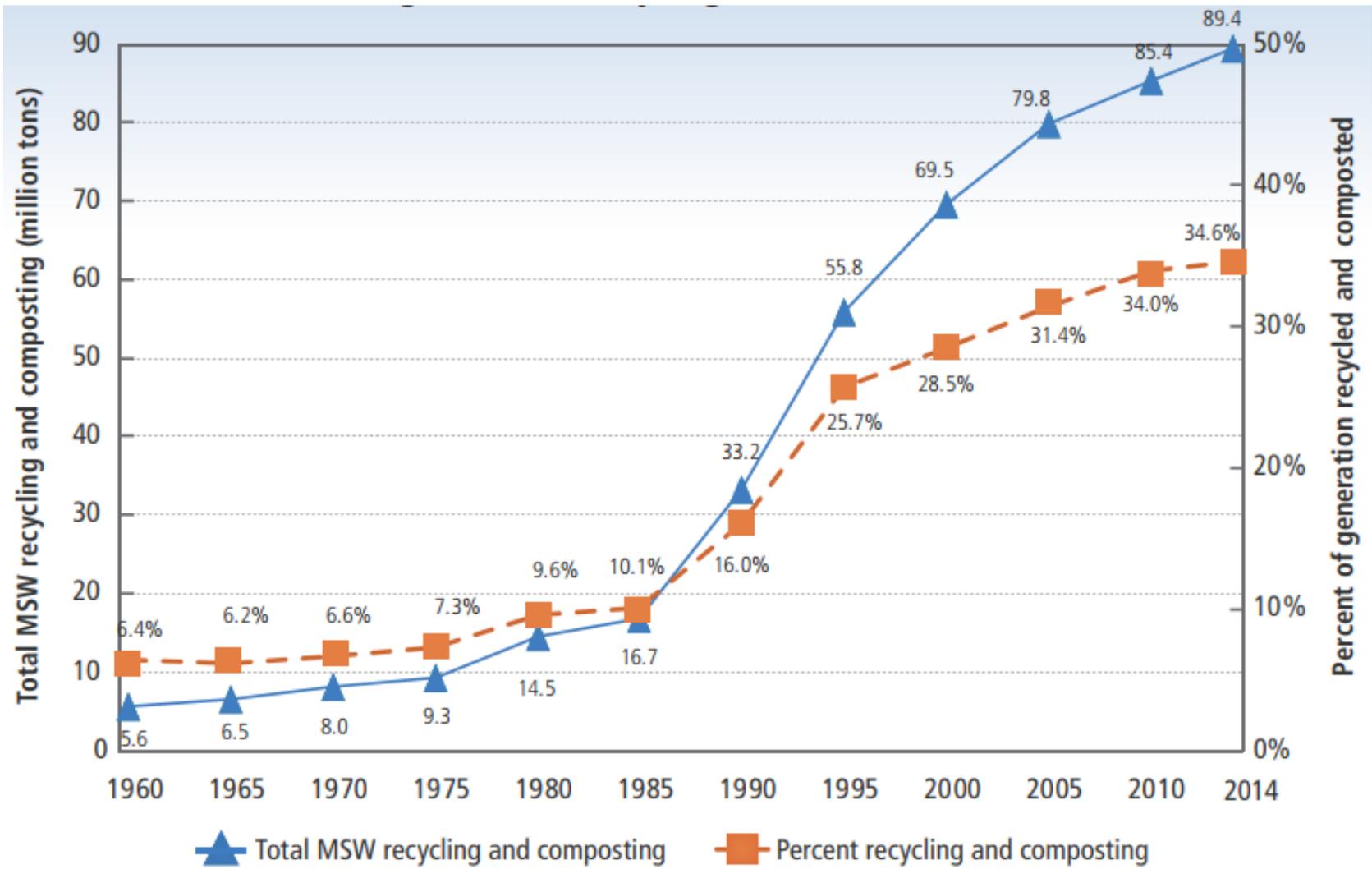


Challenges and Opportunities in Managing Waste

Ron Vance, Chief
Resource Conservation Branch
U.S. Environmental Protection Agency



Recycling (1960-2014)

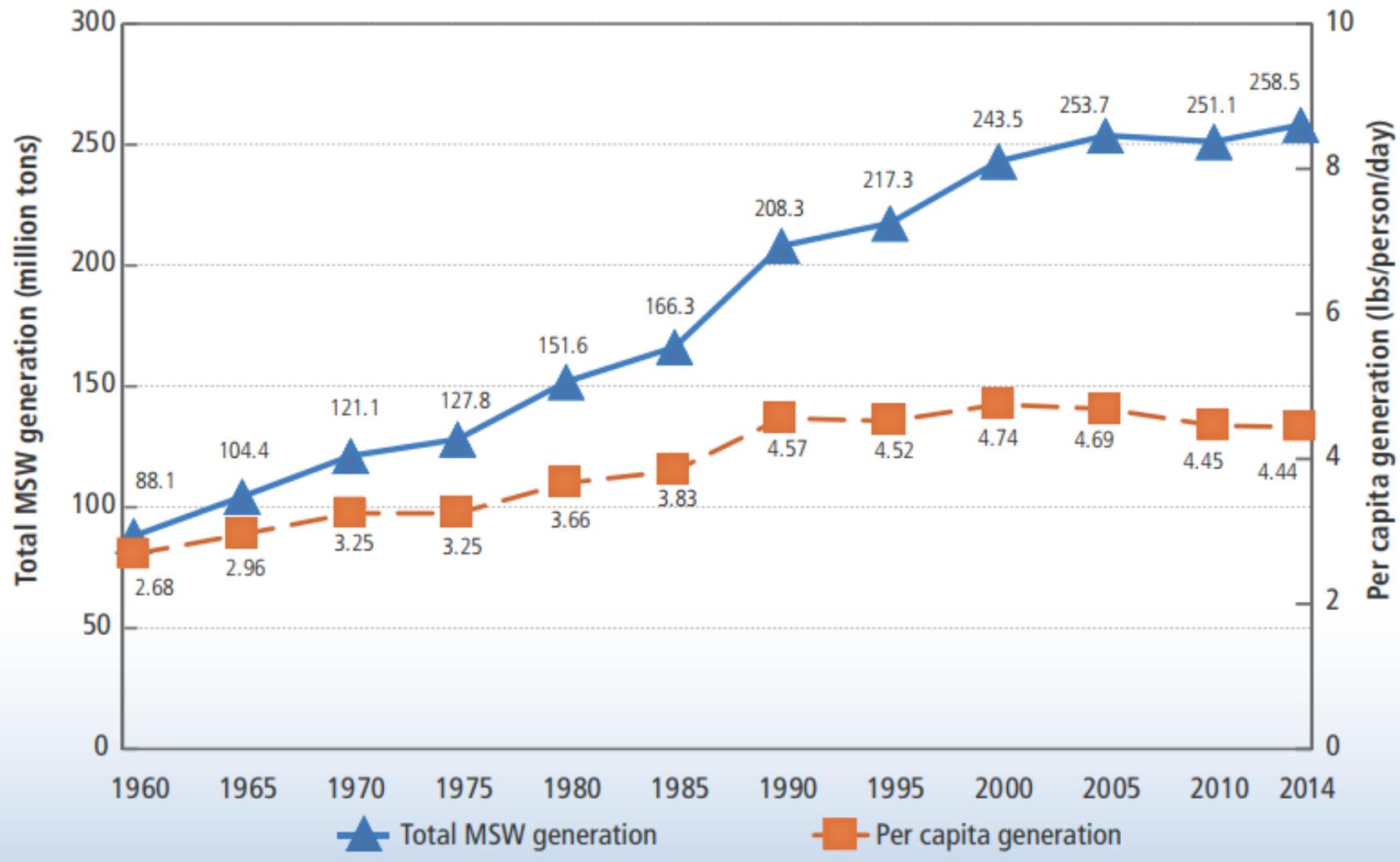


Environmental Benefits of Recycling

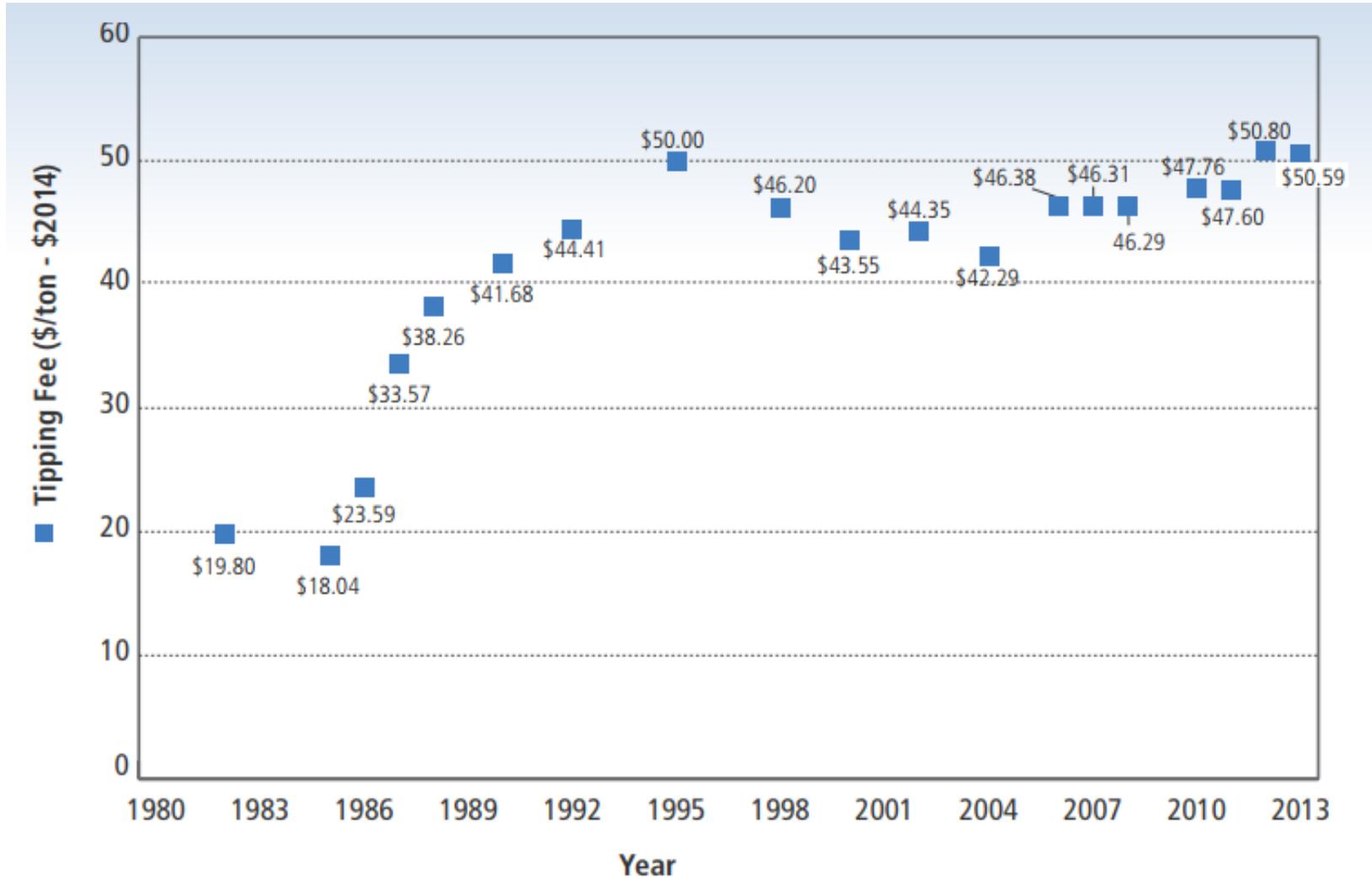
- In 2014, over 89 million tons of MSW were recycled and composted.
- Reduction of more than 181 million MTCO₂E
- Equivalent to removing more than 38 million passenger vehicles from the road for one year



Waste Generation (1960-2014)



Cost of Waste



Cost of Waste



\$6.7 billion

Spent to send materials to landfill in 2014



Value of Waste



\$8.9 billion

Value of recyclable materials landfilled in 2014



Thank you!

Please visit us:



epa.gov/smm



Twitter: [@EPAland](https://twitter.com/EPAland)



Facebook: facebook.com/EPA



BXP Waste Management

Ben Myers
Sustainability Manager



2017 ENERGY STAR Commercial Buildings Partner Meeting | Oct. 24 – 25, 2017

Sustainability Strategy

- Promote our growth and operations in a sustainable and responsible manner
- Focus on the economic, social, and environmental aspects of our activities
- Maximize sustainability performance transparency through the disclosure of environmental, social, and governance (ESG) data



Board Room to Boiler Room

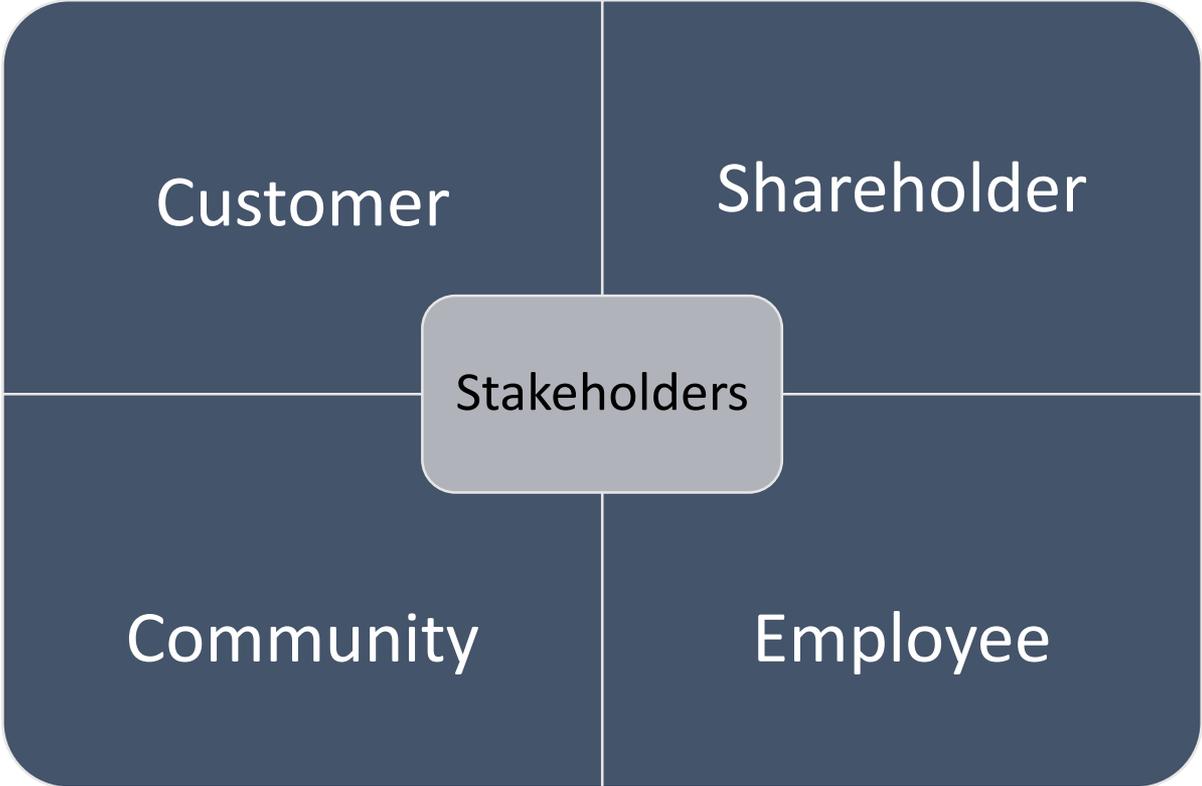
[b]responsible

Reduce Operating Costs

Enhance Asset Value

Expand Socially Responsible Investment





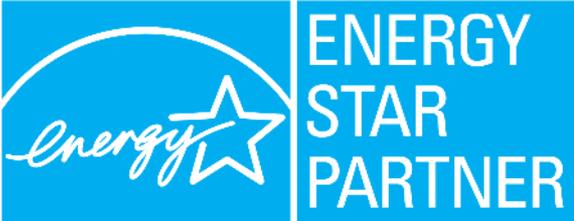
**When there's a
scoreboard,
people play
differently.**



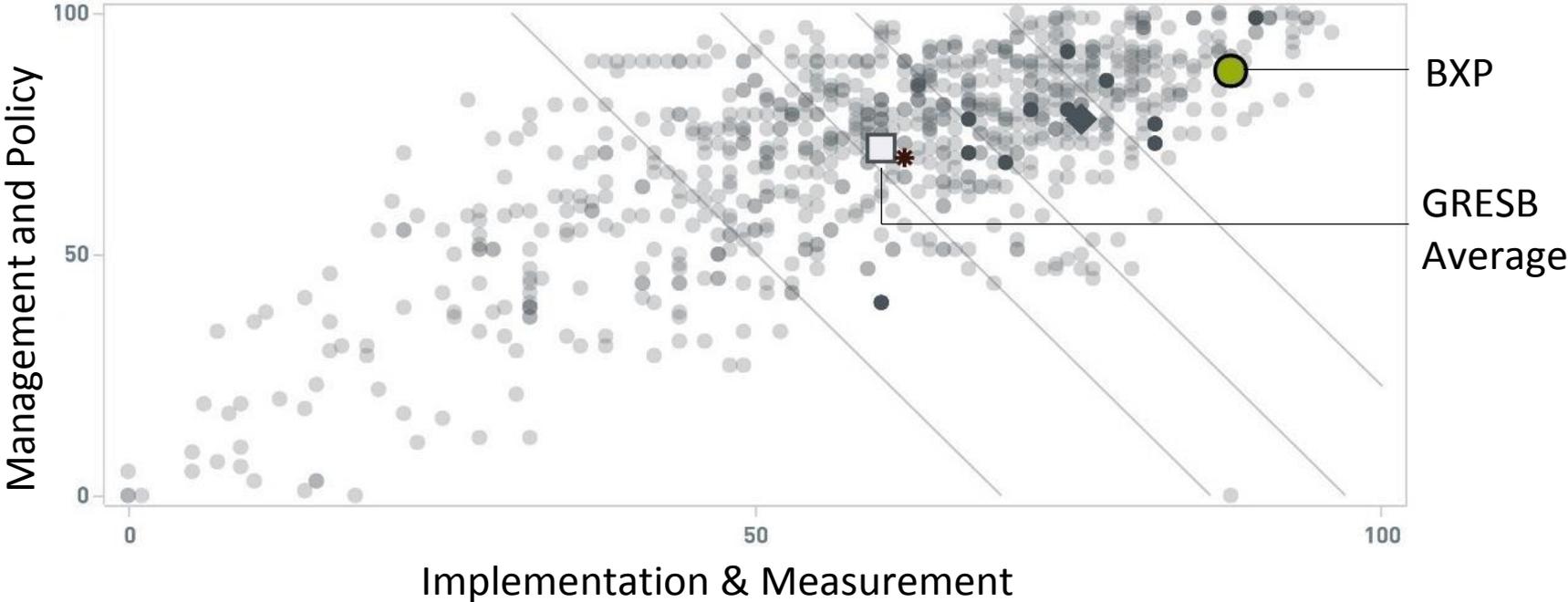
ESG Data Management



Certification and Recognition



2017 GRESB Results



2020 Sustainability Goals



15x20 Energy Use Reduction

Reduce energy use intensity 15%



20x20 Greenhouse Gas Reduction

Reduce Scope 1 and Scope 2 greenhouse gas emissions intensity 20%



20x20 Water Use Reduction

Reduce water use intensity 20%

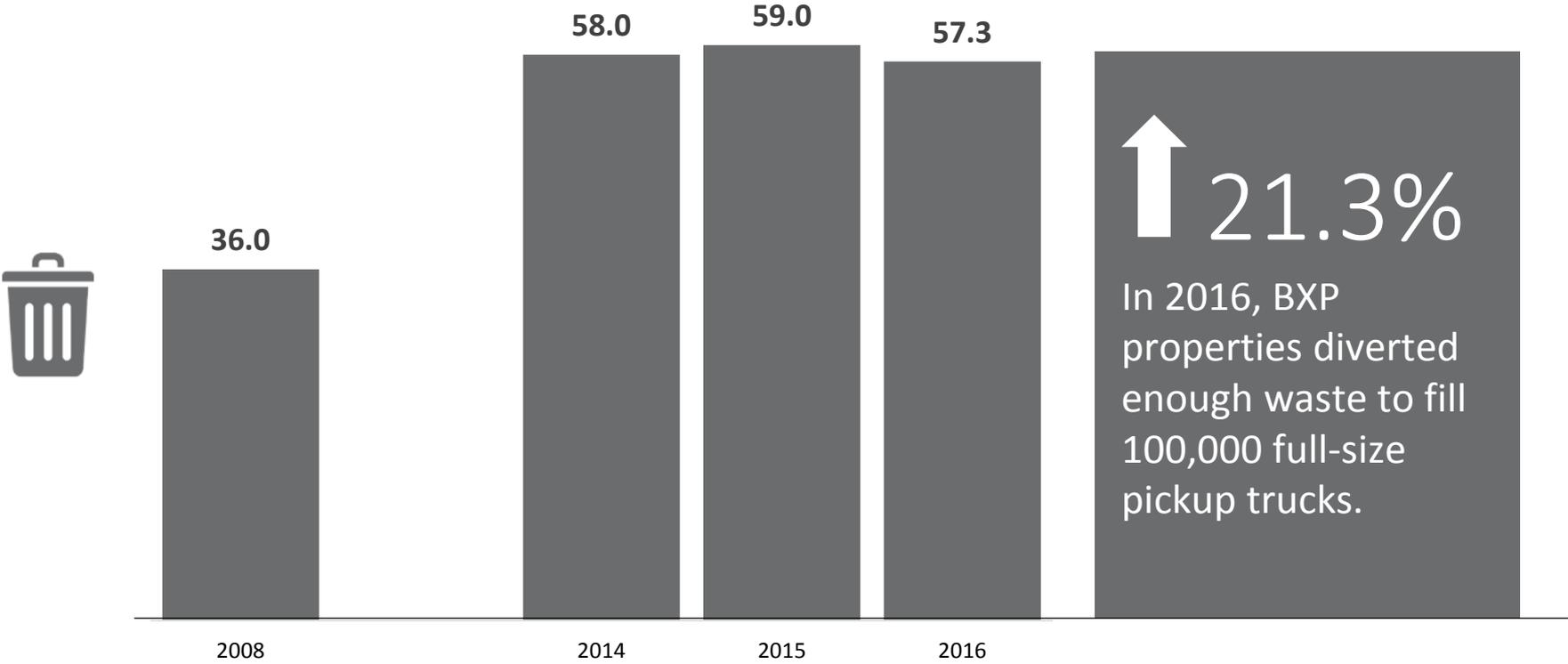


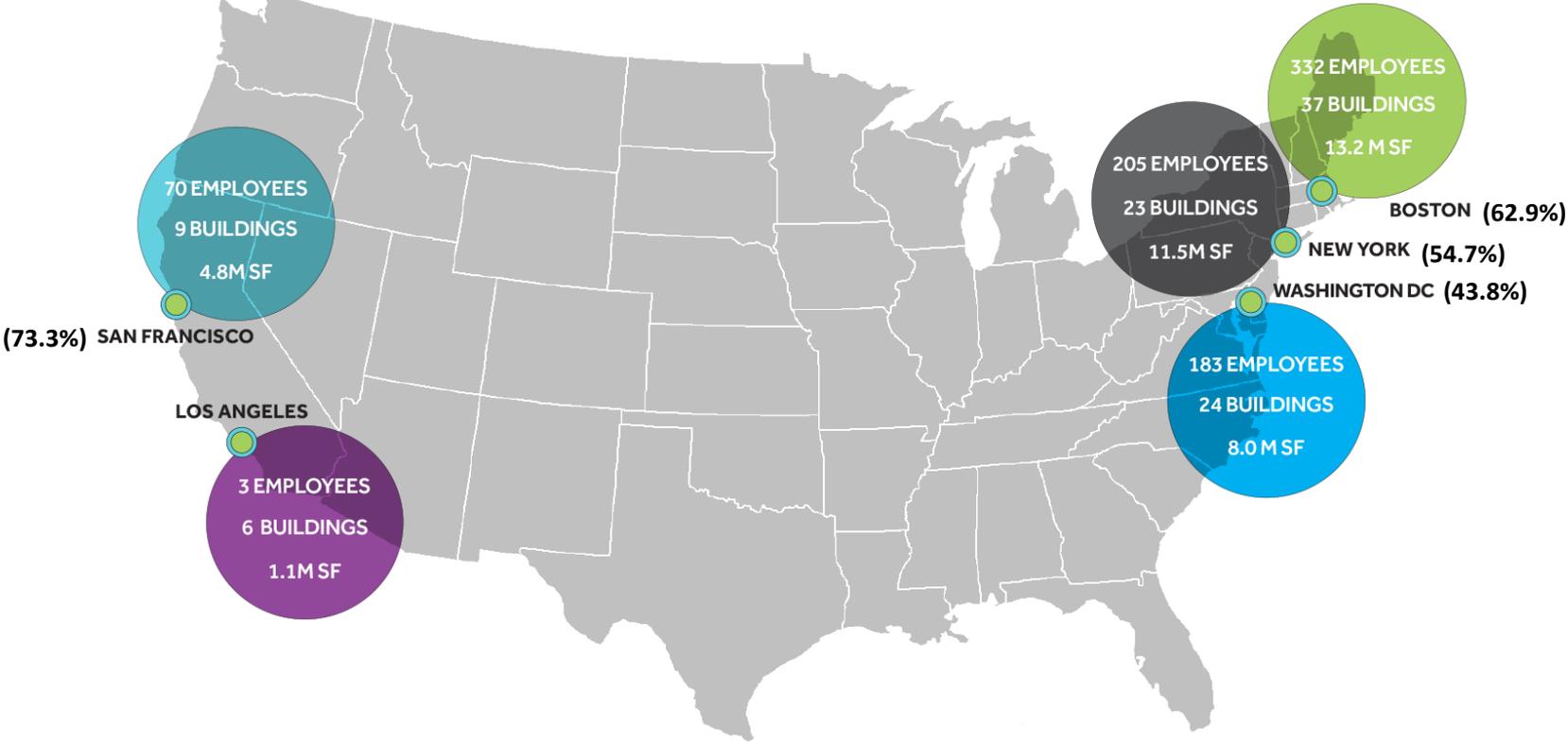
65x20 Waste Diversion

Increase waste diverted from landfill to 65%

All targets are measured against a 2008 baseline.

Waste Diversion





Waste Streams



Sustainability Goal Progress

GOAL	PROGRESS	NOTES
 <p>15x20 Energy Use Reduction</p>		<p>Complete - 19.8% reduction*</p>
 <p>20x20 Greenhouse Gas Reduction</p>		<p>Complete - 31.5% reduction*</p>
 <p>20x20 Water Use Reduction</p>		<p>Complete - 21.8% reduction*</p>
 <p>65x20 Waste Diversion</p>		<p>73% complete - 21.3% increase*</p>

*Since 2008

The Challenges

- **Materiality and cost signals are weak.**
 - Composting has been a break-even initiative (at best).
 - Where vendors are scarce, composting premium can be 3X.
- **Real estate owners and managers have less operational control over waste than other KPIs.**
 - Waste management has a large behavioral component.
 - Tenant engagement and responsiveness have been inconsistent.
 - Benchmarking and audits are less common.
- **Hauling industry is fragmented.**
 - Waste data measurement and disclosure best practices have not been universally implemented.
 - Data acquisition and quality control deficiencies persist.

Case Study 1: 200 Clarendon Street



- Single Stream Recycling
- Composting
- Two hauls per day at \$115 per haul → one per day, saving \$29,900
- Saved an additional \$5,400 by diverting ~70 tons/year from the waste stream

Case Study 2: Reston Town Center



- Launched Reduce, Reuse, Recycle, RESTON
- Tenant Engagement (F&B Focus) – Q4
Tenant Competition (8 buildings in RTC)
- Hosted a waste diversion lunch and learn
- Added desk-side recycling containers where they were missing
- Clear Trash Bags for Recycling

Case Study 3: Embarcadero Center

toolworks

people with disabilities | employers

recyclability

recyclability



Zero Waste, Real Savings & Full Employment
a winning formula for San Francisco

The City of San Francisco has the most ambitious goal in the country – striving to become the first Zero-Waste city. Toolworks has partnered with **recyclability** – an on-site waste sorting service to help meet this goal – to increase the building's recycling and composting rates.

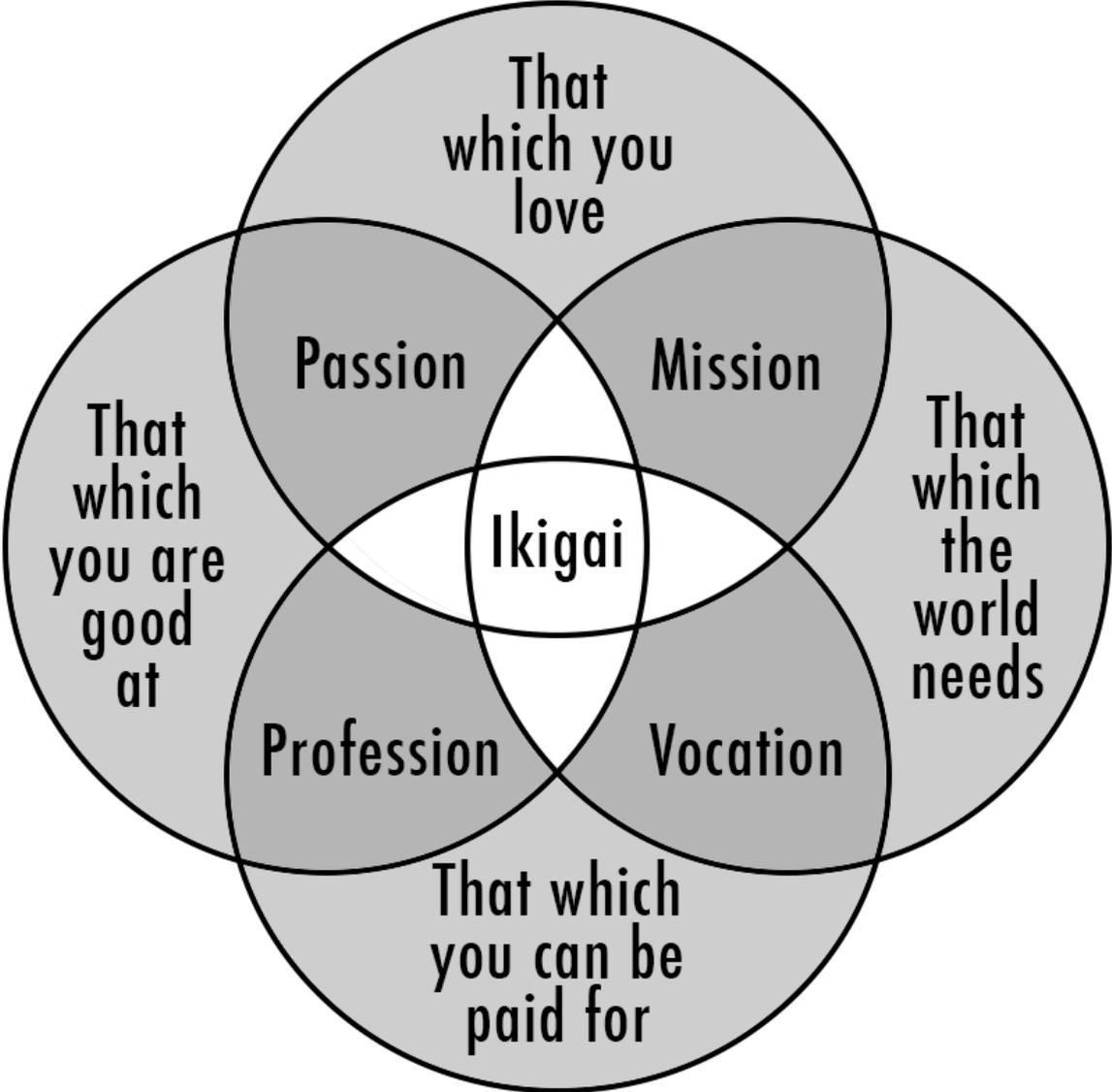
Why should you care? Because reducing the amount of waste sent to landfills will save you thousands of dollars on your waste bill and bring your building into full compliance with mandatory recycling ordinances.

Did you know that San Francisco businesses can receive a discount on their Recology™ bill?

These are real savings offered by Recology™ as part of the City of San Francisco's Recology™ program. Customers regularly receive discounts of 60-75% on their waste bills. You can pay for the **recyclability** program and still save thousands of dollars a year on your waste bill.

- You'll receive significant savings on your Recology™ bill by bringing your building into compliance with San Francisco's mandatory recycling ordinances.

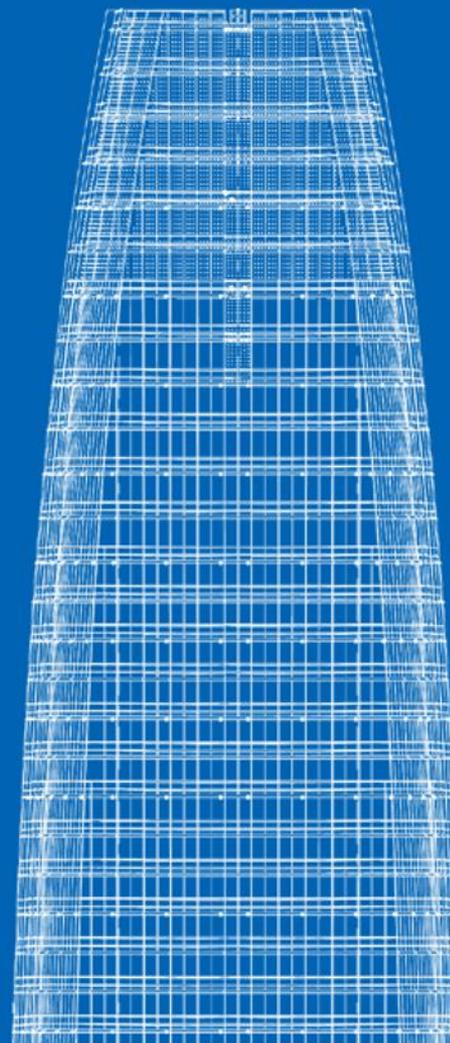
- Partnered with Toolworks to monitor and assist with sorting
- Added jobs
- Increased diversion rate to 88%!





2016 SUSTAINABILITY REPORT

BOSTON • LOS ANGELES • NEW YORK • SAN FRANCISCO • WASHINGTON, DC





Challenges and Opportunities in Managing Waste (Data)

Brian Trainor

Data Analyst, Sustainability Reporting



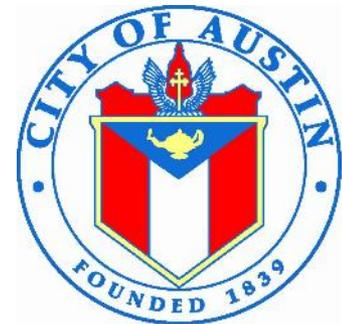
2017 ENERGY STAR Commercial Buildings Partner Meeting | Oct. 24 – 25, 2017

Main Drivers for Waste Tracking



G R E S B

ROBECOSAM 
We are Sustainability Investing.



Challenges of Portfolio Level Waste Tracking

- Data Transparency and Vendor Communication
- Limited online portals for streamlined collection
- Assumptions and estimations vary depending on vendor
- Vendor bill format and level of information varies by company and region





13630 Fondren Rd
Houston TX 77085-201212

Customer Service (713) 937-9955
RepublicServices.com/Support

Important Information

With My Resource, you can easily access your account, pay your bill, schedule a pickup and more. Sign up today at RepublicServices.com/MyAccount

Account Number

Invoice Number

Invoice Date

September 26, 2017

Previous Balance \$224.99

Payments/Adjustments -\$224.99

Current Invoice Charges \$694.25

Total Amount Due	Payment Due Date
\$694.25	October 16, 2017

PAYMENTS/ADJUSTMENTS

Description	Reference	Amount
Payment - Thank You 09/06	1	-\$224.99

CURRENT INVOICE CHARGES

Description	Reference	Quantity	Unit Price	Amount
2 Front Load (2 Yd Comp), 6 Lifts Per Week				
Non-Scheduled Service 09/04	Edgar Franco	1.0000	\$85.00	\$85.00
Receipt Number 17660				
Non-Scheduled Service 09/06	Edgar	1.0000	\$85.00	\$85.00
Receipt Number 22283				
Non-Scheduled Service 09/08	Edgar Franco	1.0000	\$85.00	\$85.00
Receipt Number 25294				
Pickup Service 10/01-10/31			\$116.91	\$116.91
2 Recycle Container 2 Cu Yd, 6 Lifts Per Week				
Non-Scheduled Service 09/04	Edgar Franco	1.0000	\$137.50	\$137.50
Receipt Number 17663				
Waste/Recycling Overage 09/25		1.0000	\$41.00	\$41.00
Pickup Service 10/01-10/31			\$90.93	\$90.93
Total City Tax				\$6.42
Total Mta Tax				\$6.42
Total State Tax				\$40.07
CURRENT INVOICE CHARGES				\$694.25

Lacks
Tonnage but
Contains
Yardage



Vendor Estimated Tonnage

July 2017

Commodity	Containers	Frequency	Volume	Estimated Weight
Trash	1.5 yard container	5x/wk (21)	31.5 cy	1.65 tons
Recycling	2 yard container	5x/wk (21)	42 cy	2.4 tons
	96 gallon carts (3)	1x/wk (4)	5.7 cy	
Compost	64 gallon carts (2)	3x/wk (13)	8.2 cy	0.62 tons
Diversion Percentage			64%	65%

Weight estimation key:

Trash: 105 lbs per cubic yard

Recycling: 100 lbs per cubic yard

Compostables: 150 lbs per cubic yard

Compacter: 3:1 Ratio

Volume: 202 gallons = one cubic yard

EPA Estimated Tonnage

Commodity	lbs per Cubic Yard	Volume	Tons
Trash	138	31.5	1.74
Recycle	155	47.7	2.96
Compost	135	8.2	0.44
Diversion Percentage		63.96%	66.16%

Assumptions:

Compost (Organics – Commercial): 135 lbs /cu yd

Trash (Commercial Building): 138 lbs / cu yd

Recyclables (Commercial Buildings): 155 lbs / cu yd





Actual
Monthly
Tonnage

Previous Balance	+	Payments	+	Adjustments	+	Current Charges	=	Total Due
2,753.69		(2,753.69)		0.00		3,571.60		3,571.60

Details for Service Location:		Customer ID:		
[Redacted]		[Redacted]		

Description	Date	Ticket	Quantity	Amount
35 Yd compactor	08/03/17	145136	1.00	374.56
Disposal per ton			7.89	362.86
Ticket Total				737.42
35 Yd compactor	08/10/17	160670	1.00	374.56
Disposal per ton			7.93	364.70
Ticket Total				739.26
35 Yd compactor	08/17/17	175609	1.00	374.56
Disposal per ton			7.48	344.00
Ticket Total				718.56
35 Yd compactor	08/24/17	191030	1.00	374.56
Disposal per ton			6.64	305.37
Ticket Total				679.93

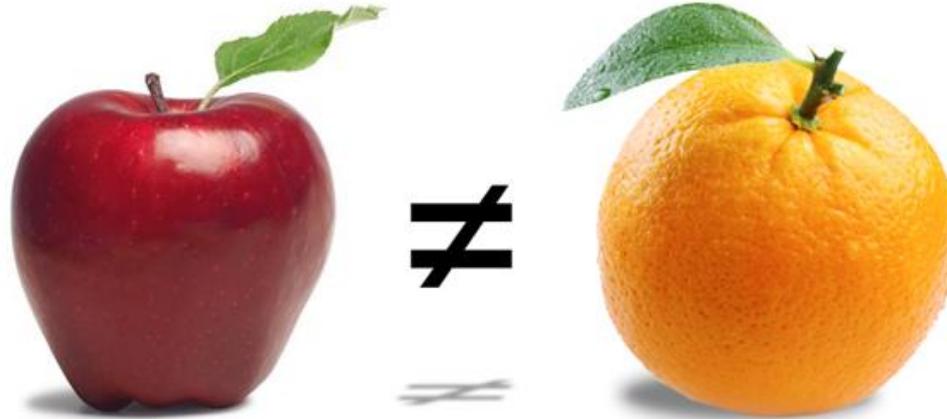
25% Diversion Rate	7.5 Tons	7.5 Tons + Service Pick up
Percent Savings	10%	20%
Cost Savings (\$)	\$345	\$720

Please detach and send the lower portion with payment --- (no cash or staples) -----

Invoice Date	Invoice Number	Customer ID (Include with your payment)
09/01/2017	[Redacted]	[Redacted]
Payment Terms	Total Due	Amount
Total Due by 10/01/2017	\$3,571.60	
If Received after 10/01/2017	\$3,660.89	

1 Ton = \$45.99
1 Haul = \$374.56





Data normalization between assets and portfolios is very difficult!

Total Monthly Volume

yards

$$Volume = [\# \text{ Containers}] \times [\text{Container size in yards}] \times [\text{Freq per week}] \times [4.3333 \text{ weeks per month}] \times [\% \text{ full}]$$



Volume-to-Weight Conversion Factors
 U.S. Environmental Protection Agency
 Office of Resource Conservation and Recovery
 April 2016



Advocate for Data Transparency!

- Reach out to your property teams and waste vendor contacts to express the importance of your sustainability goals
- Ask for Diversion Reports with actual tonnage reporting
- Ask for source estimations or request that estimations align with EPA Standards





MyPortfolio [Sharing](#) [Reporting](#) [Recognition](#)

Goby Test Building

33 N LaSalle, Chicago, IL 60606 | [Map It](#)
 Portfolio Manager Property ID: 6070897
 Year Built: 2008

[Edit](#)

Not eligible to apply for ENERGY STAR Certification

Weather-Normalized Source EUI (kBtu/ft²) Why not score?

Current EUI: [N/A](#)

Baseline EUI: [N/A](#)

[Summary](#) [Details](#) [Energy](#) [Water](#) **[Waste & Materials](#)** [Goals](#) [Design](#)

Meter Summary

3 Waste and Materials Meters Total

3 - Used to Compute Metrics

[Add a meter](#)

Current Waste and Materials Date: Sep 30, 2017

[Update Data](#)



[Export Data by Calendar Month](#)

Meters - Used to Compute Metrics (3) [Add A Meter](#)

[Change Meter Selections](#)

Name	Waste Meter Type	Frequency	Most Recent Date
Meter ID			

ENERGY STAR Waste & Materials



Landfill Estimations

	Start Date	End Date	Your 4 Cubic Yards container		Total Cost (\$)	Disposal Destination
			# of Times Emptied	Average Percent Full		
<input type="checkbox"/>	1/1/2017	1/31/2017	24	100% ▼		100 % Landfill Edit
<input type="checkbox"/>	2/1/2017	2/28/2017	27	100% ▼		100 % Landfill Edit
<input type="checkbox"/>	3/1/2017	3/31/2017	26	100% ▼		100 % Landfill Edit
<input type="checkbox"/>	4/1/2017	4/30/2017	25	100% ▼		100 % Landfill Edit
<input type="checkbox"/>	5/1/2017	5/31/2017	29	100% ▼		100 % Landfill Edit
<input type="checkbox"/>	6/1/2017	6/30/2017	27	100% ▼		100 % Landfill Edit
<input type="checkbox"/>	7/1/2017	7/31/2017	28	100% ▼		100 % Landfill Edit
<input type="checkbox"/>	8/1/2017	8/31/2017	26	100% ▼		100 % Landfill Edit
<input type="checkbox"/>	9/1/2017	9/30/2017	27	100% ▼		100 % Landfill Edit

Great First Step | Simple Tracking | Limited Vendor Communication Needed



Landfill Tonnage

	Start Date	End Date	Quantity (Tons)	Total Cost (\$)	Disposal Destination
<input type="checkbox"/>	1/1/2017	1/31/2017	12.16		100 % Landfill Edit
<input type="checkbox"/>	2/1/2017	2/28/2017	10.87		100 % Landfill Edit
<input type="checkbox"/>	3/1/2017	3/31/2017	11.34		100 % Landfill Edit
<input type="checkbox"/>	4/1/2017	4/30/2017	12.54		100 % Landfill Edit
<input type="checkbox"/>	5/1/2017	5/31/2017	13.98		100 % Landfill Edit
<input type="checkbox"/>	6/1/2017	6/30/2017	12.33		100 % Landfill Edit
<input type="checkbox"/>	7/1/2017	7/31/2017	11.34		100 % Landfill Edit
<input type="checkbox"/>	8/1/2017	8/31/2017	11.88		100 % Landfill Edit
<input type="checkbox"/>	9/1/2017	9/30/2017	11.17		100 % Landfill Edit

More Effort | Higher Accuracy | Greater Transparency





THE BOMA W2 WATER AND WASTE CHALLENGE

- Two-year initiative using ENERGY STAR Portfolio Manager to:
 - encourage tracking of water and waste consumption
 - Track costs
 - Implement common practices to improve water performance and reduce waste.
- 2018: Baseline Tracking Year
- 2019: Implement and Promote Performance Improvements
- Enrollment Deadline January 1, 2018



Opportunities

- Identifying areas for operational efficiencies and cost savings
- Increased engagement and communication on sustainability goals with property teams and tenants
- Increased scores on portfolio level sustainability reporting and asset level certifications

