Waste Collection Optimization for the Amager Resource Center

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Project Statement

This project explored waste collection optimization in the City of Copenhagen and developed various recommendations for ARC as they transition for the impending E-truck upscale in 2022.

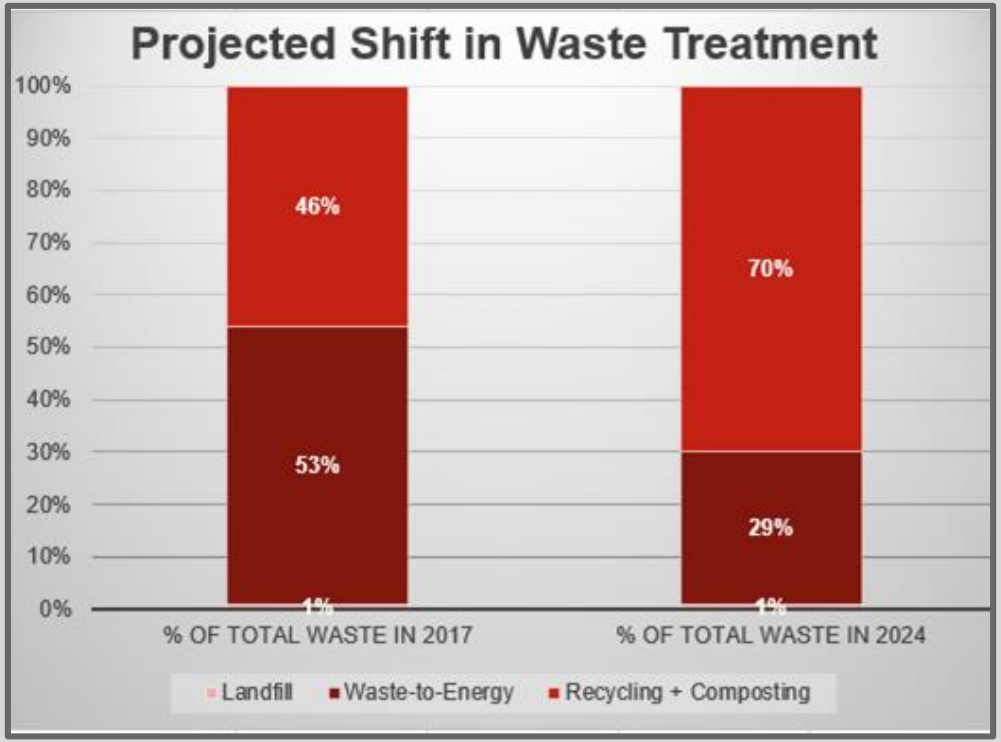
Methodology

Objective 1: Investigate inefficiencies

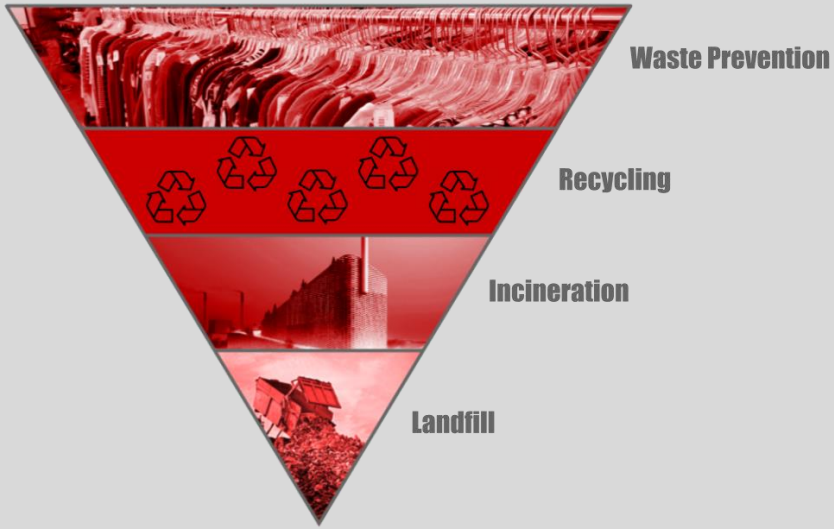
Objective 2: Develop processes

Objective 3: Formulate recommendations

The waste collection industry is changing and adapting to represent a more sustainable model



Waste Hierarchy



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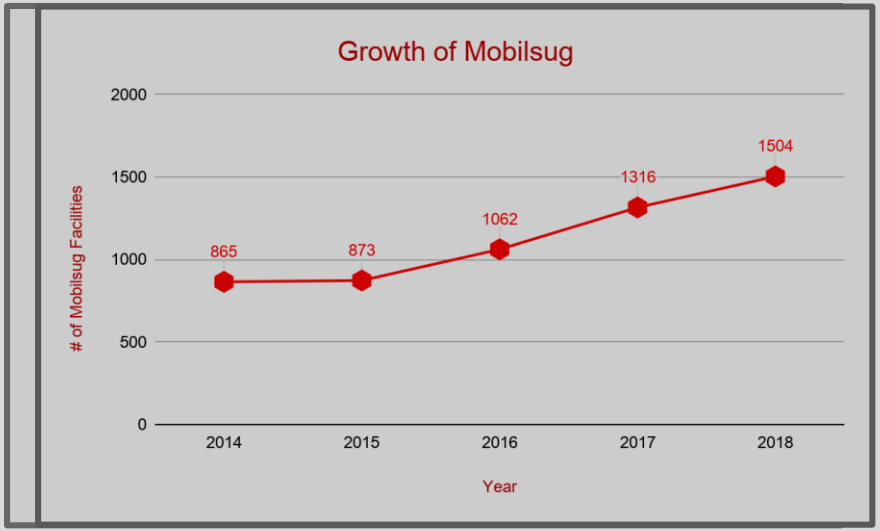
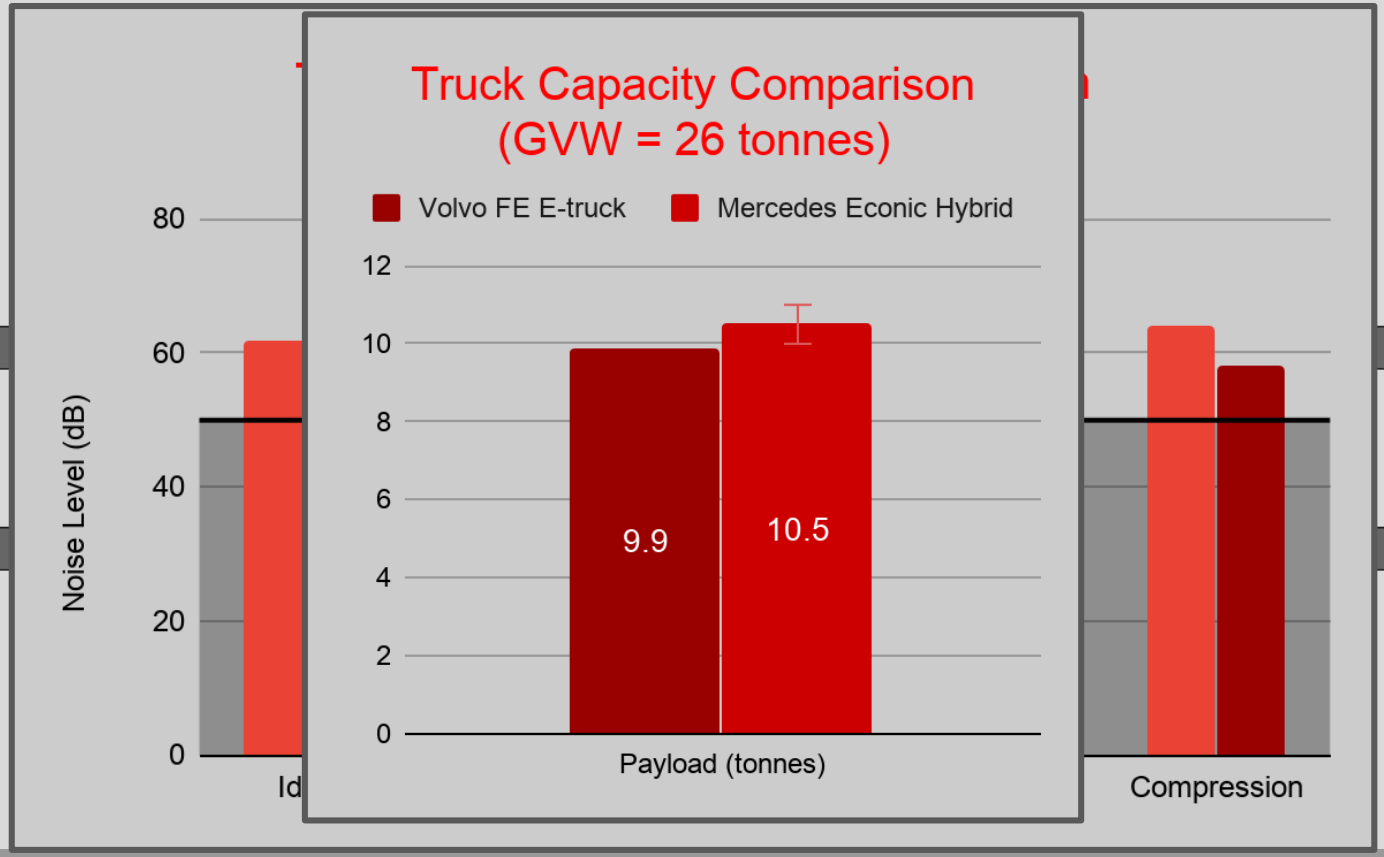
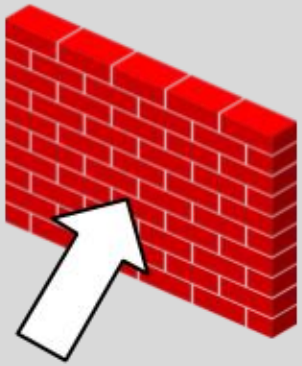


Performance of E-Trucks is similar to that of diesel and biogas trucks



Automated route planning software has not been effective



Unreliable:

Dead ends
One way streets
False entrances

Inflexible:

Less continuity
Driver confusion

Inefficient:

Averages 1-2 hours longer
Minimal traffic avoidance

Cost of collection is dependent upon the number of bins collected per shift

Level	Weighted Bins	Index of Shift Premium
3	900	100%
4	950	106%
5	1000	112%
6	1050	118%
7	1100	124%
8	1150	130%
9	1200	136%
10	1250	152%

ARC can decrease their projected fleet size by optimizing collection capacity

Number of Bins in a Region

Options for Shift Premium

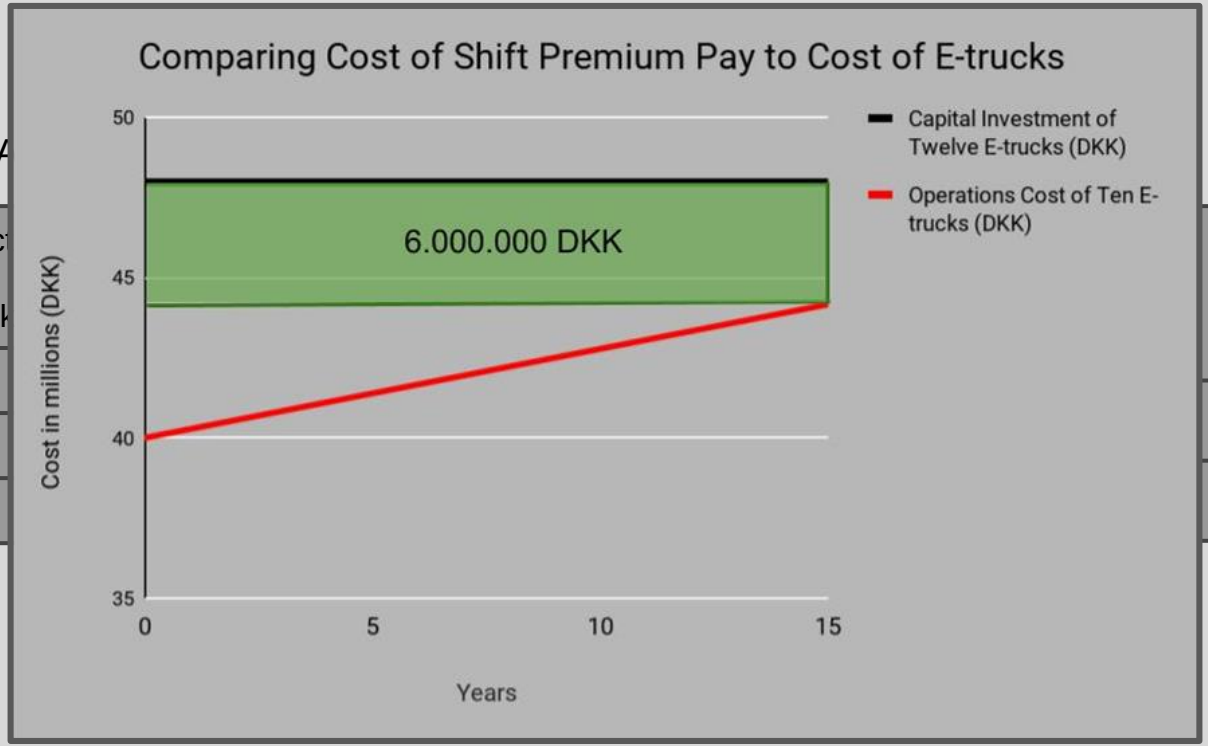
Number of Trucks Needed

Waste collection can be conducted with fewer trucks than currently utilized

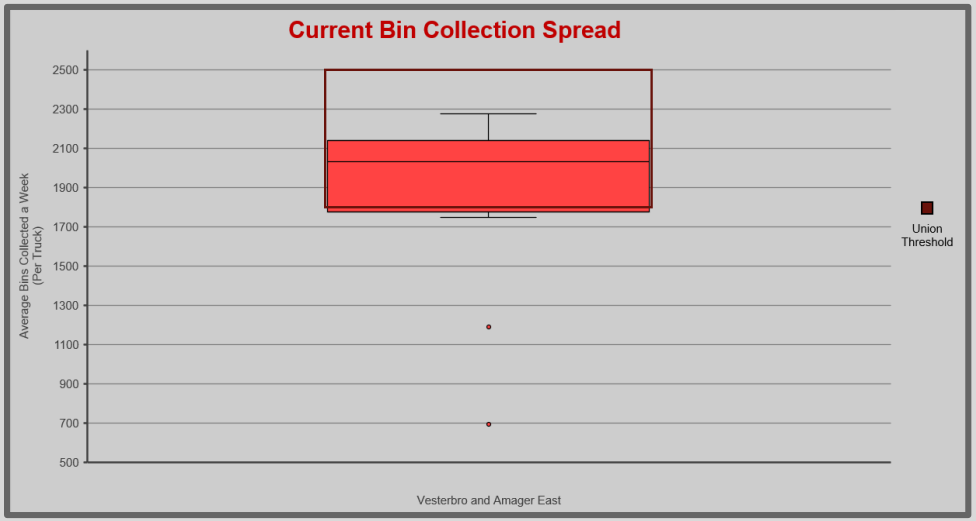
Amager East Example	
Number of Bins Per Week Per Person	Trucks Needed
900	6 
950	6 
1000	6 
1050	6 
1100	5 
1150	5 
1200	5 
1250	5 

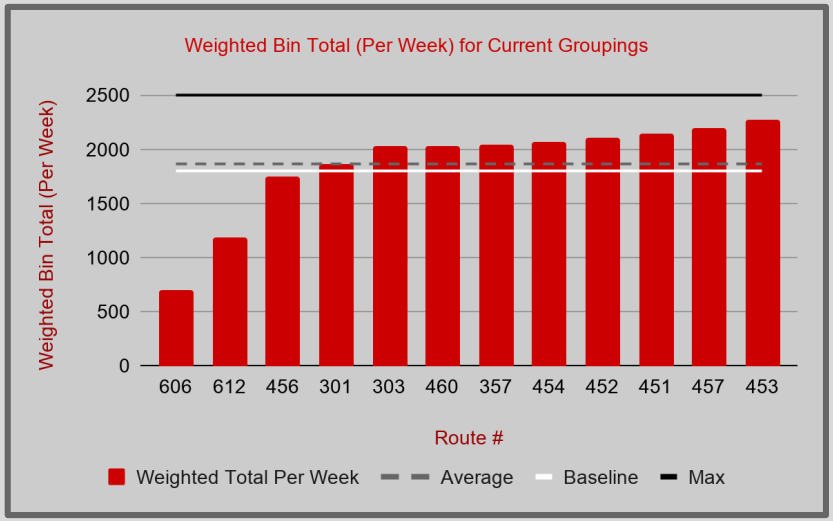
ARC should utilize this process to present an opportunity for savings in the E-truck fleet

Union Weekly Collec Bracket (2 collectors per truck	of trucks
1150	
1100	
1050	

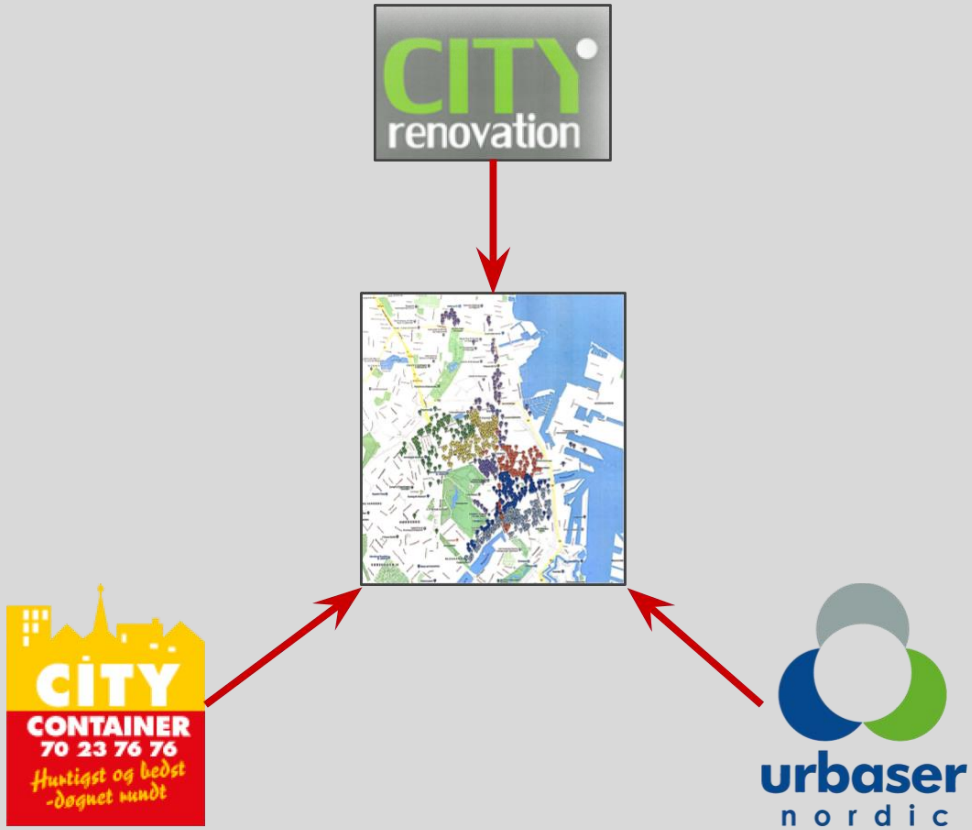


Inconsistencies in the current waste collection process can be reduced



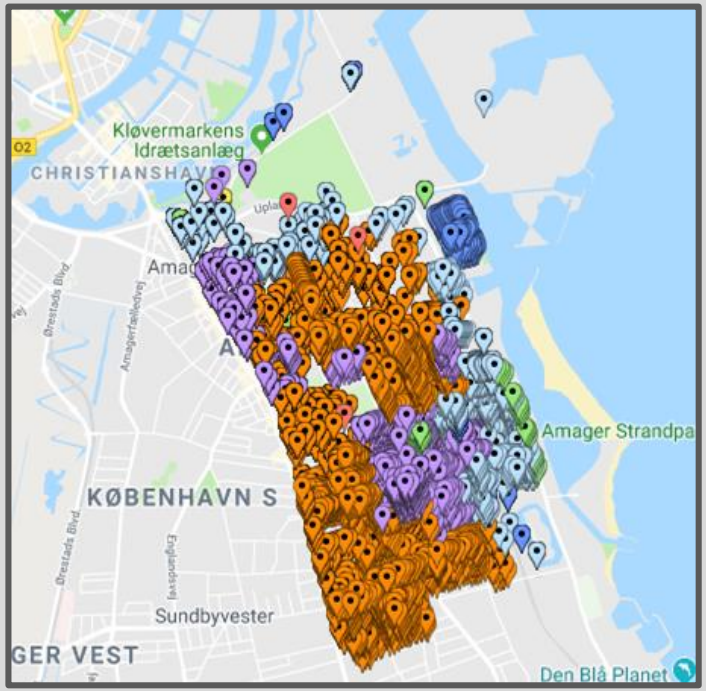


A combination of mapping software and manual routing is an effective option for route planning



The optimized process creates less geographically dispersed groupings than current practice

Current Routes	Recommended Route



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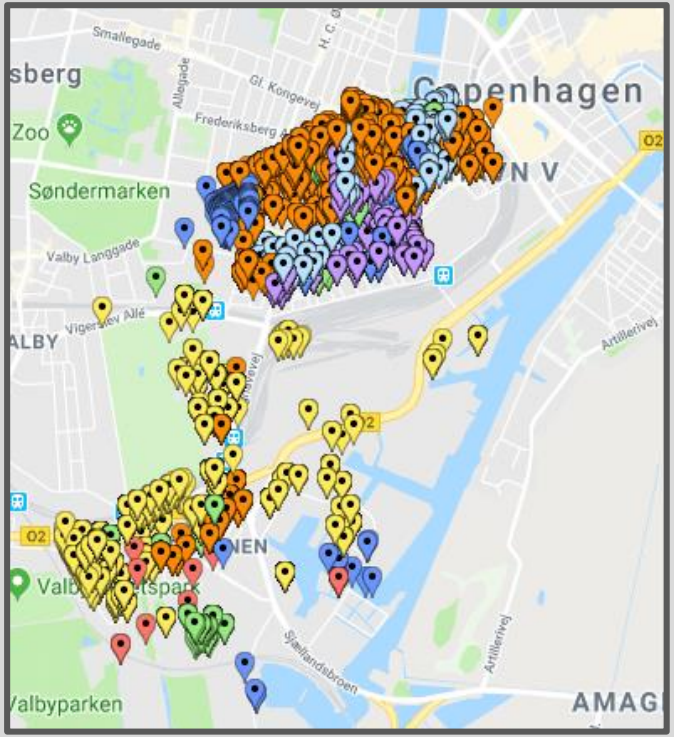	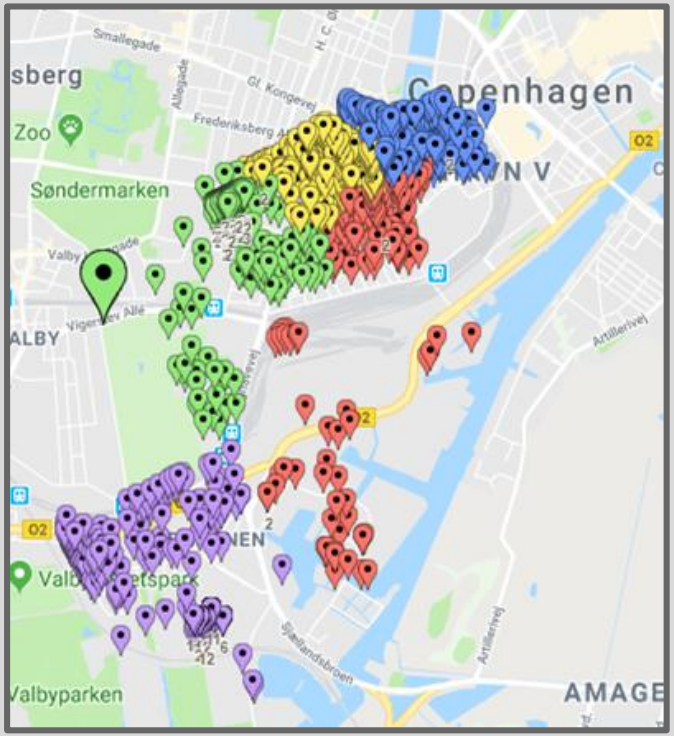

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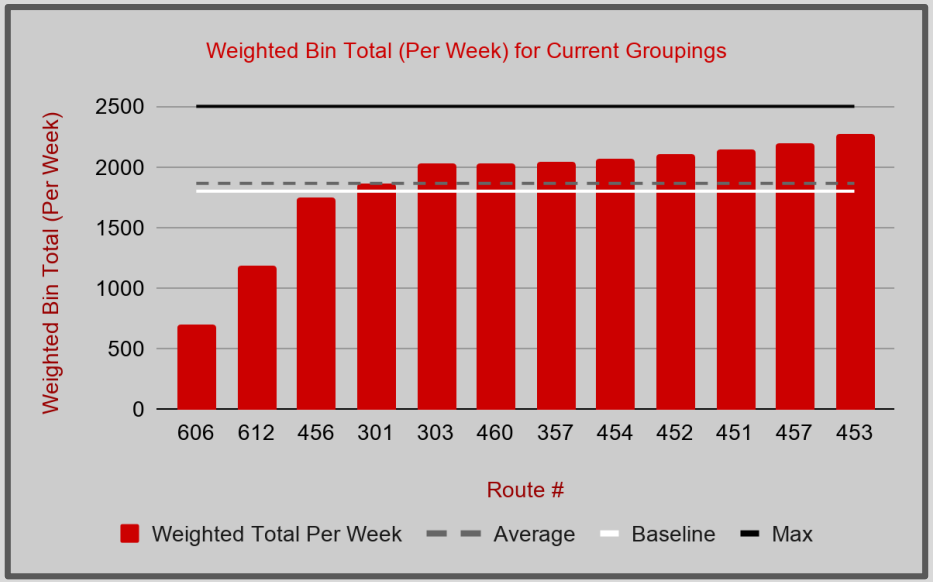
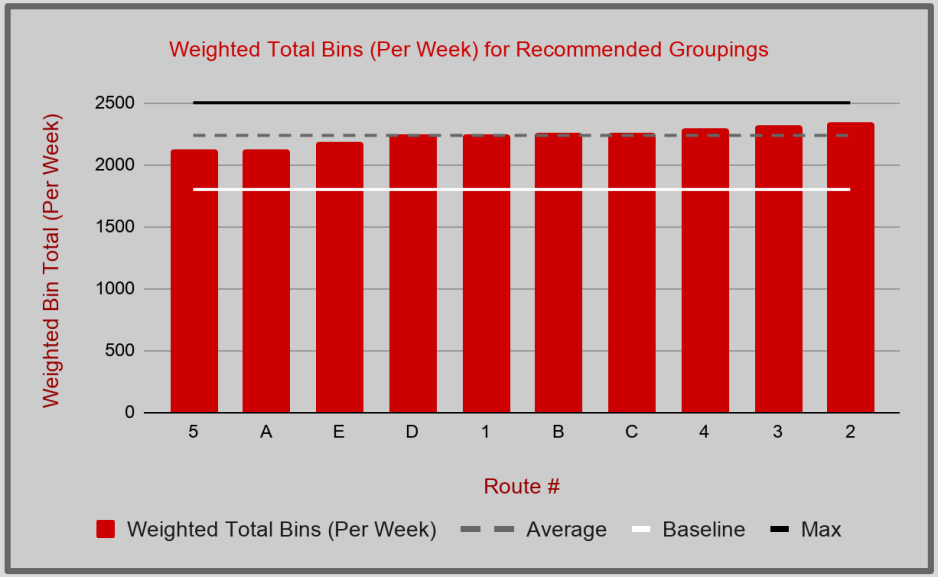
The optimized process uses fewer routes than current practice





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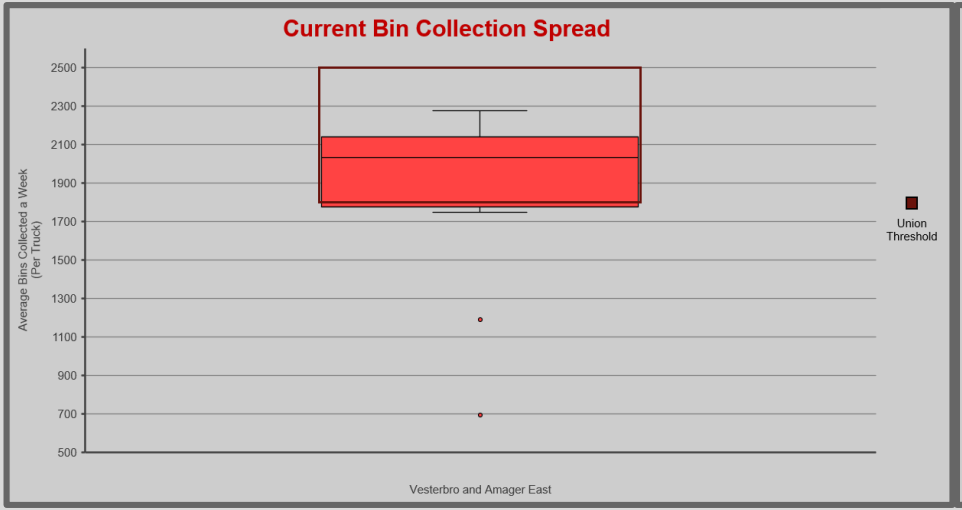
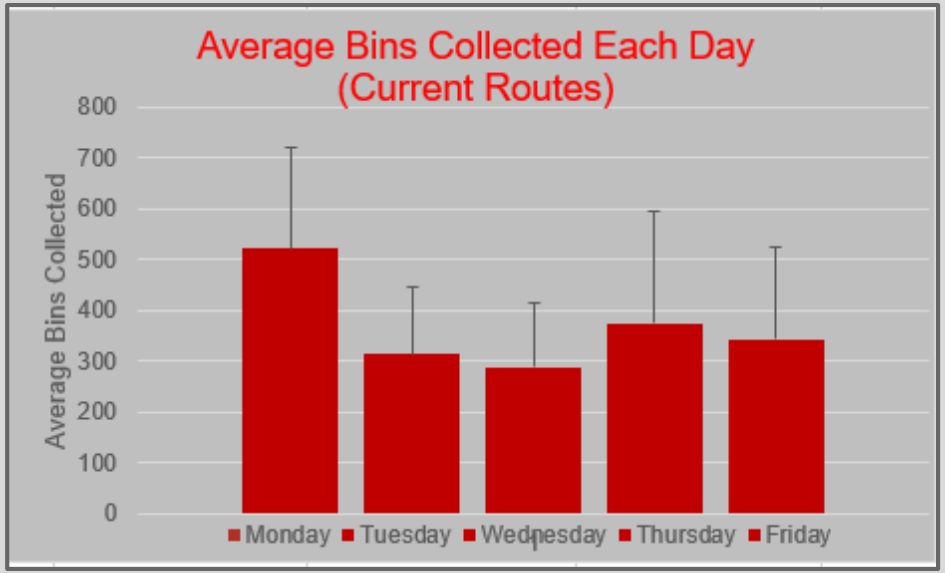
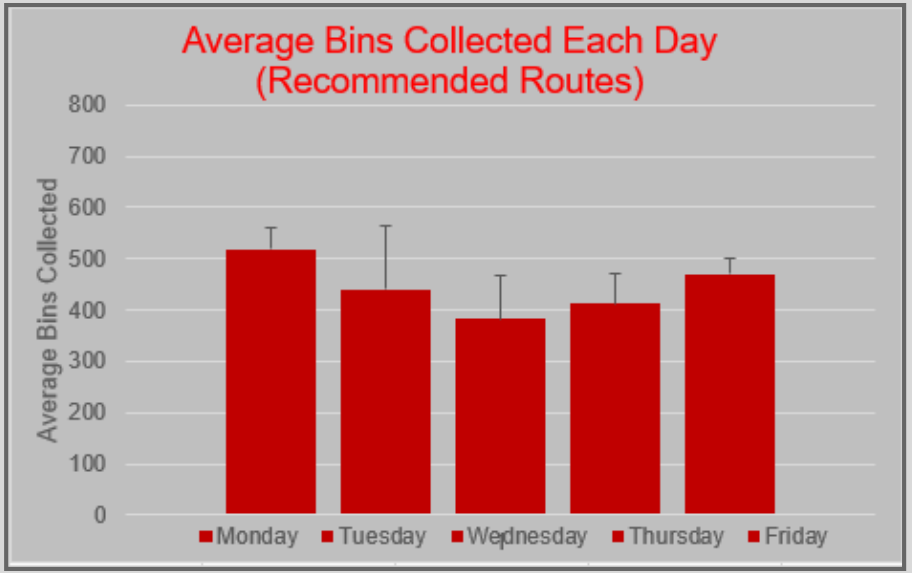
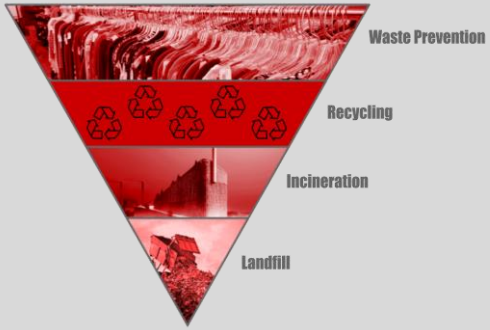


The optimized process creates a more even distribution throughout the week





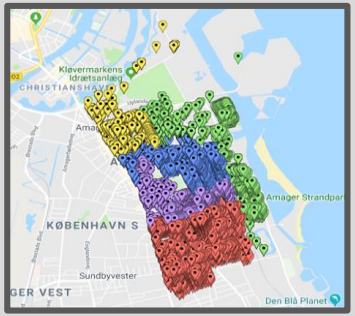
Summary



Addressed Changing Industry

Amager East Example	
Number of Bins Per Week Per Person	Trucks Needed
900	6
950	6
1000	6
1050	6
1100	5
1150	5
1200	5
1250	5

Optimized Fleet Size



Developed Grouping Strategy

Developed Frequency Distribution Strategy

Tak!

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