchart or diagram. In the background, another person is working on a laptop. The scene is set on a wooden desk. A green semi-transparent banner is overlaid on the middle of the image, containing the title text. A red triangle is in the top-left corner.

MRF FINANCIAL IMPACT MITIGATION OPTIONS ANALYSIS (NATIONAL)



BACKGROUND

- CMI is exploring two methods to mitigate the financial impact of recycling refund systems on MRFs and their customers. These methods could be incorporated into new recycling refund policies as they are adopted. Policy should also consider impacts on MRF cash flow as reimbursement schedules are developed.
 - Option 1: The organization that manages the recycling refund program is required to share a portion of the scrap value of all redeemed beverage containers (5% or 10%) with MRF operators.
 - Option 2: The organization that manages the recycling refund program is required to pay MRFs the refund value for a portion (60% or 80%) of the beverage containers that the MRF sorts and markets.
- Similar options are showing up in recycling refund bills.
 - Amended version of Illinois SB 85
 - 5% of scrap value going to the MRFs and drop-off facilities for seven years and up to 80% of the refund value going to MRFs and drop-off facilities if quality standards are met.
 - Washington State Wrap Act
 - MRFs can get the full refund value if certain criteria are met.
 - 2024 recycling refund bill in Minnesota
 - Not introduced yet but early drafts include provisions on revenue to MRFs from both scrap value and percent of redemption value.

OPTION 1: SCRAP VALUE SHARING

	5% SCRAP VALUE		10% SCRAP VALUE		BREAK EVEN	
	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
PET Beverage Containers	\$180,200	\$235,600	\$360,300	\$471,200	\$645,900	\$834,100
Glass Beverage Containers	\$27,800	\$36,400	\$55,700	\$72,800	\$99,800	\$128,900
Aluminum Beverage Containers	\$115,000	\$150,300	\$229,900	\$300,600	\$412,100	\$532,200
Total Share	\$323,000	\$422,300	\$645,900	\$844,700	\$1,157,900	\$1,495,200
Estimated Impact	(\$1,157,900)	(\$1,495,200)	(\$1,157,900)	(\$1,495,200)	(\$1,157,900)	(\$1,495,200)
Net	(\$834,900)	(\$1,072,900)	(\$512,000)	(\$650,500)	\$0	\$0
Break Even % Scrap Value (Base)					18%	18%
Break Even % Scrap Value (Alternate)					28%	22%

- The 5% and 10% scrap value sharing scenarios fall short of balancing the impact on the MRFs and their customers.
- Base analysis assumes that MRFs retain commodity revenue of the material processed, and that they achieve high quality for a MRF processor; it does not assume the MRF sorts a beverage container only mix, or that they achieve "grade A" or deposit quality.
- Alternate analysis assumes that MRFs do not retain commodity revenue of the beverage containers processed.

OPTION 2: DEPOSIT VALUE PAYMENT

	80% DEPOSIT VALUE		60% DEPOSIT VALUE		BREAK EVEN	
	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
PET Beverage Containers	\$1,780,600	\$2,137,300	\$1,335,400	\$1,603,000	\$568,600	\$910,000
Glass Beverage Containers	\$425,800	\$79,600	\$319,300	\$59,700	\$136,000	\$33,900
Aluminum Beverage Containers	\$1,419,300	\$1,294,800	\$1,064,400	\$971,100	\$453,300	\$551,300
Total Payment	\$3,625,600	\$3,511,700	\$2,719,200	\$2,633,800	\$1,157,900	\$1,495,200
Estimated Impact	(\$1,157,900)	(\$1,495,200)	(\$1,157,900)	(\$1,495,200)	(\$1,157,900)	(\$1,495,200)
Net	\$2,467,700	\$2,016,500	\$1,561,300	\$1,138,600	\$0	\$0
Break Even % Deposit Value (Base)					26%	34%
Break Even % Deposit Value (Alternate)					47%	45%

- A modest deposit value percentage payment can serve to keep MRFs and their customers "whole" as deposits are implemented.
- Base analysis assumes that MRFs retain commodity revenue of the material processed, and that they achieve high quality for a MRF processor; it does not assume the MRF sorts a beverage container only mix, or that they achieve "grade A" or deposit quality.
- Alternate analysis assumes that MRFs do not retain commodity revenue of the beverage material processed.



MRF COST & REVENUE IMPACTS (MN)



MODEL ASSUMPTIONS FOR MRF COST AND REVENUE IMPACT

- MN MRF, sized at 93,600 TPY, serving a community of ~1.25M people
- Equipment run time and labor cost are reduced with fewer processed tons
- Measurable direct variable cost savings were calculated for each material
 - Indirect impacts cannot be modeled without additional testing / measurement
- Revenue impact assumes 5-year average commodity value
- All tables are populated with rounded values and may not sum or multiply to given totals.
 - Per ton impacts are rounded to the nearest \$0.10
 - Tonnages are rounded to the nearest 10 tons
 - Impacts are rounded to the nearest \$100

AVERAGE COMMODITY REVENUE (ACR) OF MRF TON

MATERIAL	PRICE/TON (JUL. 2023)	PRICE/TON (5-YEAR AVG.) BEFORE DEPOSIT	PRICE/TON (5-YEAR AVG.) AFTER DEPOSIT	PRICE/TON (DEPOSIT)	PRE-DEPOSIT COMPOSITION	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
SRPN	\$35	\$49	\$49		22.0%	25.9%	27.5%
Mixed Paper	\$10	\$25	\$25		11.0%	13.0%	13.7%
OCC	\$46	\$79	\$79		26.0%	30.7%	32.5%
Glass (Beverage)	(\$24)	(\$23)	(\$23)	\$25	15.9%	4.8%	0.5%
Glass (Non-Beverage)	(\$24)	(\$23)	(\$23)		3.1%	3.7%	3.9%
Aluminum (Beverage)	\$1,397	\$1,307	\$1,307	\$1,307	2.3%	1.0%	0.5%
Aluminum (Non-Beverage)	\$1,397	\$1,307	\$1,307		0.1%	0.1%	0.1%
Steel Cans	\$196	\$170	\$170		1.8%	2.1%	2.2%
PET (Beverage)	\$223	\$304	\$266	\$544	3.4%	1.7%	1.1%
PET (Non-Beverage)	\$223	\$304	\$266		1.1%	1.3%	1.4%
Natural HDPE	\$1,165	\$1,094	\$1,094		1.0%	1.2%	1.2%
Colored HDPE	\$217	\$372	\$372		0.8%	0.9%	0.9%
Mixed Plastics	\$16	\$6	\$6		0.7%	0.8%	0.8%
Carton/Aseptic	\$3	\$17	\$17		0.3%	0.3%	0.3%
Residue	(\$84)	(\$84)	(\$84)		10.0%	11.8%	12.5%
ACR of MRF Ton (Jul. 2023)					\$69	\$55	\$50
ACR of MRF Ton (5-yr avg.)					\$83	\$71	\$68

TONS OF MATERIALS REMOVED FROM MODEL MRF (93,600 TPY)

When a beverage container deposit system is implemented, material that was previously recycled at curbside will instead be redeemed for the deposit. The amount of each MRF beverage container stream that is redirected (from the MRF to the deposit system) in the modeled system is presented below.

	SCENARIO 1 <i>ALL BEVERAGE, \$0.05</i>	SCENARIO 2 <i>ALL BEVERAGE, \$0.10</i>
PET Beverage Containers	1,790	2,330
Glass Beverage Containers	11,110	14,530
Aluminum Beverage Containers	1,350	1,760
Total	14,240	18,620

IMPACT OF DEPOSITS ON MODEL MRF COMMODITY REVENUE (PER TON PROCESSED)

	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
All Remaining MRF PET	(\$1.20)	(\$1.00)
PET Beverage Containers	(\$6.80)	(\$9.50)
Glass Beverage Containers	\$3.30	\$4.50
Aluminum Beverage Containers	(\$22.10)	(\$30.70)
Revenue Loss Total	(\$26.90)	(\$36.50)
Revenue Loss MRF (20%)	(\$5.40)	(\$7.30)
Revenue Loss MRF Customer (80%)	(\$21.50)	(\$29.20)

- All remaining MRF PET has a lower commodity value because of a higher proportion of PET thermoforms.
- Analysis assumes a MRF customer/MRF revenue split of 80%/20%
- This arrangement is typical of MRF contracts and shows how commodity revenue losses have a greater impact on MRF customers (e.g., local governments) than on MRFs

IMPACT OF DEPOSITS ON MODEL MRF PROCESSING REVENUE (PER TON PROCESSED)

	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
Reduced Tonnage at MRF	14,240	18,620
Processing Fee Per Ton	\$115.00	\$115.00
Revenue Loss MRF	(\$20.60)	(\$28.60)
Processing Savings MRF Customer	\$20.60	\$28.60

- A processing revenue loss to the MRF is a savings to MRF customers as the deposit system now manages those tons.
- In the net impact, processing is a wash, but it shifts more of the impact on the MRF.

IMPACT OF DEPOSIT SYSTEMS ON MODEL MRF VARIABLE COSTS (PER TON PROCESSED)

	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
Labor Cost Savings Per Ton	\$4.60	\$6.40
PET Beverage Containers	\$1.20	\$1.30
Glass Beverage Containers	\$0.00	\$0.00
Aluminum Beverage Containers	\$1.00	\$1.00
Variable Cost Savings	\$6.70	\$8.70

- Variable cost savings reflect direct labor, equipment, and plant variables for each material and are assumed to be entirely realized by the MRF.
- Most of the savings comes from reduced labor due to fewer processed tons. This will vary widely depending on actual MRF staffing, processing bottle necks, and level of automation.

ESTIMATED IMPACT OF DEPOSITS ON MODEL MRF AND MRF CUSTOMERS

	MRF IMPACT		MRF CUSTOMER IMPACT		TOTAL IMPACT	
	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
Commodity Revenue	(\$5.40)	(\$7.30)	(\$21.50)	(\$29.20)	(\$26.90)	(\$36.50)
Processing Revenue	(\$20.60)	(\$28.60)	\$20.60	\$28.60	\$0.00	\$0.00
Variable Cost	\$6.70	\$8.70	-	-	\$6.70	\$8.70
Net Impact/Ton	(\$19.30)	(\$27.10)	(\$0.90)	(\$0.70)	(\$20.20)	(\$27.80)
Tonnage Basis	79,360	74,981	79,360	74,981	79,360	74,981
Net Impact	(\$1,531,300)	(\$2,034,600)	(\$69,100)	(\$50,900)	(\$1,600,400)	(\$2,085,500)

Assumes MRF designed for 93,600 TPY (before deposit) serves community of ~1.25m people in 473,000 households.

CHANGE IN NET IMPACT BETWEEN SCENARIO WHERE MRFS MARKET THE MATERIAL AND ALTERNATIVE SCENARIO WHERE MRFS DO NOT MARKET THE MATERIAL

	<i>MRF IMPACT</i>		<i>MRF CUSTOMER IMPACT</i>		<i>TOTAL IMPACT</i>	
	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10	SCENARIO 1 <i>ALL BEVERAGE,</i> \$0.05	SCENARIO 2 <i>ALL BEVERAGE,</i> \$0.10
Commodity Revenue Change	(\$3.10)	(\$1.70)	(\$12.40)	(\$6.70)	(\$15.50)	(\$8.30)
Processing Revenue Change	-	-	-	-	-	-
Variable Cost Change	-	-	-	-	-	-
Net Impact/Ton Change	(\$3.10)	(\$1.70)	(\$12.40)	(\$6.70)	(\$15.50)	(\$8.30)
Tonnage Basis	79,360	74,981	79,360	74,981	79,360	74,981
Net Impact Change	(\$246,300)	(\$124,900)	(\$985,200)	(\$499,600)	(\$1,231,500)	(\$624,600)
Net Impact Total	(\$1,777,600)	(\$2,159,500)	(\$1,054,300)	(\$550,500)	(\$2,831,900)	(\$2,710,000)

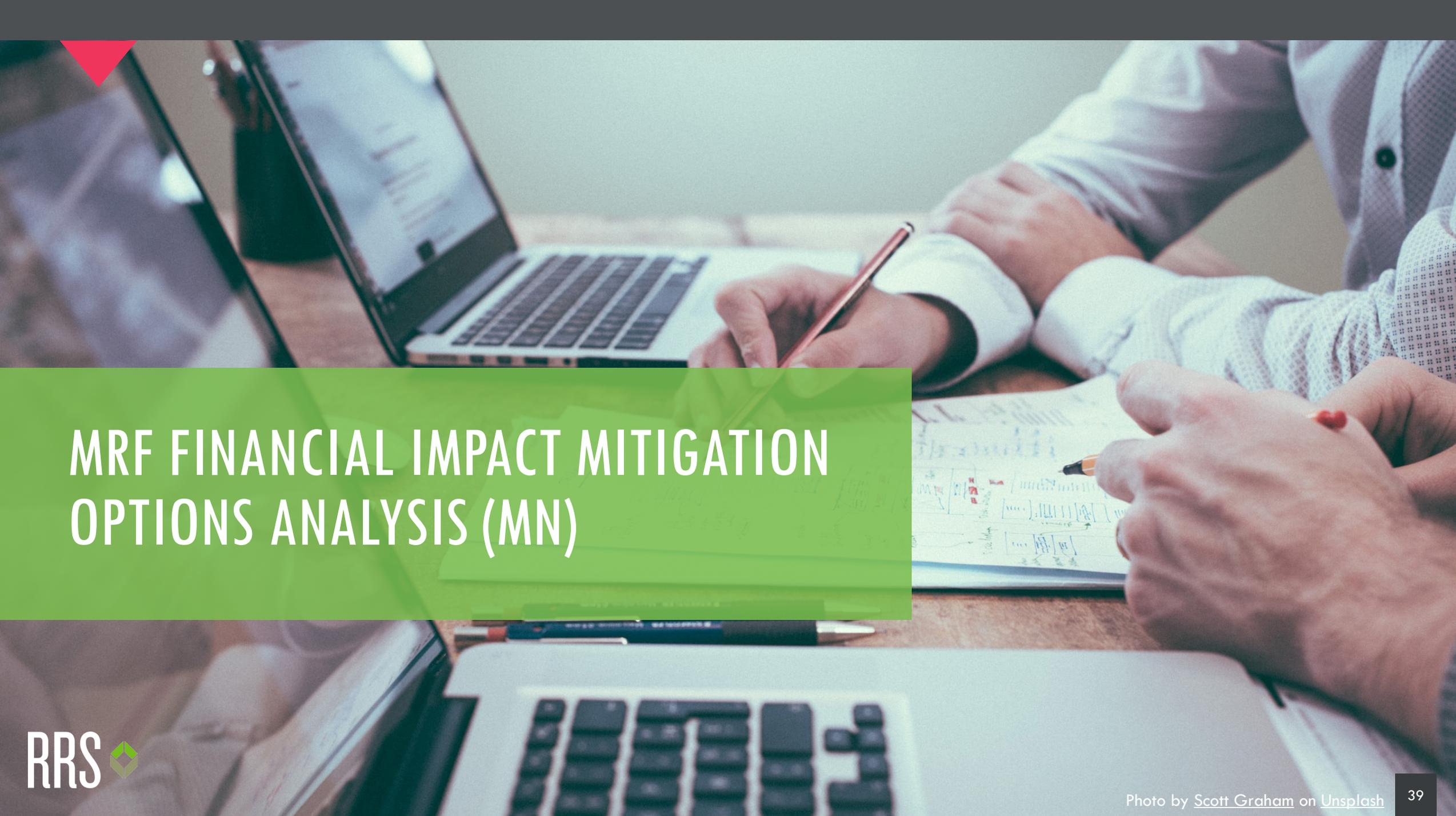
- Only commodity revenue losses increase, analysis does not account for the effort to produce beverage only commodities.
- As stated previously, commodity revenue losses have a greater impact on MRF customers.
- Net Impact Total is calculated by adding the Net Impact calculated for the scenario where the MRFs market the material and the Net Impact Change going from that scenario to one where the MRFs do not market the material.

DISPOSAL COST SAVINGS FOR AREA SERVED BY MODEL MRF

	SCENARIO 1 <i>ALL BEVERAGE, \$0.05</i>	SCENARIO 2 <i>ALL BEVERAGE, \$0.10</i>
Reduced Tonnage in Disposal	17,180	22,460
Landfill Tipping Fee Per Ton*	\$83.66	\$83.66
Disposal Cost Savings	\$1,476,500	\$1,930,900

* EREF Analysis of MSW Landfill Tipping Fees - 2022

- Recycling Refund programs lead to a reduction in disposal costs as consumers return containers for recycling instead of throwing them in the trash.
- These savings are realized by whoever pays for disposal in the system (i.e., municipalities, haulers, ratepayers)
- These estimates are provided for context, but do not affect the financial impact of recycling refunds on MRFs and their customers.

A photograph of a business meeting. In the foreground, a person's hands are visible, one holding a red pen and the other pointing at a document with a blue pen. The document contains a flowchart or diagram. In the background, another person is working on a laptop. The scene is set on a wooden desk. A green semi-transparent banner is overlaid on the middle of the image, containing the title text. A red triangle is in the top left corner.

MRF FINANCIAL IMPACT MITIGATION OPTIONS ANALYSIS (MN)



BACKGROUND

- CMI is exploring two methods to mitigate the financial impact of recycling refund systems on MRFs and their customers. These methods could be incorporated into new recycling refund policies as they are adopted. Policy should also consider impacts on MRF cash flow as reimbursement schedules are developed.
 - Option 1: The organization that manages the recycling refund program is required to share a portion of the scrap value of all redeemed beverage containers (5% or 10%) with MRF operators.
 - Option 2: The organization that manages the recycling refund program is required to pay MRFs the refund value for a portion (60% or 80%) of the beverage containers that the MRF sorts and markets.
- Similar options are showing up in recycling refund bills.
 - Amended version of Illinois SB 85
 - 5% of scrap value going to the MRFs and drop-off facilities for seven years and up to 80% of the refund value going to MRFs and drop-off facilities if quality standards are met.
 - Washington State Wrap Act
 - MRFs can get the full refund value if certain criteria are met.
 - 2024 recycling refund bill in Minnesota
 - Not introduced yet but early drafts include provisions on revenue to MRFs from both scrap value and percent of redemption value.

OPTION 1: SCRAP VALUE SHARING

	5% SCRAP VALUE		10% SCRAP VALUE		BREAK EVEN	
	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
PET Beverage Containers	\$155,900	\$203,900	\$311,800	\$407,800	\$697,500	\$908,900
Glass Beverage Containers	\$29,400	\$38,400	\$58,800	\$76,900	\$131,500	\$171,400
Aluminum Beverage Containers	\$172,400	\$225,500	\$344,900	\$451,000	\$771,400	\$1,005,200
Total Share	\$357,700	\$467,800	\$715,500	\$935,600	\$1,600,400	\$2,085,500
Estimated Impact	(\$1,600,400)	(\$2,085,500)	(\$1,600,400)	(\$2,085,500)	(\$1,600,400)	(\$2,085,500)
Net	(\$1,242,700)	(\$1,617,700)	(\$884,900)	(\$1,149,900)	\$0	\$0
Break Even % Scrap Value (Base)					22%	22%
Break Even % Scrap Value (Alternate)					33%	27%

- The 5% and 10% scrap value sharing scenarios fall short of balancing the impact on the MRFs and their customers.
- Base analysis assumes that MRFs retain commodity revenue of the material processed, and that they achieve high quality for a MRF processor; it does not assume the MRF sorts a beverage container only mix, or that they achieve "grade A" or deposit quality.
- Alternate analysis assumes that MRFs do not retain commodity revenue of the beverage material processed.

OPTION 2: DEPOSIT VALUE PAYMENT

	80% DEPOSIT VALUE		60% DEPOSIT VALUE		BREAK EVEN	
	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10	SCENARIO 1 ALL BEVERAGE, \$0.05	SCENARIO 2 ALL BEVERAGE, \$0.10
PET Beverage Containers	\$1,540,900	\$1,849,600	\$1,155,700	\$1,387,200	\$598,700	\$995,200
Glass Beverage Containers	\$449,400	\$84,000	\$337,100	\$63,000	\$174,600	\$45,200
Aluminum Beverage Containers	\$2,128,900	\$1,942,200	\$1,596,700	\$1,456,600	\$827,100	\$1,045,000
Total Payment	\$4,119,200	\$3,875,800	\$3,089,400	\$2,906,900	\$1,600,400	\$2,085,500
Estimated Impact	(\$1,600,400)	(\$2,085,500)	(\$1,600,400)	(\$2,085,500)	(\$1,600,400)	(\$2,085,500)
Net	\$2,518,800	\$1,790,300	\$1,489,000	\$821,400	\$0	\$0
Break Even % Deposit Value (Base)					31%	43%
Break Even % Deposit Value (Alternate)					55%	56%

- A modest deposit value percentage payment can serve to keep MRFs and their customers "whole" as deposits are implemented.
- Base analysis assumes that MRFs retain commodity revenue of the material processed, and that they achieve high quality for a MRF processor; it does not assume the MRF sorts a beverage container only mix, or that they achieve "grade A" or deposit quality.
- Alternate analysis assumes that MRFs do not retain commodity revenue of the beverage material processed.



RESA DIMINO

MANAGING PRINCIPAL

518.610.8095

RESA@RECYCLE.COM

CHRIS KING

SENIOR ENGINEER

505.270.9945

CKING@RECYCLE.COM