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

![Graph showing the cost of waste over time from 1980 to 2013. The graph plots the tipping fee (in $/ton - $2014) on the y-axis and the year on the x-axis. The cost of waste has generally increased over the years, with values ranging from $19.80 to $50.59.](image-url)
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

Facebook: facebook.com/EPA
BXP Waste Management

Ben Myers
Sustainability Manager
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

Reduce Operating Costs
Enhance Asset Value
Expand Socially Responsible Investment
Customer  
Shareholder  
Community  
Employee  

Stakeholders
When there’s a scoreboard, people play differently.
ESG Data Management
Certification and Recognition
2017 GRESB Results

Management and Policy vs. Implementation & Measurement

BXP

GRESB Average
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

In 2016, BXP properties diverted enough waste to fill 100,000 full-size pickup trucks.

21.3% increase from 2008.
Waste Streams

- Recycling: 13,595 Tons (46.6%)
- Composting: 3,125 Tons (10.7%)
- Trash: 12,463 Tons (42.7%)
## Sustainability Goal Progress

<table>
<thead>
<tr>
<th>GOAL</th>
<th>PROGRESS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>15x20 Energy Use Reduction</td>
<td><img src="https://via.placeholder.com/50" alt="" /></td>
<td>Complete - <strong>19.8% reduction</strong>*</td>
</tr>
<tr>
<td>20x20 Greenhouse Gas Reduction</td>
<td><img src="https://via.placeholder.com/50" alt="" /></td>
<td>Complete - <strong>31.5% reduction</strong>*</td>
</tr>
<tr>
<td>20x20 Water Use Reduction</td>
<td><img src="https://via.placeholder.com/50" alt="" /></td>
<td>Complete - <strong>21.8% reduction</strong>*</td>
</tr>
<tr>
<td>65x20 Waste Diversion</td>
<td><img src="https://via.placeholder.com/50" alt="" /></td>
<td>73% complete - <strong>21.3% increase</strong>*</td>
</tr>
</tbody>
</table>

*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

- Partnered with Toolworks to monitor and assist with sorting
- Added jobs
- Increased diversion rate to 88%!
If energy use intensity remained flat since 2008, BXP would have spent roughly $0.55/SF more on energy in 2016.
Challenges and Opportunities in Managing Waste (Data)

Brian Trainor
Data Analyst, Sustainability Reporting
Main Drivers for Waste Tracking
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
Lacks Tonnage but Contains Yardage
## Waste & Recycling Monthly Report

August-17

### Recycling Diversion Rate

<table>
<thead>
<tr>
<th>Description</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Recycling (in Tons)</td>
<td>31.05</td>
</tr>
<tr>
<td>Total Solid Waste (in Tons)</td>
<td>48.03</td>
</tr>
<tr>
<td>Total Waste Stream (in Tons)</td>
<td>79.08</td>
</tr>
</tbody>
</table>

**Recycling Rate:** 39%

### Commodities Recycled

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrugated Cardboard (in Tons)</td>
<td>31.05</td>
</tr>
<tr>
<td>Office Waste Paper (in Tons)</td>
<td>0.00</td>
</tr>
<tr>
<td>Cans &amp; Bottles (in Tons)</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Total (in Tons)</strong></td>
<td>31.050</td>
</tr>
</tbody>
</table>

### Commodities Saved

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees Saved</td>
<td>528</td>
</tr>
<tr>
<td>Water Conserved</td>
<td>217,350</td>
</tr>
<tr>
<td>Cubic Yards NOT Landfilled</td>
<td>101</td>
</tr>
<tr>
<td>kWh Electricity</td>
<td>124,200</td>
</tr>
<tr>
<td>Oil (in gallons)</td>
<td>2,453</td>
</tr>
<tr>
<td>Air Pollution Reduced (in Pounds)</td>
<td>1,863</td>
</tr>
</tbody>
</table>

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Vendor

Estimated Tonnage
Vendor Estimated Tonnage

EPA Estimated Tonnage

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

- 25% Diversion Rate
- 7.5 Tons
- 7.5 Tons + Service Pick up

<table>
<thead>
<tr>
<th>Percent Savings</th>
<th>10%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Savings ($)</td>
<td>$345</td>
<td>$720</td>
</tr>
</tbody>
</table>

1 Ton = $45.99
1 Haul = $374.56
Data normalization between assets and portfolios is very difficult!

<table>
<thead>
<tr>
<th>Total Monthly Volume</th>
<th>yards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume = [# Containers] x [Container size in yards] x [Freq per week] x [4.3333 weeks per month] x [% full]</td>
<td></td>
</tr>
</tbody>
</table>

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
ENERGY STAR Waste & Materials
Landfill Estimations

<table>
<thead>
<tr>
<th>Start Date</th>
<th>End Date</th>
<th># of Times emptied</th>
<th>Average Percent Full</th>
<th>Total Cost ($)</th>
<th>Disposal Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1/2017</td>
<td>1/31/2017</td>
<td>24</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
</tr>
<tr>
<td>2/1/2017</td>
<td>2/28/2017</td>
<td>27</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
</tr>
<tr>
<td>3/1/2017</td>
<td>3/31/2017</td>
<td>26</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
</tr>
<tr>
<td>4/1/2017</td>
<td>4/30/2017</td>
<td>25</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
</tr>
<tr>
<td>5/1/2017</td>
<td>5/31/2017</td>
<td>29</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
</tr>
<tr>
<td>6/1/2017</td>
<td>6/30/2017</td>
<td>27</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
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<tr>
<td>7/1/2017</td>
<td>7/31/2017</td>
<td>28</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
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<tr>
<td>8/1/2017</td>
<td>8/31/2017</td>
<td>26</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
</tr>
<tr>
<td>9/1/2017</td>
<td>9/30/2017</td>
<td>27</td>
<td>100%</td>
<td></td>
<td>100% Landfill Edit</td>
</tr>
</tbody>
</table>

Great First Step | Simple Tracking | Limited Vendor Communication Needed
Landfill Tonnage

<table>
<thead>
<tr>
<th>Start Date</th>
<th>End Date</th>
<th>Quantity (Tons)</th>
<th>Total Cost ($)</th>
<th>Disposal Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1/2017</td>
<td>1/31/2017</td>
<td>12.16</td>
<td></td>
<td>100 % Landfill</td>
</tr>
<tr>
<td>2/1/2017</td>
<td>2/28/2017</td>
<td>10.87</td>
<td></td>
<td>100 % Landfill</td>
</tr>
<tr>
<td>3/1/2017</td>
<td>3/31/2017</td>
<td>11.34</td>
<td></td>
<td>100 % Landfill</td>
</tr>
<tr>
<td>4/1/2017</td>
<td>4/30/2017</td>
<td>12.54</td>
<td></td>
<td>100 % Landfill</td>
</tr>
<tr>
<td>5/1/2017</td>
<td>5/31/2017</td>
<td>13.98</td>
<td></td>
<td>100 % Landfill</td>
</tr>
<tr>
<td>6/1/2017</td>
<td>6/30/2017</td>
<td>12.33</td>
<td></td>
<td>100 % Landfill</td>
</tr>
<tr>
<td>7/1/2017</td>
<td>7/31/2017</td>
<td>11.34</td>
<td></td>
<td>100 % Landfill</td>
</tr>
<tr>
<td>8/1/2017</td>
<td>8/31/2017</td>
<td>11.88</td>
<td></td>
<td>100 % Landfill</td>
</tr>
<tr>
<td>9/1/2017</td>
<td>9/30/2017</td>
<td>11.17</td>
<td></td>
<td>100 % Landfill</td>
</tr>
</tbody>
</table>

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