# Environmental Impacts and Social Costs of Recycling

David Allaway, DEQ
August 13, 2020

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Waste impact calculator, social cost accounting

Cascadia Consulting Group: Infrastructure Scenario Evaluation

| Tons (by Material) | Direct Transactional Costs | Other Evaluation Criteria |

Waste Impact Calculator → Environmental Cost Accounting → Full Social Cost Accounting

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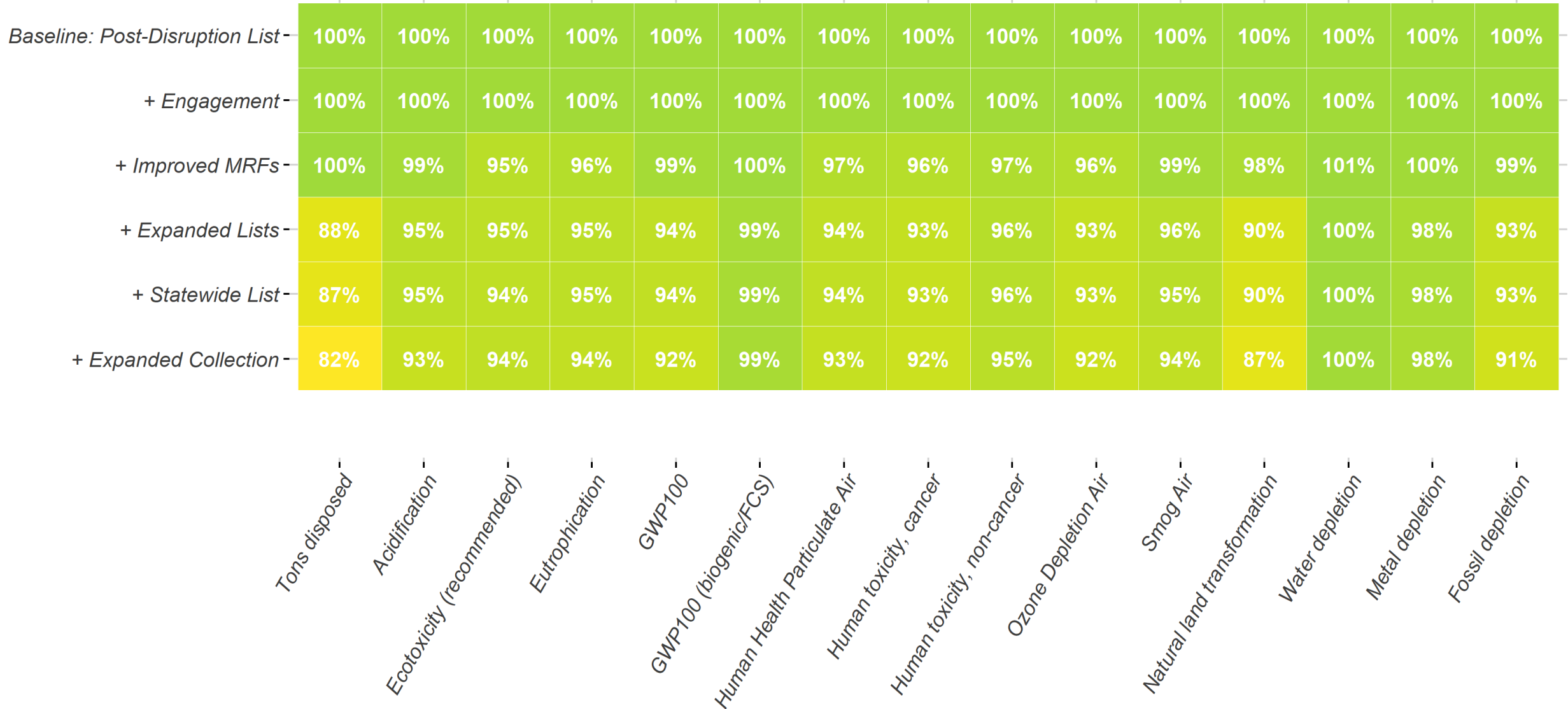
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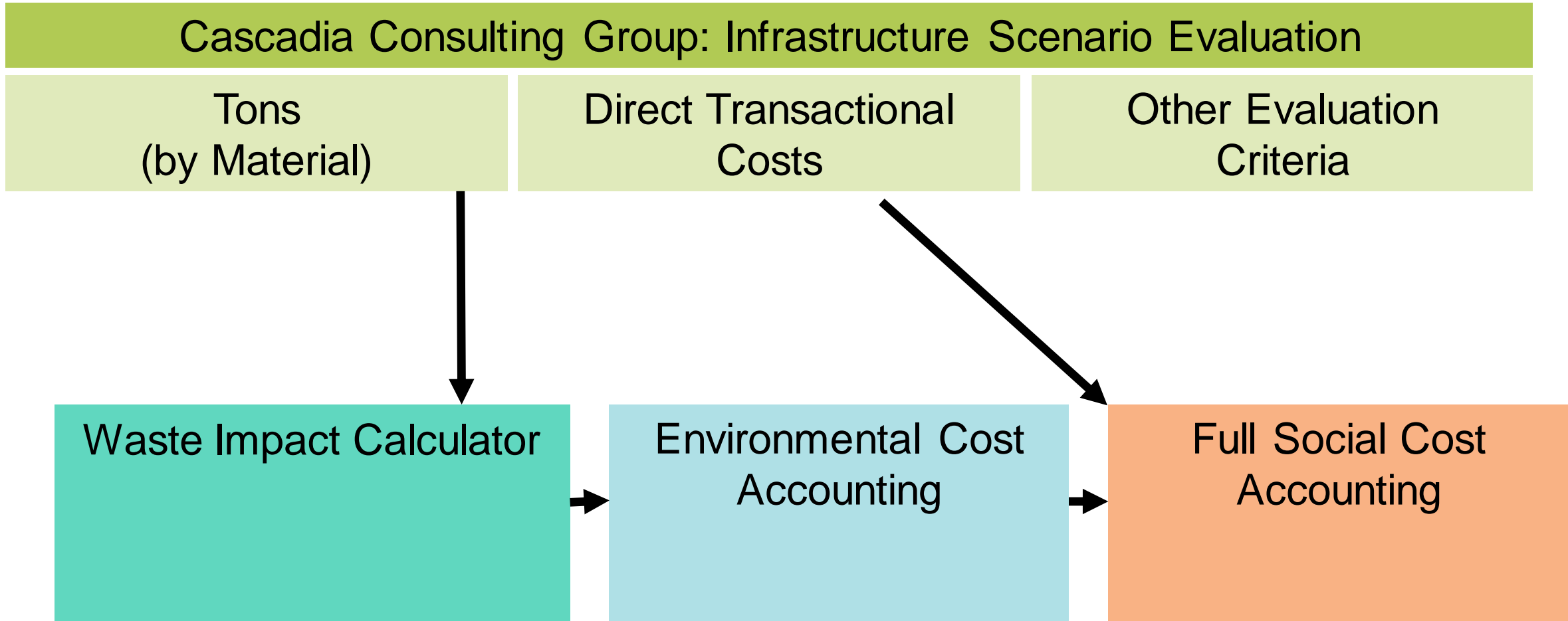
Technical documents on the project website

- Cascadia's detailed tonnage, baler and cost models
- Full model results and other supplemental information

www.oregon.gov/deq/recycling/Pages/Recycling-Steering-Committee-Resources.aspx

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Draft environmental impact results as a heatmap

Heatmap of scenario impacts (as % of baseline)

	Tons disposed	Acidification	Ecotoxicity (recommended)	Eutrophication	GWP100	GWP100 (biogenic/FCS)	Human Health Particulate Air	Human toxicity, cancer	Human toxicity, non-cancer	Ozone Depletion Air	Smog Air	Natural land transformation	Water depletion	Metal depletion	Fossil depletion
Baseline: Post-Disruption List	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
+ Engagement	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
+ Improved MRFs	100%	99%	95%	96%	99%	100%	97%	96%	97%	96%	99%	98%	101%	100%	99%
+ Expanded Lists	88%	95%	95%	95%	94%	99%	94%	93%	96%	93%	96%	90%	100%	98%	93%
+ Statewide List	87%	95%	94%	95%	94%	99%	94%	93%	96%	93%	95%	90%	100%	98%	93%
+ Expanded Collection	82%	93%	94%	94%	92%	99%	93%	92%	95%	92%	94%	87%	100%	98%	91%

Total cost formula

Transactional Costs + **Environmental Costs** = **Total Costs**

Three adjustments to compare transactional and social costs:

1. Compare marginal costs (from base case), not totals
2. Convert to constant units (2019 dollars)
3. Expressed as ranges, not points

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What is the range of uncertainty?

Recycling "Worst Case"

Highest Increase in Gross Transactional Costs

–

Lowest Increase in Revenue

+

Lowest Increase in Environmental Benefit

Recycling "Best Case"

Lowest Increase in Gross Transactional Costs

–

Highest Increase in Revenue

+

Highest Increase in Environmental Benefit

Where should improvements be made and are they justified?

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What happens when you conduct customer engagement only?

Adding customer engagement relative to post-disruption baseline (CY 2025 costs, millions of 2019$)

		Net Transactional Costs	Environmental Cost (Benefit)	Full Social Cost
+ Contamination Programming (A-)	worst case	$102	$0.7	$103
	best case	**($44)**	$0.5	**($43)**

Negative values, such as **($123)**, represent savings (reductions in cost)

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Scenario evaluation compared to base case after market disruption

In millions of 2019 dollars

Net transaction cost　　　+　　　Environmental　　　=　　　Full Social Cost

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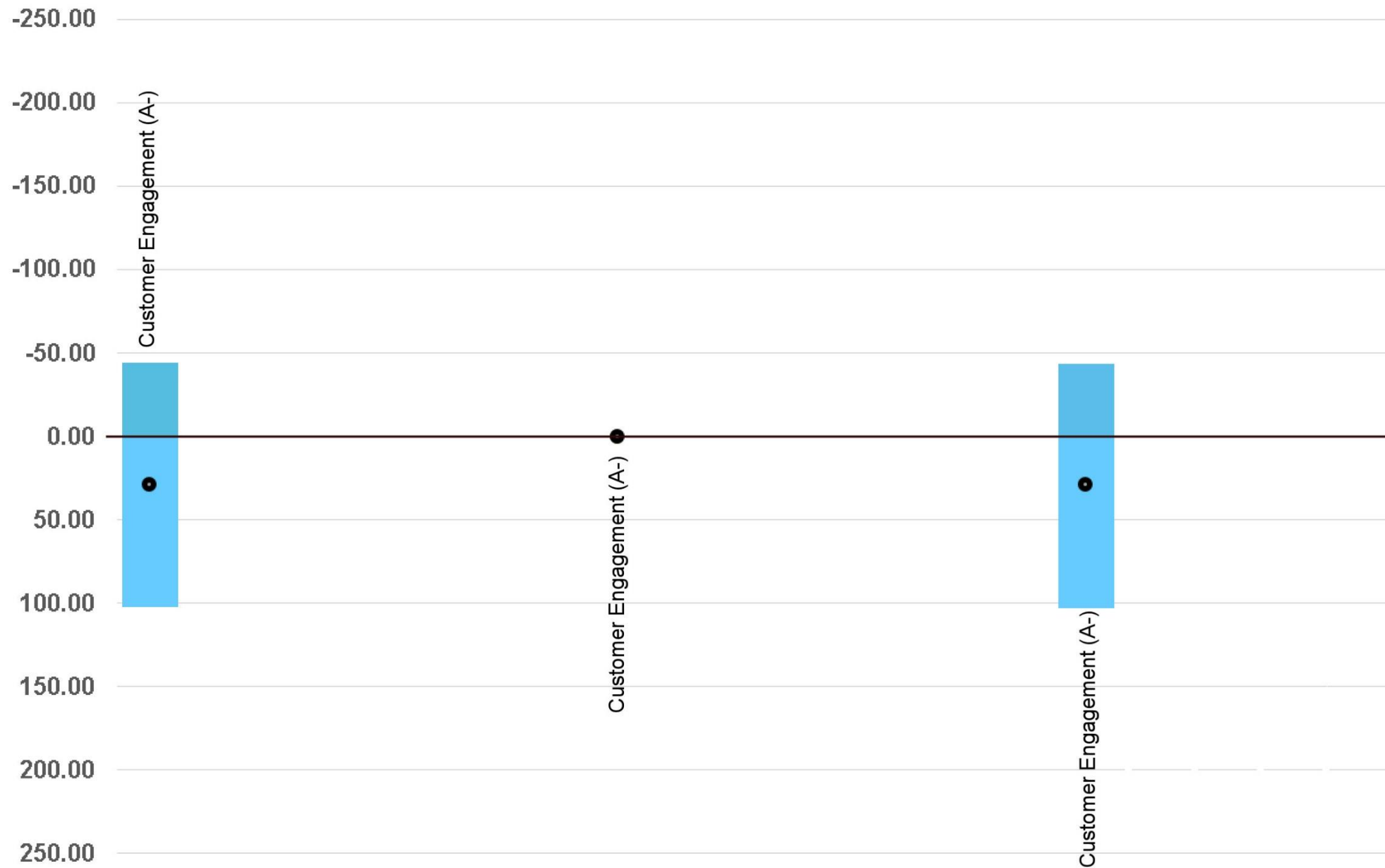
What is the impact of making processing improvements?

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Improving MRFs relative to post-disruption baseline (CY 2025 costs, millions of 2019$)

		Net Transactional Costs	Environmental Cost (Benefit)	Full Social Cost
+ Contamination Programming (A-)	worst case	$102	$0.7	$103
	best case	**($44)**	$0.5	**($43)**
+ Improved MRFs (A)	worst case	$108	**($38)**	$70
	best case	**($46)**	**($79)**	**($125)**

Negative values, such as **($123)**, represent savings (reductions in cost)

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Scenario evaluation compared to base case after market disruption

In millions of 2019 dollars

Net transaction cost   +   Environmental   =   Full Social Cost

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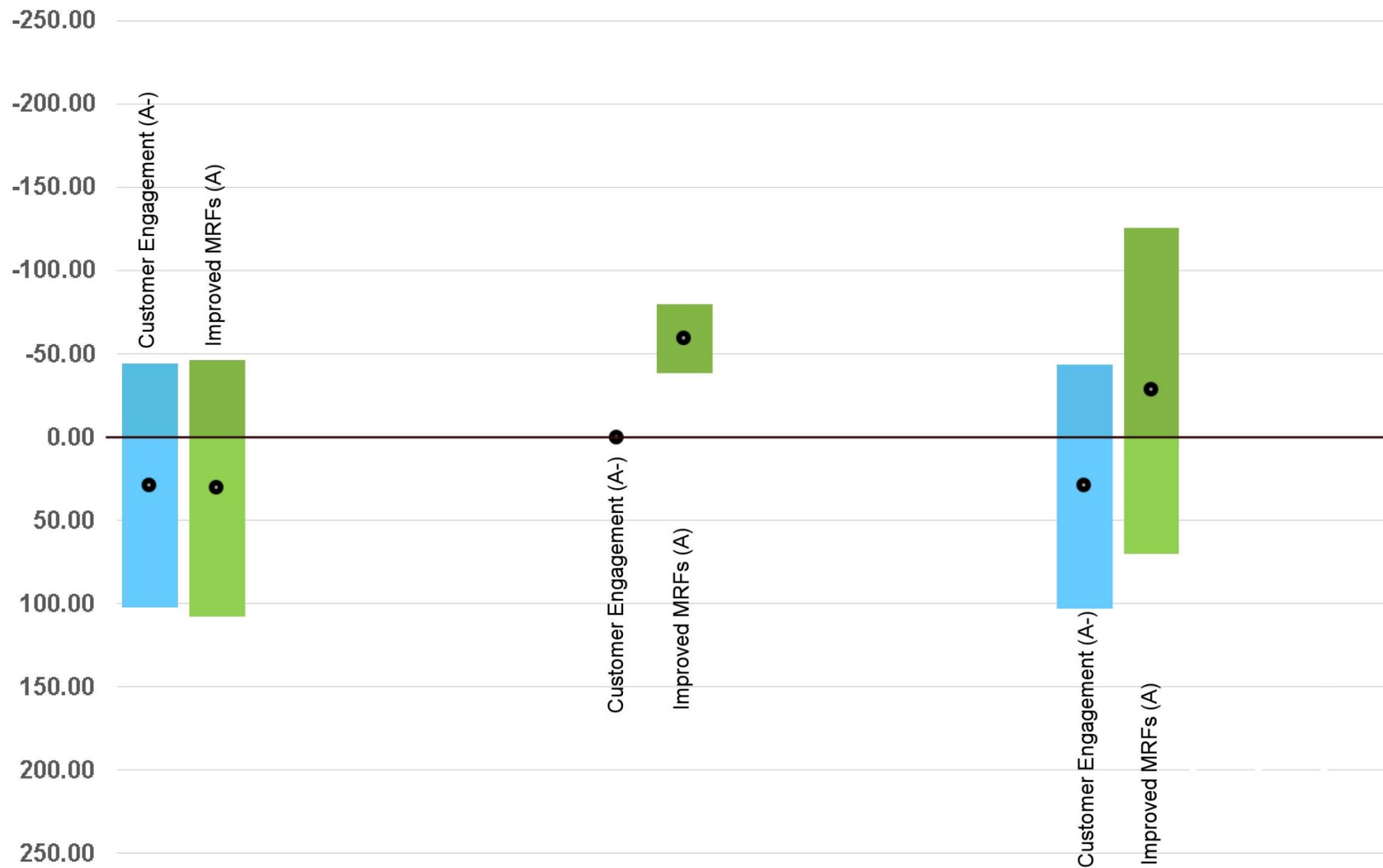
What happens if we expand and have a standardized statewide list?

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Expanded and statewide list relative to post-disruption baseline (CY 2025 costs, millions of 2019$)

		Net Transactional Costs	Environmental Cost (Benefit)	Full Social Cost
+ Contamination Programming (A-)	worst case	$102	$0.7	$103
	best case	**($44)**	$0.5	**($43)**
+ Improved MRFs (A)	worst case	$108	**($38)**	$70
	best case	**($46)**	**($79)**	**($125)**
+ Expanded Lists (A+)	worst case	$107	**($83)**	$24
	best case	**($45)**	**($154)**	**($199)**
+ Consistent Statewide List (A++)	worst case	$111	**($88)**	$23
	best case	**($44)**	**($161)**	**($205)**

Negative values, such as **($123)**, represent savings (reductions in cost)

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Scenario evaluation compared to base case after market disruption
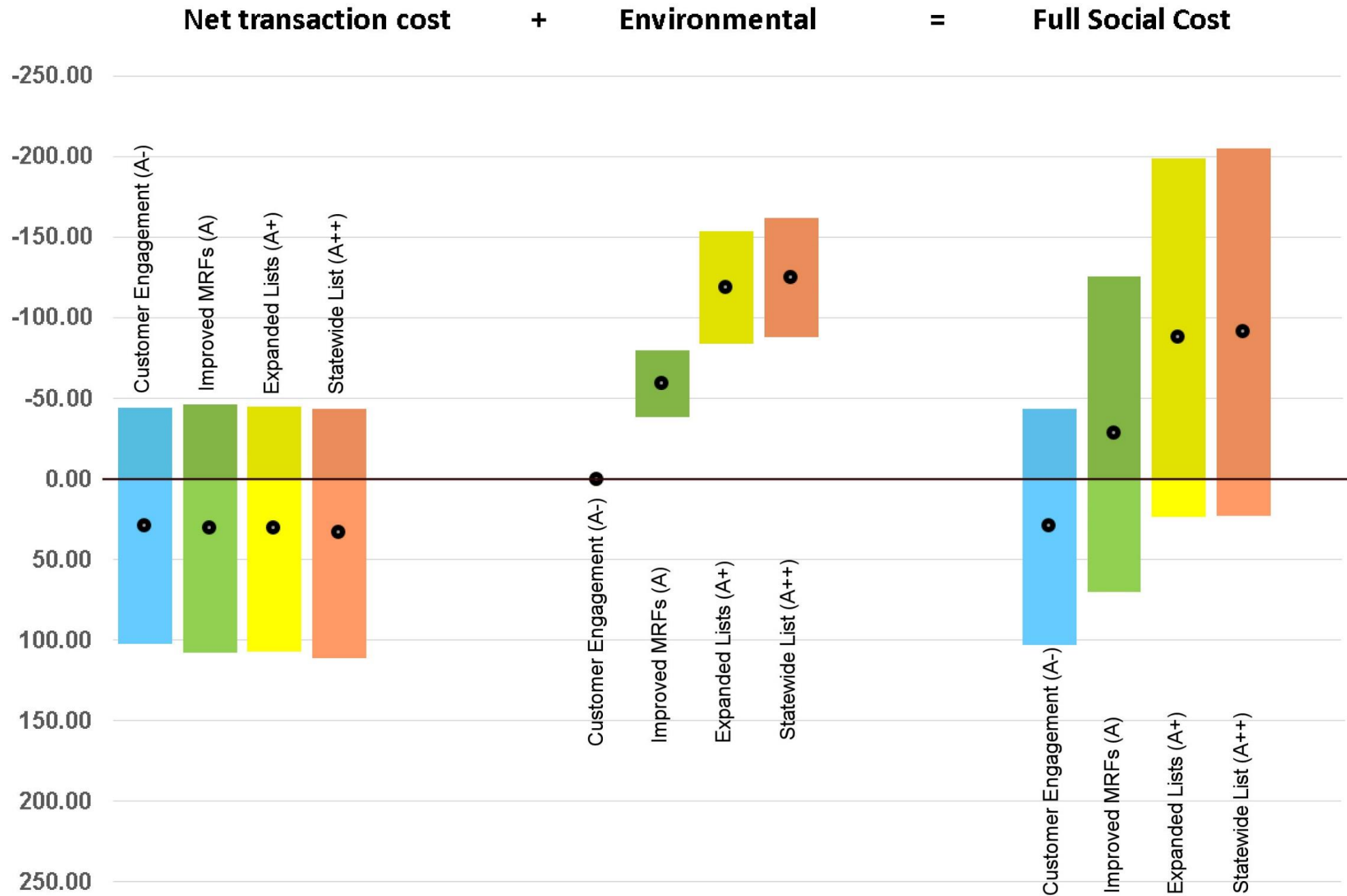## In millions of 2019 dollars

Net transaction cost   +   Environmental   =   Full Social Cost

Scenario evaluation compared to base case after market disruption
In millions of 2019 dollars

Net transaction cost   +   Environmental   =   Full Social Cost

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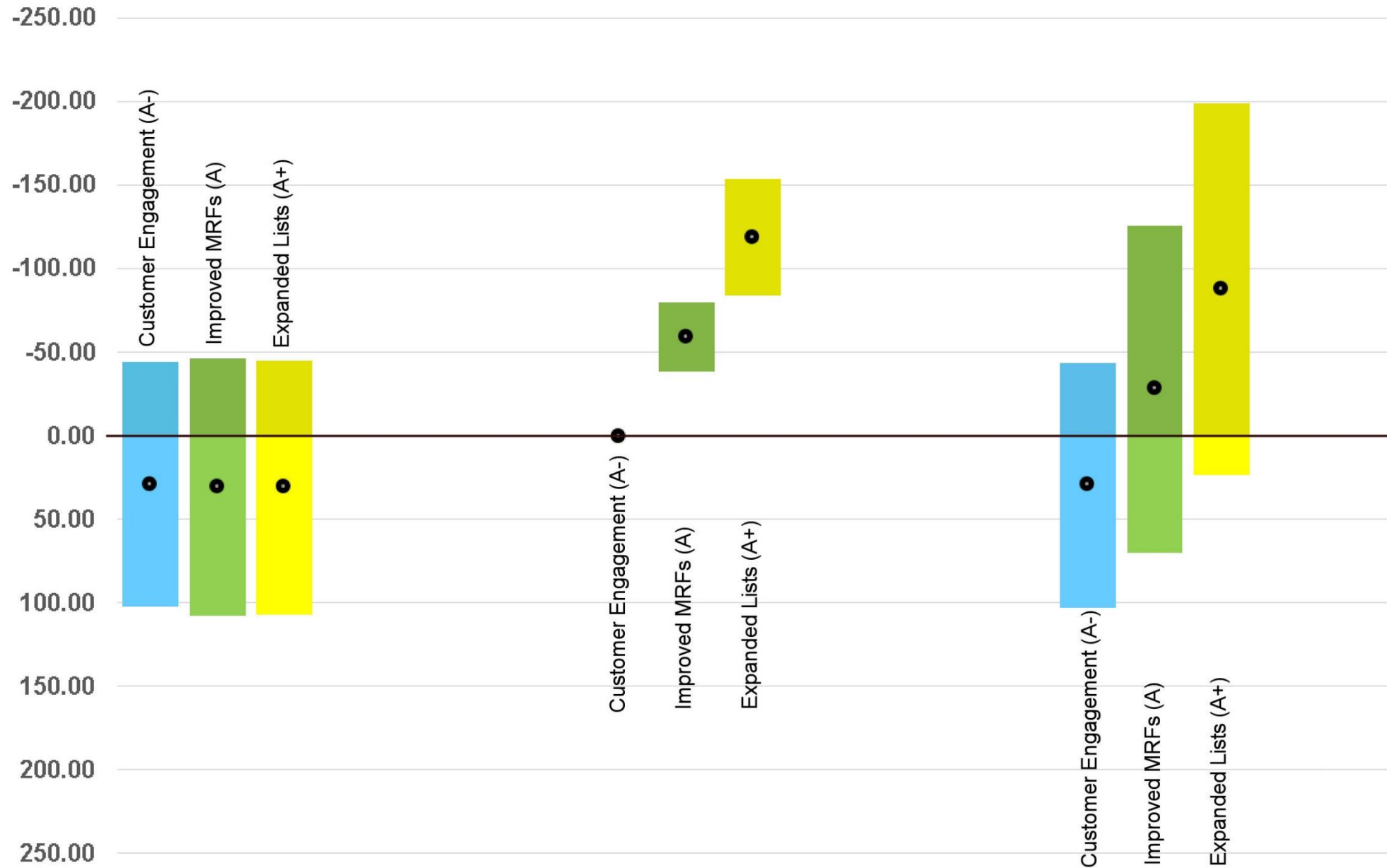
What if we expanded collection opportunities to more communities and customers?

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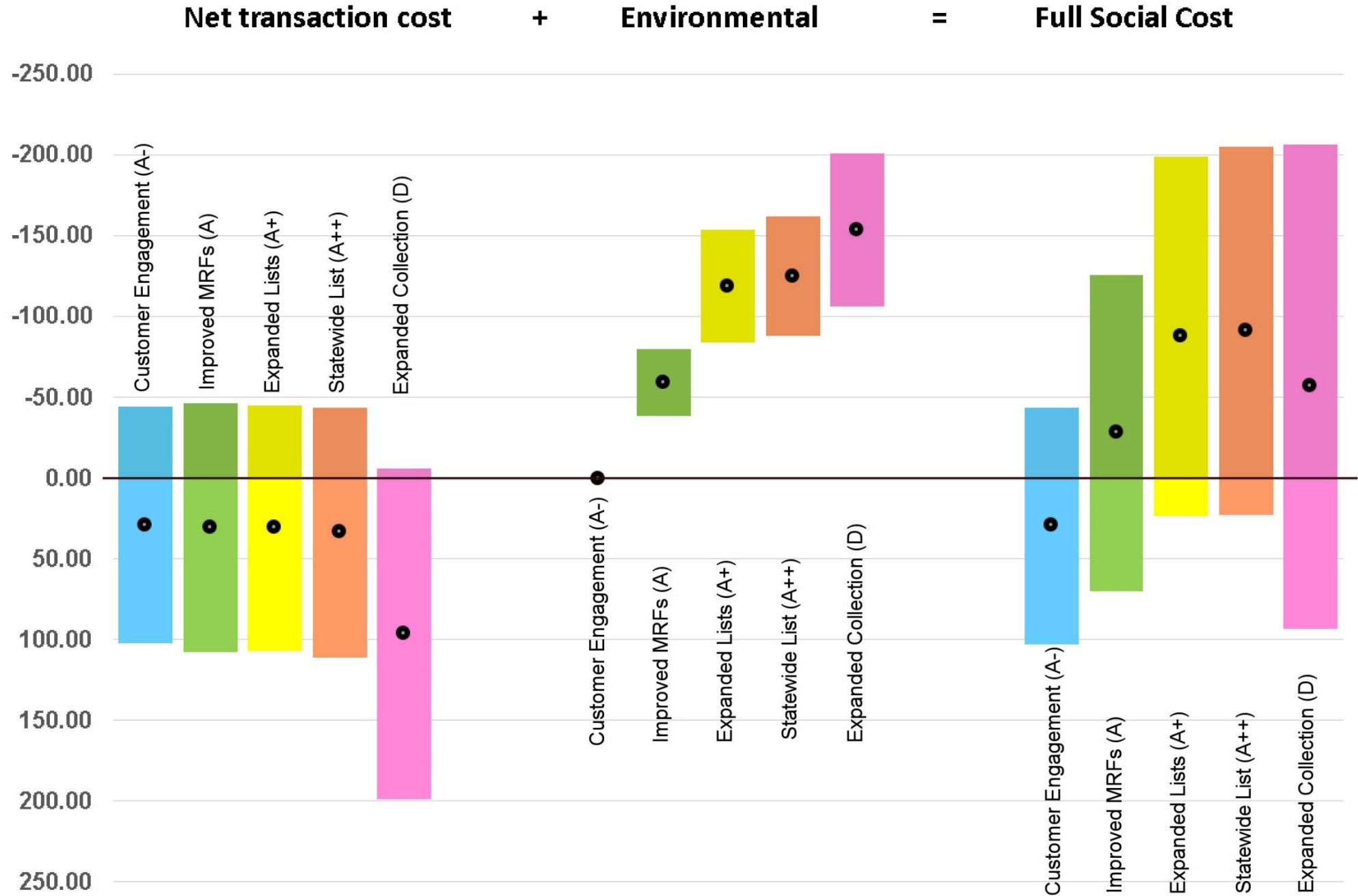# Expanded collection relative to post-disruption baseline (CY 2025 costs, millions of 2019$)

		Net Transactional Costs	Environmental Cost (Benefit)	Full Social Cost
+ Contamination Programming (A-)	worst case	$102	$0.7	$103
	best case	($44)	$0.5	($43)
+ Improved MRFs (A)	worst case	$108	($38)	$70
	best case	($46)	($79)	($125)
+ Expanded Lists (A+)	worst case	$107	($83)	$24
	best case	($45)	($154)	($199)
+ Consistent Statewide List (A++)	worst case	$111	($88)	$23
	best case	($44)	($161)	($205)
+ Expanded Collection (D)	worst case	$199	($105)	$93
	best case	($6)	($200)	($206)

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Scenario evaluation compared to base case after market disruption
In millions of 2019 dollars

Net transaction cost + **Environmental** = **Full Social Cost**

How much might modernization cost?

Calendar year 2025 costs, millions of 2019$, relative to post-disruption list base case

	Customer engagement	Multifamily property improvements	Collection	Cost Savings (Disposal)	Initial Transfer/ Transport	Processing *
+ Contamination Programming (A-)	$28.4	$0.0	$2.0	$1.3	($0.1)	($3.0)
+ Improved MRFs (A)	$28.4	$0.0	$2.0	$1.3	($0.1)	($2.2)
+ Expanded Lists (A+)	$28.4	$0.0	$4.9	($4.4)	$1.5	$4.1
+ Consistent Statewide List (A++)	$28.4	$0.0	$5.2	($4.6)	$1.7	$3.9
+ Expanded Collection (D)	$34.8	$18.7	$33.5	($7.0)	$3.2	$8.6

*Most scenarios include larger expenses for capital upgrades at MRFs, but these costs are partially offset by labor savings.

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Alternative base cases for consideration

"Zero recycling"

Revised anti-contamination base case

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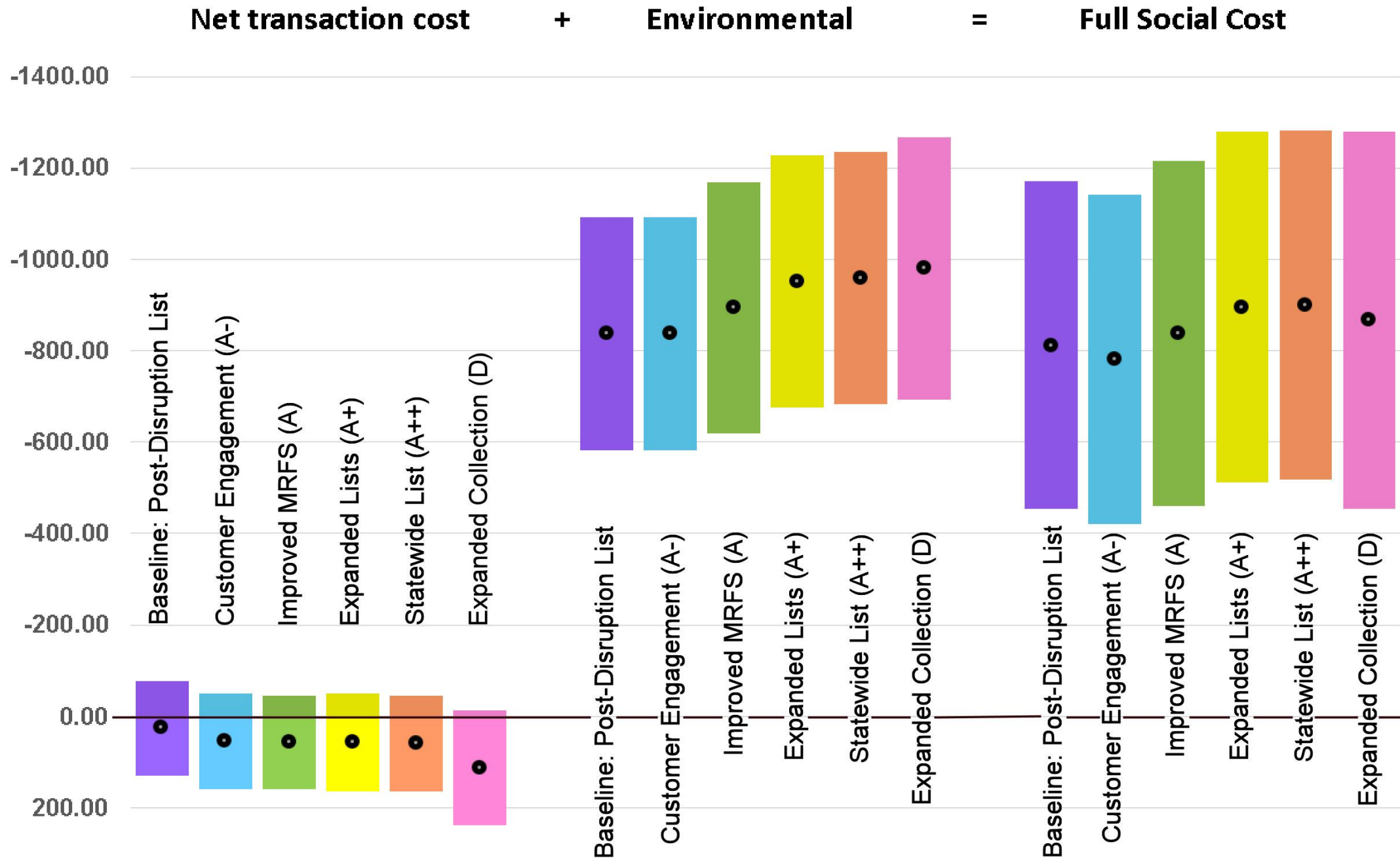
"Zero recycling" (CY 2025 costs, millions of 2019$)

		Net Transactional Costs	Environmental Cost (Benefit)	Full Social Cost
Baseline: Post-Disruption List	worst case	$129	$(581)	$(452)
	best case	$(78)	$(1,092)	$(1,170)
+ Contamination Programming (A-)	worst case	$160	$(581)	$(421)
	best case	$(51)	$(1,091)	$(1,142)
+ Improved MRFs (A)	worst case	$158	$(619)	$(461)
	best case	$(45)	$(1,169)	$(1,215)
+ Expanded Lists (A+)	worst case	$164	$(675)	$(512)
	best case	$(51)	$(1,228)	$(1,279)
+ Consistent Statewide List (A++)	worst case	$165	$(681)	$(516)
	best case	$(46)	$(1,235)	$(1,281)
+ Expanded Collection (D)	worst case	$239	$(693)	$(455)
	best case	$(14)	$(1,267)	$(1,280)

Negative values, such as **($123)**, represent savings (reductions in cost)

"Zero Recycling"
(CY 2025 costs, in millions of 2019 dollars)

Net transaction cost + **Environmental** = **Full Social Cost**

Revised base case: Post-disruption list and generator facing contamination reduction programming

- Proposed during public in early June

- Addresses asymmetry of all costs + no benefits

- Neutralizes some of the uncertainty

Revised base case (CY 2025 costs, millions of 2019$)

Post-disruption list and generator-facing contamination reduction programming

|		Net Transactional Costs	Environmental Cost (Benefit)	Full Social Cost
+ Improved MRFs (A)	worst case	$81	$(38)	$42
	best case	$(77)	$(80)	$(157)
+ Expanded Lists (A+)	worst case	$80	$(84)	$(4)
	best case	$(76)	$(155)	$(230)
+ Consistent Statewide List (A++)	worst case	$84	$(88)	$(4)
	best case	$(75)	$(162)	$(237)
+ Expanded Collection (D)	worst case	$172	$(106)	$67
	best case	$(38)	$(201)	$(239)

Negative values, such as **$(123)**, represent savings (reductions in cost)

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Scenarios compared to base case with post-disruption list, generator-facing contamination reduction programming

(CY 2025 costs in millions of 2019 dollars)

Net transaction cost + **Environmental** = **Full Social Cost**
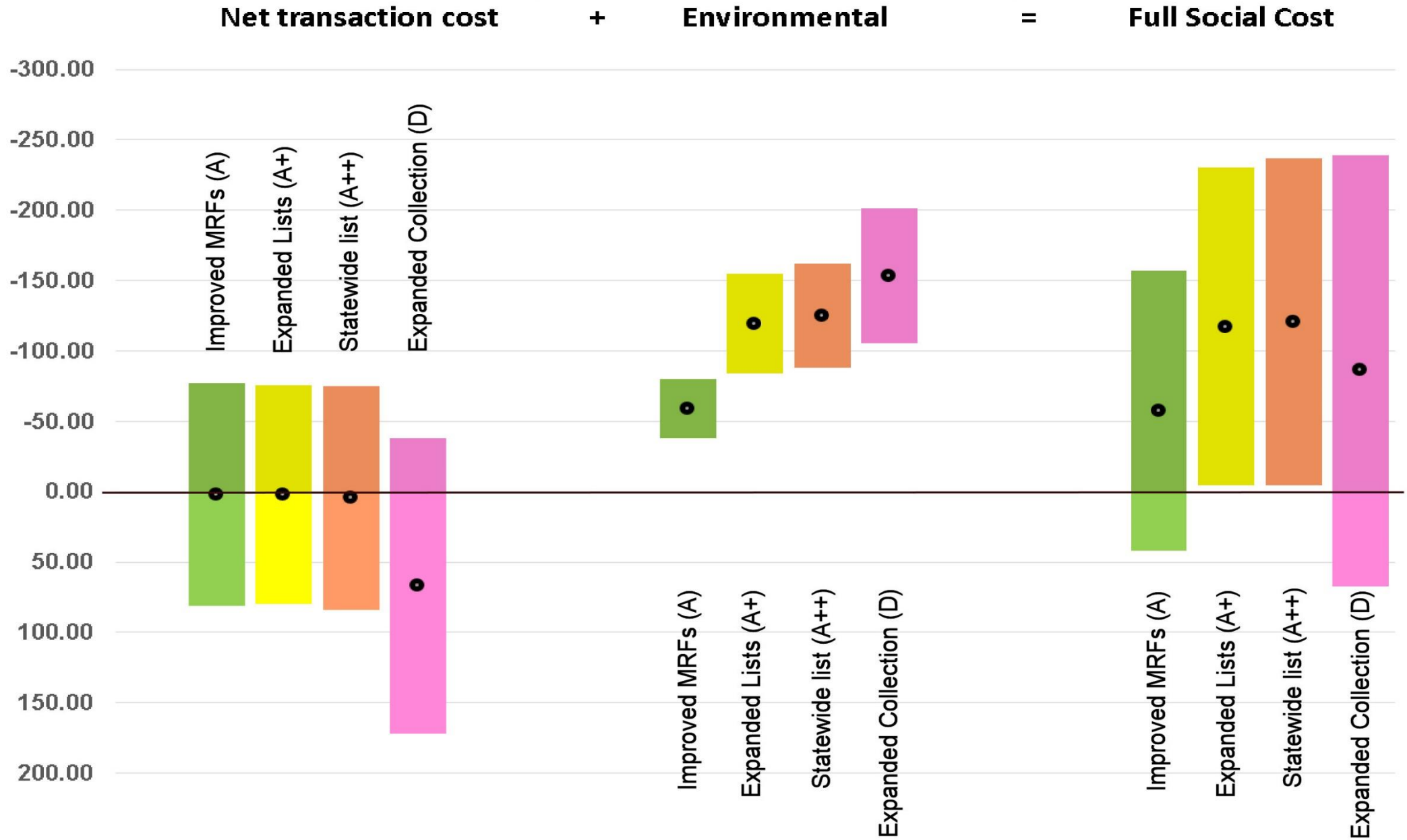
Thank you

Questions?

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