
Future Look of the Solid Waste Management in the Region
Welcome

Daniel K. Moon

President & Executive Director

Environmental Business Council of New England
Conference Introduction – What You Will Learn

David A. Murphy, P.E.

Conference Chair and Moderator

Chair, EBC Solid Waste Management Committee

Vice President, Tighe & Bond
How Does a City Transition After a Major Landfill Closes?

Stanley W. Kulig, P.E.

DPW Project Advisor
Department of Public Works
City of Chicopee, MA
Status of MIRA’s Hartford Waste-to-Energy Project

Peter W. Egan

Director of Operations & Environmental Affairs
Materials Innovation & Recycling Authority
Materials Innovation and Recycling Authority

Status of MIRA’s CSWS (Hartford) Waste-to-Energy Project

March 4, 2020
Connecticut Solid Waste System (CSWS)
MIRA’s Hartford wTe Project

- Hartford Waste-to-Energy Project - Facilities
- Facility Operators
- Agreements
- Tons Managed
- Future of the System

March 4, 2020
CSWS Facilities

Hartford Resource Recovery Facility
- RDF Technology
- WPF & PBF

Recycling Facility
- Single Stream

Transfer Stations
- Essex
- Torrington
- Watertown

March 4, 2020
Facility Operators

- Hartford RRF — NAES Corporation — Through June 2026
- Hartford Recycling Facility — Republic — Through June 2021
- Essex TS — CWPM — Through June 2023
- Torrington TS — USA — Through June 2023
- Watertown TS — CWPM — Through June 2023
Waste Delivery Agreements

- Municipal Service Agreements with 51 towns
- 50 towns through June 2027, but can opt out each year when MIRA sets its annual tip fee
- One-Year Delivery Agreements with 33 Waste Hauling Companies

March 4, 2020
**MSW - Tons Managed**

- **Entire System**
  - **RRF and 3 Transfer Stations**
    - Contract Towns: 419,000 TPY
    - Non-Contract Towns: 126,000 TPY
    - Total: 545,000 TPY
  - Plus Interruptible/Spot Waste

March 4, 2020
MSW - Tons Managed

- Direct to Hartford RRF
  - Contract Towns: 290,000 TPY
  - Non-Contract Towns: 72,000 TPY
  - Total: 362,000 TPY

March 4, 2020
MSW - Tons Managed

- Essex TS
  - Contract Towns: 36,000 TPY
  - Non-Contract Towns: 15,000 TPY
  - Total: 51,000 TPY

March 4, 2020
MSW - Tons Managed

- **Torrington TS**
  - Contract Towns: 51,000 TPY
  - Non-Contract Towns: 200 TPY
  - Total: 51,000 TPY
MSW - Tons Managed

- Watertown TS
  - Contract Towns: 43,000 TPY
  - Non-Contract Towns: 38,000 TPY *
  - Total: 81,000 TPY

* On track to receive only ~6,000 TPY this year

March 4, 2020
Recyclables - Tons Managed

- Hartford Recycling Facility
  - Total: 74,000 TPY
    - Direct and from transfer stations

March 4, 2020
Tip Fees - FY2021

- MSW - Contract Towns: $91.00 per ton
- MSW - Non-Contract Towns: $93.00 per ton
- Recyclables - Contract Towns: $0.00 per ton
- Recyclables - Non-Contract Towns: $50.00 - $72.00 per ton
Future of the System

- Resource Rediscovery
  - Sacyr Rooney Recovery Team (SRRT)
  - Facility Condition Assessment (HDR)
  - Term Sheet Executed November 2019
  - Requires Firm Contracts for 550,000 TPY by May 31

March 4, 2020
Future of the System

- Resource Rediscovery
  - $333 MM Investment
    - $290 MM - RRF Capital Upgrades (3 Years)
    - $20 MM - Recycling Facility Refurbishment
    - $23 MM - Reserve Fund, Finance Costs

March 4, 2020
Future of the System

- Resource Rediscovery
  - $145 per ton beginning 2025
    - Assumes $35.00 MWh
  - Comprehensive Development Agreement
    October 2020 — 35 Years

March 4, 2020
Resource Rediscovery

Planning for Alternatives

- Status Quo (operate RRF for several years)
- Manage transition to permit compliant transfer operation
- Conversion to intermodal transfer station
  - Permit modification necessary

March 4, 2020
Materials Innovation and Recycling Authority

Peter W. Egan, Director of Operations and Environmental Affairs

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March 4, 2020
Updates from the Commonwealth of Massachusetts

John Fischer

Deputy Division Director
Solid Waste Materials Management
Massachusetts DEP
Massachusetts Solid Waste Updates

EBC Talking Trash Conference
March 4, 2020
John Fischer, MassDEP
Topics

- Solid Waste Master Plan
- C&D Facility Minimum Performance Standard
- Waste Ban Regulations
- Overall Solid Waste Regulations
- Source Reduction & Reuse Workgroup
- Municipal Recycling Contracting Guidance
- Market Development Workgroup
The SWMP:
- Since 1990 – plan issued every decade
- Establishes the Commonwealth’s policy framework for reducing and managing solid waste.
- Proposes a broad vision and strategies for how the Commonwealth will manage our waste over the next decade and beyond.
- Is prepared in accordance with the requirements of Massachusetts General Law Chapter 16, Section 21.
Management Capacity

- Limited capacity
  - Disposal in state and in region
  - Recycling (MRFs)
- Available capacity
  - Solid waste transfer (growing rail capacity)
  - Anaerobic digestion capacity
  - C&D processing capacity
2018 Solid Waste Data

- Combustion capacity projected level at 3.2 million tons
- Landfill capacity to drop to 60K tons by 2030 (1 MSW landfill)
- Projected net export for disposal in 2030
  - If meet 2030 goal = 780K tons
  - If disposal stays flat = 2.4 million tons
What is in Our Trash Now?

- **Food Waste**: 26%
- **Uncoated Corrugated Cardboard/Kraft Paper**: 9%
- **Textiles**: 6%
- **Compostable Paper**: 6%
- **Treated Wood**: 6%
- **Plastic Film**: 5%
- **Other Recyclable Paper**: 3%
- **Bio-Hazardous**: 3%
- **Carpet and Carpet Padding**: 3%
- **Remainder/Composite C&D**: 3%
- **All Other Materials**: 27%
- **Remainder/Composite Plastic**: 3%
- **Compostable Paper**: 6%
- **Textiles**: 6%
- **Compostable Paper**: 6%
- **Treated Wood**: 6%
- **Plastic Film**: 5%
- **Other Recyclable Paper**: 3%
- **Bio-Hazardous**: 3%
- **Carpet and Carpet Padding**: 3%
- **Remainder/Composite C&D**: 3%
- **All Other Materials**: 27%
Material Priorities

1. Greatest diversion potential
   - Food material – 570K tons
   - Cardboard – 220 K tons
   - Untreated wood – 135K tons
   - Textiles – 130K tons
   - Bulky materials – 130K tons
2. Difficult to recycle – reduce use
   - Single use packaging
Material Priorities

3. Reuse & Donation
   - Food donation
   - Building materials
   - Office furniture & equipment
   - Textiles

4. Local Markets
   - Food material
   - Mattresses
   - Glass
   - Textiles
2030 SWMP Proposed Goals

- 30% reduction by 2030
  - 5.7 million → 4 million tons
- 90% reduction by 2050
  - 5.7 million → 570,000 tons
- Reduce the toxicity of the waste stream

Figure 10.1 Projected Disposal vs. Disposal Capacity in Massachusetts (2017-2030)
Master Plan Schedule and Process

• Expect to publish Final 2030 Plan shortly
• Will also publish Response to Comments document
• Year 1 Priorities
  • Source Reduction & Reuse Workgroup & Action Plan
  • Expanded Waste Bans
  • C&D Minimum Performance Standard
  • Increased Waste Ban Inspections
  • Municipal Recycling Contracting Guidance
  • Market Development Work Group and Action Plan
C&D Facility Minimum Performance Standard

- Objectives
  - Level playing field
  - Direct mixed C&D to processors achieving high separation rates
- Minimum process separation rate =15%
  - Amount recycled as feedstock or fuel/
  - Total incoming material (C&D waste & bulky waste)
- Must also demonstrate separating all waste ban materials
- Effective reporting year 2020 – rates published June 2021
- MassDEP will also publish advisory 2019 data in June 2020
New Draft Waste Bans Regulations

- 301 CMR 19.017 – Proposed New Bans
  - Commercial Organics >1/2 ton per week disposal
    - About 2,000 additional businesses impacted
    - 100,000 tons of additional food waste
    - Plus more diversion from businesses subject to current ban
  - Textiles
    - Estimated 250,000 tons of trash
    - 90% of all textiles can be recovered
    - Reuse and Recycling infrastructure in place
  - Mattresses
    - Estimated 600,000 mattresses generated for disposal annually
    - High cost for disposal ($20-$50/each)
    - 80+% of mattress can be recycled
    - Recycling infrastructure is growing and cost effective (<$25/each)
Proposed Waste Bans Schedule

- Stakeholder input opportunities
- Draft Regulations with Public Hearings – Early Summer
- Final Regulations – Fall 2020
- Regulatory Effective Date of new bans – Fall 2021
Overall Solid Waste Regulations

- Comprehensive review of 310 CMR 16.00 and 19.000
- Developing internal recommendations now
- Propose to hold external stakeholder meetings to review proposed changes
- Timing TBD – summer or fall 2020
- Draft regulations for comment in 2021
Reduce & Reuse (R&R) Workgroup

- First meeting today
- Input into Strategic Reduce & Reuse Action Plan
- Open to anyone interested - specially seeking NGOs, businesses, and municipalities active in reduction & reuse initiatives
- Monthly meetings for 6-9 months
Reduce and Reuse: Next Steps

The Strategic reduce and reuse action plan will:

- Access best opportunities to increase source reduction and reuse
- Identify barriers and capacity needs
- Provide data on state of reuse activity in MA
- Create a diverse network of stakeholders
Priority Materials:

- Textiles
- Furniture (commercial/institutional)
- Household durable goods
- Building materials
- Electronics
- Single use packaging and food service products
- Transportation and distribution packaging
- Wasted food
Community Engagement

- How can we best engage the broader community to garner more input and support for the R&R Action Plan?
Municipal Recycling Contracting Guidance

- Hired consultant to develop by June 2020
- Update old existing contract template
- Address new and evolving contracting issues
  - Recycling collection & processing contracts
  - Contamination audits - methodology
  - Transparency with market indices, composition and audits
- Will hold two workshops for municipal officials only
- Also planning to hold meeting with MRFs and haulers
Market Development Workgroup

- Next workgroup after Source Reduction & Reuse
- Similar approach – provide input into strategic market development plan
- Support market development across stages of waste reduction hierarchy
- Identify materials as best candidates for in-state market development
- Begin by summer 2020
Questions/Comments

- Contact Information

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617-292-5632
Market Trends and the Benefits of Waste to Energy

James Belden

Area Asset Manager

Covanta Energy
Market Trends and the Benefits of Waste-to-Energy
Recycling Market Crisis is Deepening

New China policies spark disarray in region’s recycling industry
By David Abel

Worcester faces new challenges in recycling as costs rise, demand changes
By Brian Lee

Massachusetts glass woes deepen as state approves disposal

Mountains of paper stacks up at E.L. Harvey after China says no more

Stricter Chinese Policies Boost Cost Of Recycling
https://www.capenews.net/regional_news/stricter-chinese-policies-boost-cost-of-recycling/article_77ea8039-1e78-51fb-8ab2-d79209741bed.html

Wake up call: The global recycling market hits home in Lexington and beyond

Central Mass. recyclers face China import restriction

MassRecycle 2018: Municipalities should brace for more expensive recycling
Massachusetts has lost 1,377,000 tons of in-state disposal capacity because landfills have filled up and closed in the past few years.

By 2024 there will be almost no landfill capacity for municipal solid waste remaining in Massachusetts.
Regional Waste Disposal Capacity

Disposal market in Northeast is contracting...

- 10 Disposal Facilities
- 4 Landfill Gas-to-Energy Facilities
- Other disposal sites (closed)
- Other disposal sites (potential to close)
- 2 New Disposal Facilities online
- Expected NYC waste flows

Hyland LF
- 465k tonne/yr
- 13.7mm tonnes capacity

Ontario LF
- 918k tonne/yr
- 10.1mm tonnes capacity

Clinton LF
- 175k tonne/yr
- 15.4mm tonnes capacity

WasteUSA LF
- 600k tonne/yr
- 15.1mm tonnes capacity

NCES LF
- No annual cap
- 1.2mm tonnes capacity

Juniper Ridge LF
- No annual cap
- 20.0mm tonnes capacity

Southbridge LF
- 405k tonne/yr
- 0.3mm tonnes capacity

Massachusetts

<table>
<thead>
<tr>
<th>Disposal Capacity (twns in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess</td>
</tr>
<tr>
<td>Tons Disposed</td>
</tr>
<tr>
<td>Shortfall</td>
</tr>
<tr>
<td>2015</td>
</tr>
<tr>
<td>2018</td>
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<tr>
<td>2021</td>
</tr>
</tbody>
</table>

- Total disposal capacity includes permitted and permissible airspace estimates at each site as of 12/31/17.
- The Company announced plans to abandon efforts to pursue additional permits at the Southbridge LF on 8/2/17; please refer to the Company’s Form 10-Q for the quarter ended 6/30/17.
- McKean LF annual capacity does not include the 1.1mm tonnes of red matrix.
- Juniper Ridge LF has an annual limit of 91.8k tonne/yr of MGO through 2/28/18.
Waste-to-Energy in Massachusetts

- 7 WTE plants
- 9,490 Tons per Day
  - ~3,250,000 Tons per Year
- 72% of In-State Disposal
- Massachusetts current waste picture approximately 42% WTE, 37% Recycling, 20% landfill
- 256.9 MW Installed Capacity
- $591.6 million in Total Economic Output
- 1,441 Total Jobs
Waste-to-Energy in Connecticut

- 5 WTE plants
- 6,939 Tons per Day
  - ~2,330,116 Tons per Year
- 100% of In-State Disposal
- Connecticut current waste picture approximately 69% WTE, 31% Recycling
- 184.3 MW Installed Capacity
- $384 million in Total Economic Output
- 950 Total Jobs
Waste to Energy has been hit especially hard by the drop in the wholesale price of electricity. As natural gas prices remain low, there is no end in sight.

$83,000,000 a year in loss in energy at the Mass WTE facilities
Connecticut: 5 Year Changes in Energy and Waste Pricing

CT EfW Revenue % Change, 2014 - 2019

- Waste Revenue
- Energy Revenue
The Green Communities Act requires half of the proceeds from the sale of Waste Energy Certificates (WECs) be directed to recycling programs approved by MassDEP. The WEC payments received by MassDEP are deposited into the SMRP Expendable Trust, which is used to fund grants, technical assistance and education to help communities, businesses and institutions increase recycling and reduce waste. The SMRP program has provided ~$40 million for recycling program since 2010.

• **Declining Demand**
  – The MA-II-WTE market is currently out of balance: the supply of credits is outpacing demand.
  – MA-II-WTE demand is fixed at 3.5% of load, and ISO load forecasts are downward trending.
  – The MA-II-WTE ACP is much lower than other MA RPS Classes.

• **Declining wholesale market revenues**
  – When the MA-II-WTE Class was created and the ACP set, the annual average wholesale energy price was ~$80/MWh (2008). In 2017, annual average wholesale energy price was ~$34/MWh.

• **Draft DOER Proposal**
  – Increase the percentage requirement from 3.5% to 3.7%
  – Increase the Alternative Compliance Payment (ACP) equal to other Class II—~$28
  – Sunset at the end of 2025
    • Ensure that increases in the cost of disposal for local governments are minimized and no increase in GHG emissions from the waste sector by making the in-state WTE facilities more financial sustainable
    • Increase the amount available for recycling ~$15 million dollars a year (an increase of ~$9 million/year)
    • Minimal rate payer impact ~$.34 on a monthly bill
    • Consistent with the recent change for WTE steam credits in the APS and legislation passed in CT
What goes into the cost per ton?

- Our business has three important revenue sources – energy sales, metal (recycling) and waste disposal
  - Both power pricing and metal pricing are at historic lows with no signs of significant improvement in the near term. Waste pricing has also been relatively stagnant until long-term agreements roll off, apart from recent Boston area increases driven by capacity shortfall

- Maintenance costs
  - Our annual maintenance costs have grown over 5.5% while CPI has remained relatively low

- Reserve/bypass capacity and post closure costs
  - We are regulated by the DEP to maintain bypass capacity for both waste and ash disposal. The associated costs have more than doubled due to overall reduction in capacity and availability
  - Closure of ash disposal sites are also rising. Required to close and cap, as well as maintain sites 30 years after closing

- Challenges in the recycling markets
  - More paper and plastic in the waste stream has had a negative effect for our process as the increased heating value in these materials reduces the number of tons that we can process. Less tons equals less waste revenue and also drives the market pricing

- Indemnification costs have greatly increased
  - We take title of waste when it is received. As such, we incur large liability costs

- All of our market adjustment pricing does NOT just fall to our bottom line; it gets invested in operations
  - We are investing over $270M over the next two years in our MA facilities. In addition to RR&M these investments include metal processing systems, ash reduction programs, upgrades to further reduce our emissions, and others to improve our overall availability and future capacity
EPA Study: Lifecycle Energy Emissions

EfW is far below landfill gas to energy (LFGTE) in every category: CO₂, SOₓ, NOₓ, CO, PM

- **CO₂**—EfW better than landfills, coal, oil, and on par with natural gas.
- **SO₂**—EfW better than landfills, coal, and oil.
- **NOₓ**—EfW better than landfills & coal. On par with oil & natural gas.
- **PM**—EfW better than landfills, coal, and oil.

*Source:* Kaplan, P.O., J. DeCarolis, S. Thorneloe, Is It Better To Burn or Bury Waste for Clean Electricity Generation?, *Environ. Sci. Technol.*, 2009, 43 (6), 1711-1717
Lifecycle GHG Comparison: Major Electricity Sources

Lifecycle GHG Emissions - Electricity Sources

- Coal
- Natural Gas
- Nuclear
- Wind
- Solar (PV)
- EfW

EfW is a net GHG negative source of electricity when including avoided landfill CH₄ emissions.

Emissions from our facilities consistently fall below established limits, usually operating at 60 to 90 percent or more below permitted parameters.

Since launching our first sustainability program in 2007, we’ve reduced emissions by up to 50 percent.
GHG Benefits of EfW: International Recognition

- **U.S. EPA Clean Power Plan**
- **U.S. EPA Scientists**: “If the goal is greenhouse gas reduction, then WTE should be considered an option…”
- **European Environment Agency**: “As recycling and incineration with energy recovery are increasingly used, net greenhouse gas emissions from municipal waste management are expected to drop considerably by 2020”
- **IPCC**: WTE recognized as a “key GHG mitigation technology”
- **Rio UN Conference**: “We therefore commit to further reduce, reuse and recycle waste (3Rs), and to increase energy recovery from waste”
- **Davos World Economic Forum**: WTE included in the list of 10 low-carbon energy technologies
- **Clean Development Mechanism**: Over 40 EfW projects registered, combined annual GHG reduction of 5 million metric tons of CO2e per year
In the EU, recycling and Energy Recovery have grown together because of policies that minimize landfills.

The European Environment Agency says “there is no evidence to support” the argument that “incineration of waste with energy recovery hinders the development of recycling.”

In the U.S., many Covanta communities recycle well over 50%.

EU Waste Management Trends
(2000 - 2016)
New Technology: Investing in the Future

Boosting recovery
• Over the past five+ years, we’ve increased our metals recovery by nearly 20 percent

Closing the loop
• Development underway to reuse ash as aggregate for roadways and construction materials

Reducing Emissions
• SeMass—Replace ESP/COPAH systems with state-of-the-art baghouse for control of PM and metals (Pb, Cd and Hg). The existing facility has demonstrated a history of compliance. However, an evaluation of the long-term operations and reliability concluded that a new modern baghouse will provide lower emissions and provide more reliable operation.
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Solid Waste Management in South Central New England; A Looming Crisis?

Steve Poggi  
Area Director, Disposal Operations  
Waste Management, Inc.
EBC Annual Massachusetts Solid Waste Conference
“Talking Trash” - Solid Waste Management in Massachusetts

The Pending Solid Waste Disposal Capacity Shortfall

Steve Poggi, Area Director of Disposal Operations
Waste Management NE & NY Market Area
March 4, 2020
Waste Management NE-UNY Market Area
Regional Disposal Capacity Coming Offline

- Over the last 8-years New England disposal capacity decreased by 2.3M tons annually
- An additional 5.4M tons of regional capacity will come off line by 2027
- These regional sites operate at permitted capacity today
- Significant market disruption can be expected as sites come offline

### Offline Disposal Capacity

<table>
<thead>
<tr>
<th>Disposal Site</th>
<th>Annual Capacity</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claremont, NH</td>
<td>73,000</td>
<td>2013</td>
</tr>
<tr>
<td>Fall River, MA</td>
<td>468,000</td>
<td>2014</td>
</tr>
<tr>
<td>Granby, MA</td>
<td>235,000</td>
<td>2014</td>
</tr>
<tr>
<td>Bourne, MA</td>
<td>219,000</td>
<td>2015</td>
</tr>
<tr>
<td>MERC, ME</td>
<td>293,000</td>
<td>2012</td>
</tr>
<tr>
<td>Barre, MA</td>
<td>93,600</td>
<td>2016</td>
</tr>
<tr>
<td>Southbridge, MA</td>
<td>405,600</td>
<td>2018</td>
</tr>
<tr>
<td>Allegany County, NY</td>
<td>56,680</td>
<td>2018</td>
</tr>
<tr>
<td>Chicopee, MA</td>
<td>365,000</td>
<td>2019</td>
</tr>
<tr>
<td>Taunton, MA</td>
<td>120,120</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,329,000</strong></td>
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### Pending Offline Disposal Capacity

<table>
<thead>
<tr>
<th>Disposal Site</th>
<th>Annual Capacity</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>City of Auburn, NY</td>
<td>312,000</td>
<td>2022</td>
</tr>
<tr>
<td>Rapp Road, NY</td>
<td>275,100</td>
<td>2023</td>
</tr>
<tr>
<td>Allied Niagara Falls</td>
<td>591,000</td>
<td>2024</td>
</tr>
<tr>
<td>Fitchburg, MA</td>
<td>535,000</td>
<td>2024</td>
</tr>
<tr>
<td>Ontario County, NY</td>
<td>1,200,000</td>
<td>2025</td>
</tr>
<tr>
<td>Seneca Meadows, NY</td>
<td>2,190,000</td>
<td>2025</td>
</tr>
<tr>
<td>Bethlehem, NH</td>
<td>312,000</td>
<td>2025</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,415,100</strong></td>
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</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>7,744,100</strong></td>
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</table>
Driving Forces - Policies and Waste Reduction

• Northern NE capacity is generally stable and supporting the current population and economic growth conditions in that region

• Southern NE capacity is at risk of not meeting disposal needs

• Pressures on future development in Southern NE:
  o Draft MADEP Solid Waste Master Plan (SWMP) forecasts that MSW landfill capacity will decline to virtually zero by the end of this decade
  o Massachusetts currently bans expanding traditional Waste-to-Energy
  o Connecticut focusing on emerging technology for a large % of its waste

• Manufacturers are moving to reduce packaging. This is a good trend and may help to reduce some pressure on existing capacity – Examples include:
  o Nestlé aiming at 100% recyclable or reusable packaging by 2025
  o Unilever’s goals by 2025 are to halve virgin plastic used in its packaging and to collect and process more plastic packaging than they sell
  o PepsiCo’s goals by 2025 are to achieve zero waste to landfills, reduce the food waste it generates by 50%, and design 100% of its packaging to be recyclable
Projected Massachusetts Landfill Disposal Capacity
(per Massachusetts Materials Management Capacity Study)

By mid-2020, Fitchburg will represent 83% of permitted annual landfill capacity.

<table>
<thead>
<tr>
<th>Landfill Name</th>
<th>Permitted Capacity</th>
<th>Tons Received</th>
<th>% MA Tons Received</th>
<th>Expected Closure Year</th>
<th>% by Landfill Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casella Southbridge</td>
<td>405,600</td>
<td>325,889</td>
<td>98.60%</td>
<td>2018</td>
<td>25.82%</td>
</tr>
<tr>
<td>Crapo Hill</td>
<td>115,000</td>
<td>102,106</td>
<td>100.00%</td>
<td>2026</td>
<td>8.09%</td>
</tr>
<tr>
<td>Fitchburg Westminster</td>
<td>538,200(^1)</td>
<td>417,465</td>
<td>64.30%</td>
<td>2024</td>
<td>33.08%</td>
</tr>
<tr>
<td>Hull</td>
<td>14,256</td>
<td>441</td>
<td>100.00%</td>
<td>2018</td>
<td>0.03%</td>
</tr>
<tr>
<td>Middleborough</td>
<td>60,000</td>
<td>58,040</td>
<td>100.00%</td>
<td>2031</td>
<td>4.60%</td>
</tr>
<tr>
<td>Nantucket</td>
<td>26,000</td>
<td>2,800</td>
<td>100.00%</td>
<td>2030</td>
<td>0.22%</td>
</tr>
<tr>
<td>Sturbridge</td>
<td>7,644</td>
<td>275</td>
<td>100.00%</td>
<td>2030</td>
<td>0.02%</td>
</tr>
<tr>
<td>Taunton</td>
<td>120,120</td>
<td>119,072</td>
<td>99.90%</td>
<td>2020</td>
<td>9.44%</td>
</tr>
<tr>
<td>Town of Bourne(^2)</td>
<td>30,000</td>
<td>26,009</td>
<td>100.00%</td>
<td>2025</td>
<td>2.06%</td>
</tr>
<tr>
<td>WM Chicopee</td>
<td>365,000</td>
<td>209,850</td>
<td>89.90%</td>
<td>2019</td>
<td>16.63%</td>
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<td><strong>MSW SUBTOTAL</strong></td>
<td><strong>1,533,620</strong></td>
<td><strong>1,261,947</strong></td>
<td><strong>100.00%</strong></td>
<td></td>
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</tbody>
</table>

\(^1\) Temporary permit increased capacity to 538,200 tons in 2016; facility now permitted at 520,000 tons.

\(^2\) 85% of annual capacity contracted to Covanta SEMASS for ash disposal until Dec. 2021; capacity shown represents MSW capacity only.
Proposed management of waste streams over the next decade

- Proposes to focus on seven program areas for the next decade:
  - Source reduction and reuse
  - Organics waste reduction
  - Residential waste reduction
  - Commercial waste reduction
  - Construction and Demolition debris (C&D) waste reduction
  - Recycling commodity market development
  - Solid waste facility oversight and capacity management

- The SWMP highlights a critical trend:
  - Growth of both the state’s population and solid waste generation
  - Exerting pressure on the shrinking in-state waste disposal capacity

- The 2010–2020 SWMP set a 30% waste reduction goal statewide by 2020
  - Actual generation decreased by 14% through 2018
  - Per capita generation decreased by 18%
  - The 30% goal was not achieved

- The new draft SWMP notes that State Recycling facilities are “practically operating at 100% of their capacity right now.” - Confirmed
MADEP Draft Solid Waste Master Plan (SWMP)

Proposed management of waste streams over the next decade

• The new draft SWMP seeks to address not meeting past goals by:
  o *Pushing to reach zero-waste in the future, which requires:*
    ▪ Significant policy action and cultural / societal change
    ▪ Create new challenges for regulators and the regulated communities

• Goal for 2030 proposes to reduce disposal by 1.7 million tons/yr. (a 30% reduction)

• Goal for 2050 proposes to reduce disposal by 5.1 million tons/yr. (a 90% reduction)

• SWMP proposes reaching these goals by prioritizing 5 materials for diversion:
  o Food material; Cardboard; Untreated wood; Textiles; Bulky material

• MADEP believes the diversion potential for these 5 targeted materials is ~ 1.2 million tons/yr., nearly half of which is projected to come from diverting organics

• After several years of promoting organics recycling and the markets have not yet responded robustly. Several small organics facilities have been constructed, but the projected 570,000 tons of diversion in this sector is quite aggressive
Develop Resilience in Solid Waste Master Plan

• MADEP projects closing of in-state landfill capacity

• Acknowledges recycling facilities are full and that there is a gap with in-state disposal capacity

• Planning for municipal solid waste needs to account for the impact of:
  o *Infrastructure bottlenecks – WTE unscheduled shutdowns or Acts of God?*
  o *Lack of local landfill capacity – Plan to store waste? How long will it last with a major system disruption? CT MIRA WTE Outage in November 2018*
  o *Insufficient trucking or rail capacity to hauling to distant out of state landfills*
  o *New disposal technologies may not reliably process large volumes of waste*

• Do hosts of out of state landfills want to be the recipient of MA solid waste?
  o *NH and ME are proposing legislation to curb out of state waste*
  o *Some NY landfills already restrict waste sources*
  o *Is Ohio next?*

• The disposal network in southern New England today lacks resiliency and may be at risk if the SWMP falls short of its goals again
Key SWMP Takeaways

• With limited system capacity, any disruption (facility closures, poor weather or peak volumes) can lead to haulers having difficulty finding adequate disposal outlets

• Despite increased efforts to reduce, reuse and recycle, the SWMP acknowledges there is a gap in in-state disposal capacity

• Even if the 2030 30% reduction goal is met, the SWMP projects a 700,000 TPY in-state disposal capacity gap

• As capacity diminishes in Massachusetts and throughout the Northeast costs will continue to rise

• As such, SWMP recognizes the need to consider applications to expand in-state capacity and intends to work with stakeholders to address short and medium term disposal needs
Key Recommendations & Considerations

• All methods of waste reduction, recycling and disposal must be utilized in order for the State to manage its own solid waste streams

• Heavy reliance on out-of-state MSW disposal comes with risks; transportation & legislation
  - NH and ME are proposing legislation to curb out-of-state waste (900k tons in 2018)
  - Some NY landfills already restrict waste sources
  - Is Ohio next? (700k tons in 2018)

• Commonwealth should pursue waste & recycling independence

• Planning needed for major, long-term disruptions, Acts-of-God?

• New MSW technologies have yet to be proven at scale

• Siting of reliable, local disposal capacity is critical to bridging the gap until new technology can be proven
Challenges Facing Recycling

Chris Lucarelle

Recycling Director
Waste Management, Inc.
Update on WTE and Rail Haul

John Farese
Marketing Manager
Wheelabrator Technologies / Tunnel Hill Partners
Company Overview
March 2020
Company Overview

Vertically-integrated business – Collections, Transfer and Disposal (Landfill and Waste-to-Energy)

- Over 1,700 Employees
- Wheelabrator and Tunnel Hill Partners acquired independently by MIRA in February 2019
- New leadership team established in 2019 with full integration of companies on track for mid-2020

Wheelabrator:
- Waste-to-Energy (WTE) – Operate 19 WTE facilities (one under construction in U.K.) and 2 waste fuel facilities in the U.S. and U.K.

Tunnel Hill Partners / City Carting:
- Collections & Hauling – 7,000 industrial and commercial customers and 13,000 residential customers across Westchester County, NY and Fairfield County, NY and 6 managed municipal transfer stations
- Rail Transfer – Largest integrated waste-by-rail company in the US. Constrained Northeast landfill capacity makes rail transport economically attractive vs. alternatives
- Transfer Stations – 9 owned and 2 Material Recovery Facility across CT, MA, NJ, and NY.
- Landfill – 2 Landfills in Ohio, 1 in PA

Asset Map
Management Team

Robert “Bob” Boucher, Jr.
President & CEO
- CEO since July 2015
- 30+ years experience in U.S. waste industry
- Previously served as CEO of Transpacific Industries Group
- Prior senior executive positions at Republic Services, Synagro Technologies, Allied Waste, Waste Management and American Waste Systems

Mark Doheny
Chief Financial Officer (CFO)
- CFO since November 2019
- 20+ years Finance experience
- Previously SVP of Finance for Vallen Distribution, transforming the business finance function over four years and oversaw a financial integration and legal merger
- Previously held senior leadership roles at Eaton, a diversified power management company

Anthony “Tony” Farina
SVP of Operations
- SVP of Operations since September 2019
- 30+ years experience in U.S. waste industry, including leadership positions for Waste Management, Clean Harbors, Interstate Waste Services, Progressive Waste Solutions and, most recently, chief operating officer for City Carting
- Provides overall direction and operational guidance fleet of waste-to-energy facilities, landfills, transfer stations, waste-by-rail and collection assets

Pamela “Pam” Hobbs
Chief Human Resources Officer (CHRO)
- CHRO since December 2019
- 18+ years experience in U.S. waste industry, including Waste Management, Allied Waste, Republic
- Responsible for Safety, HR Service Delivery, talent and performance management, labor relations, Total Rewards, policy development, diversity efforts and recruiting

Daniel “Dan” Mayo
Chief Strategy Officer (CSO)
- CSO since November 2019
- Responsible for developing and delivering strategic priorities, including business development and mergers and acquisitions
- Joined WTI in 2018, serving as VP of Finance
- Previously VP of Finance at InterGen, a global power company, and held positions at Morgan Stanley and Goldman Sachs

Michael O’Friel
General Counsel
- Joined WTI in 1991
- Responsible for all legal, environmental compliance, communications and community engagement and governmental affairs for the business
- Oversees all legal issues associated with operations, project development, acquisitions and divestitures, environmental compliance, financings, legislative activities and internal and external communications
- Promoted to general counsel in 1999

Julia Watsford
Managing Director, UK
- Responsible for providing the strategic vision for Wheelabrator U.K. as well as the management and growth of its fleet of six waste-to-energy facilities (two under development)
- Joined WTI in July 2015 as VP of Corporate Strategy
- Prior to joining WTI, was a director of strategy at PwC Management Consulting in Australia
- Previously worked at the Commonwealth Bank of Australia and Australian New Zealand Bank
Section 1

Wheelabrator Technologies Overview
A Leading Waste-to-Energy ("WtE") Platform

Global WtE growth platform of strategically located infrastructure assets providing critical waste disposal services

- Leading owner and operator of strategically located WtE facilities in North America with an expanding footprint in the U.K.
- Operate 25 strategically located facilities in the U.S. and U.K.
  - 19 WTE facilities (one under construction in the U.K.)
  - 2 waste fuel facilities
  - 4 ash monofills
- Approximately 85% of 2020 Revenue is contracted:
  - Tipping fee revenues from municipal and national, regional and local commercial waste customers
  - Sale of clean, renewable, baseload electricity from waste conversion
  - Sale of ferrous and non-ferrous metals recovered as byproducts from waste conversion
- In 2019, processed ~6.9 million tons of post-recycled solid waste, generated ~4.3 million net MWh of power and recycled 151,000 tons of ferrous and non-ferrous metals
- Employees: 1,105
Tunnel Hill / City Carting Infrastructure and Platform

- Largest integrated waste-by-rail company in the US. Constrained Northeast landfill capacity makes rail transport economically attractive vs. alternatives
- Owns and/or operates 15 strategically located facilities in the Northeast U.S.
  - 9 Transfer Stations
  - 3 Disposal Sites
  - 1 Collection Operation
  - 2 Material Recycling Facility
  - Operate 6 Municipal Transfer Stations
- In 2019, processed ~5.5 million tons of waste through transfer stations, disposal sites and recycle facilities
- Collection operation offers commercial, industrial and residential services and provides services to ~20,000 customers
- Employees: 596
Collections & Hauling

- **Commercial**
  - Currently service ~5,000 commercial customers
  - Routes: 31

- **Residential**
  - Services ~13,000 subscription customers and ~45,000 municipal customers
  - Routes: 33

- **Roll-Off**
  - Services ~2,000 industrial customers
  - Routes: 42
Transfer Stations / MRF

- ~1.8M tons received in 2019
- Own and operate 9 transfer stations

- Operate 6 municipal transfer stations receiving ~138K tons
- 2 WTE Ash Hauling Contracts

- MRF processes ~75K tons annually
- C&D Recycling ~94K tons
Landfills

Tunnel Hill Reclamation
- 2,700 Acres
- C&D, MSW, Biosolids, Special Waste
- Permitted Volume: 8,000 TPD
- Airspace: 25M CYD
- Site Life: 13 Years
- Rail Cars/Day: 50-70
- Avg. Turnaround Time: 18 Days
- Rail Line: CSX/NS ➔ CUOH

Sunny Farms
- 830 Acres
- C&D, MSW, Special Waste
- Permitted Volume: 7,500 TPD
- Airspace: 21M CYD
- Site Life: 9 Years
- Rail Cars/Day: 60-70
- Avg. Turnaround Time: 15 Days
- Rail Line: CSX

Hazelton
- 277 Acres
- Soils, coal ash
- No permit limits
- Airspace: 7M CYD
- Rail Line: NS
<table>
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<tr>
<th>Location</th>
<th>Count</th>
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<td>Gondolas</td>
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<tr>
<td>Flats</td>
<td>104</td>
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<tr>
<td>Avg. Age</td>
<td>8.9 years</td>
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Rail Network
Moderated Discussion

Moderator: Thomas Mackie, Mackie Shea Durning PC

Panelists:

- James Belden, Covanta Energy
- John Farese, Wheelabrator Technologies
- Toni King, Casella Waste Systems
- Scott Lemay, United Material Management
- Steve Poggi, Waste Management, Inc.