

**Massachusetts Department of Environmental Protection (MassDEP)**  
**Recycling Market Development Workgroup**  
**December 15, 2022, 10:00 am to 1:00 pm**  
**Meeting Summary**

Topic: Research and Development (Product Testing and Development of New Technology)

The meeting began with a panel discussion moderated by Sean Sylver of MassDEP. A recording of the panelist discussion is posted along with this meeting summary.

Panelists included:

Bob Bylone, President and CEO, Pennsylvania Recycling Markets Center

Kara Pochiro, VP of Communications & Public Affairs, Association of Plastics Recyclers

Laurent Canneva, Co-Founder and Chairman of Spare-It

Yuly Fuentes-Medel, Ph.D. - Program Manager of Fiber Technologies, MIT

Meeting participants then joined one of four breakout groups, each focused on different groups of recyclable materials:

1. Packaging – all forms of packaging
2. Organics – food scraps and other organics
3. Construction & Bulky Materials – construction, furniture and other bulky materials, mattresses and household goods (including textiles)
4. Materials with New and Emerging Markets – such as solar panels and wind turbines

**Questions to consider for each material group:**

1. How are you using your organization's R&D agenda to identify potential recycling market opportunities?
2. How can MassDEP, or other state agencies, stimulate recycling market development through R&D partnerships with other organizations?
3. What are the risks to developing new or expanded recycling markets and what can be done to alleviate those risks?
4. State agency purchasers have stated that three keys for recycled content products to succeed in the marketplace are consistent quality, consistent availability, and competitive price. How can R&D be used to help to achieve these goals?

**Group 1 (Packaging) Notes:**

MRF residuals are mostly plastics. EPR could reduce that in the future, but it will not go away completely. How do we create value from "waste?" For instance, for "unrecyclable" plastics, maybe pyrolysis. How do we connect investors to projects?

There have been a lot of articles recently about plastics saying recycling is ineffective. There are streams of plastic not accepted by MRFs that need to go elsewhere: for instance, plastic bags/film going back to stores. It appears we need a host of solutions for recycling plastics. There's not a magic bullet, but multiple processes - like chemical recycling - could help.

Often one needs to plan ahead to recycle at different outlets (plastic bags to store, kids' yogurt pouches in mail-back program, etc.) Make it simple, with easy solutions available for the average person. That needs to happen at the local level.

Amazon is experimenting with no packaging on some products: putting labels on boxed items that are already packaged. But some packaging is inevitable, and often there's a multi-material problem.

Some multi-material products are labeled (which is good on its face), but bottles (for instance) might say to take off plastic wrap to recycle the bottle (inconvenient). Human behavior is an issue, and more than just education is needed.

Waste Management is set to pilot film recycling curbside in Texas. New York City has talked with a local MRF regarding plastic/bag film recycling. NYC currently requires bagging of recyclables. Local MRFs have ability to break bags and collect and recycle plastic bags/films. What if bags were combined in a single bag (a chunk of plastic) for sorting at MRF?

If packagers develop a collection method, then they could claim recyclability. Many stores in NYC do not offer plastic bag collection.

What's the state's best role? MassDEP gives grants/loans to recycling businesses and hasn't really ventured into R&D or pilot programs.

In some cases, projects don't need money; they need regulatory bodies to greenlight pilot projects. Microgrants are helpful. One Massachusetts advantage is its robust academic community. Are there ways MassDEP or other state agencies could partner with our local academic community?

MassDEP and the Commonwealth can't show favoritism or go all-in on a single idea. There is, however, a robust network of state schools for potential partnerships.

Sometimes economic development corporations can do things government can't do.

Moving material around still has a greenhouse gas impact (emissions). An efficient system comes down to logistics and a regional planning infrastructure - including marine - that brings together different players.

Packaging trends have forced governments to reconsider metrics. Tonnage hasn't gone up, but volume has increased. Cardboard volume has gone up. How do we keep materials from piling up on city streets? Could balers be used at large residential buildings? Volumes are different from what they used to be - in the "evolving ton," packaging is the driver as far as what we see in the MSW stream

Historically, some have said bottle deposits don't make a difference in terms of tonnage diverted, as a small percentage of total tonnage goes through that system. But it's different from a volume perspective. It's similar with expanded Polystyrene. The "evolving ton" reflects packaging.

When looking at "scavenging," the lightweight materials are scavenged. Those materials - with bottle deposits, for instance - are lost in the stream. Bottle deposits may be easier to manage in rural areas.

Industry groups create good opportunities to gather stakeholders and learn from others.

## Group 2 (Organics) Notes:

What do we mean when we say organics? Two things in mind: food waste and leaves/yard waste streams. When we talk about organic waste and R&D, that conversation usually evolves toward composting and anaerobic digestion (AD). These technologies and research are important, but we don't want to ignore other levels of the food recovery hierarchy, such as animal feed and food donation.

MassDEP is wondering how to work with others to advance the R&D agenda relative to market development. Wondering who to partner with most effectively and how to form these partnerships.

From the municipal perspective, the city of Boston recognizes the importance of stakeholder partnerships and collaboration among organizations/agencies for R&D. These partnerships can help realize the economic development opportunities related to waste. When partnering with the private sector, it can be challenging to cast wide nets instead of operating with a single private entity.

There is a need for collaboration on the state level as well. Workforce development is an example of something that MassDEP would like to collaborate with others on.

In Maryland, there is a food diversion law that goes into effect January 1<sup>st</sup>. MDE wrote the regulations, spread the word, and gained input from stakeholders across the state. The issues are mainly from rural communities because MDE encourages food to first be donated and then sent to animal feed or land applications. MDE is getting a lot of questions/concerns from farmers about setting up small composting operations and accepting outside food residuals.

In Massachusetts, MassDEP relied on agricultural composting early on to serve larger generators like supermarkets. Since then, we have seen new composting operations develop and others have shut down, often due to odor concerns. These sites might have started in rural areas, but development led to closer neighbors. For food waste, MA has seen more growth in AD than composting. The mini MRF concept could be applied to composting: when composting on a smaller scale, nuisance conditions may be more easily managed, and this also aligns with the lowering of the organics ban threshold.

MDE is pushing smaller-scale composting initiatives in Baltimore, Maryland as well. Have been reaching out to urban farms to see if they would be interested in setting up composting operations (in MD, sites under 5,000 sq. ft. do not need a permit).

Vanguard Renewables has several AD facilities. From an R&D perspective for AD, a lot of internal work goes into figuring out pathways financially and logistically to getting food waste to the de-packaging and AD facilities.

The University of Maryland is doing a pilot anaerobic digester in Northern Maryland and oversees monitoring the system's inputs and outputs. They use the data they receive to promote it to other farms. The farm they have now uses the methane for heating on the property.

Diversification of [food waste outlet] options is key and benefits the industry as a whole. In MA, we have urban municipalities and rural municipalities who want farms to figure out how or if they can start incorporating/diverting organics. Cities and towns have different logistics for waste collection that will affect how they approach the composting or AD conversations.

One example of a successful system used by a town: The tote system at transfer stations in rural areas. This approach has avoided nuisance conditions. Additionally, when you work with schools for food waste diversion, kids learn about how this works and take this idea home with them.

At Boston Public Schools, in the cafeteria, they are struggling with the time component when sorting food waste. Many students only have 20 minutes to eat and they're already in line for 15 minutes to get their food. It comes down to education and having enough time to make the correct source separation decision. Question for AD: How does compostable service ware work in your facilities?

From a separation standpoint, there are a few things AD can't receive: Styrofoam, silverware... any contamination is an inhibitor. A napkin or paper plate is fine, but a wrapper is trash. Education on separation helps. Separation has not been an issue with the schools we work with. It may be a larger educational initiative than just in the lunchroom.

Back of house vs. front of house: most food waste is coming from back of house, the contents of which are generally cleaner and quicker to separate. However, some schools with universal lunches are experiencing more food waste. Also aware of schools using swap tables, an upstream method of avoiding food waste. Think about the flow of the room and where students walk—can the physical infrastructure be altered to make food waste separation easier? Vanguard sends toters to its depackaging facility first so we can filter out the random latex glove or milk carton items. This deals with contamination before the digester.

The prevention and reduction levels of the recovery hierarchy present opportunities to think about as well. Whether a school or businesses, looking upstream and implementing a food waste tracking system can help understand what the food waste is and the sources of contamination. For example, can you decrease contamination levels based on the packaging you use?

A big question is, whose responsibility is the de-packaging?

Agri-Cycle has a depackaging facility. If their customers can separate and recycle packaging on site, that is the preference, and it eliminates double hauling the material. The de-pack is still an option for the customers who really need it.

Vermont has a commission on depackaging.

When we talk about market development for organics and our goals, we have two categories of goals: 1) How can we divert more organics from disposal (e.g., cranberries and seafood are two challenging streams to divert) and 2) Based on the material we are getting, is there a way to optimize the AD and composting processes (e.g., more useful digestate and compost products).

Group conversation on oyster shell waste:

- Cannot easily break down in composting or AD operations.
- Can be crushed to create fill for driveways.
- There is an organization that makes sweaters out of oyster shells.
- In Maryland, there is an oyster shell movement: putting them in the bay to provide growth medium for baby oysters to grow on.

### **Group 3 (Construction & Bulky Materials) Notes:**

What data do we need to advance markets?

At the Deconstruction Workgroup meeting on 12/14, a presenter identified the need for data to map the age and number of houses built between roughly 1940 and 1980 in Mass. This information will help deconstruction specialists to direct their efforts towards the most useful materials – which includes dimensional lumber used during this period.

A recent deconstruction of a home on Martha's Vineyard resulted in materials arriving at EcoBuilding Bargains. Waste Not was the contractor; still they had several roll-offs of waste from this job.

Schools and other entities often ask for sample bid specs for deconstruction. If there was a sample for how to ask for deconstruction in a bid document, it would be very helpful. Could MassDEP hire a consultant to develop this?

There's a machine to remove mortar on old bricks during the demolition or deconstruction process. This enables bricks to be reused instead of disposing of them. Sometimes they can be reused on the same job site. Could MassDEP fund a pilot for use of this machine? A Reuse Micro-grant?

There is also a company producing a compartmentalized roll-off for C&D separation at the job site.

Focusing on quality over quantity when deconstructing or demolishing is an important element, and a conundrum - the pressure for speed and efficiency in demolition means sacrificing the production of a quality feedstock that could be reused.

What about split boxes – whenever this comes up with C&D processors, they immediately dismiss the idea; “we can't possibly accept a split box.” Could MassDEP fund a pilot to demonstrate how it works and document the cost/benefit of this approach?

Union workers are being vocal about the volume of waste going to landfills in Quebec City which signals a growing awareness of the need to reduce waste.

Potential Pilot projects: divided roll-off (split boxes) for C&D separation onsite; mortar removal machine to separate mortar from bricks at job site and allow the bricks to be reused on site for new construction. Collect data on the costs, benefits, including avoided disposal costs, value of bricks that don't have to be purchased, etc.

How can we get better sorting of difficult-to-recycle plastics?

Summary of ideas/themes to guide R&D initiatives:

- Data collection: what materials are available for recycling
  - Example from Deconstruction contractors: quantify the number and age of residential structures across Massachusetts
- Development of sample bid specs for deconstruction projects
- Survey of existing markets and technologies
  - For example: machine for removing mortar from brick; compartmentalized containers for C&D
- Pilot projects

- State is ideally suited to absorb the risk of projects with unknown return on investment

#### **Group 4 (Materials with New and Emerging Markets) Notes:**

This group focused on how MassDEP or other state agencies can stimulate recycling market development through R&D partnerships with other organizations.

Ideas included:

- Pilot through community groups with access to participation
  - Focus on building a community of research
    - Who are those willing to participate in the pilot?
    - Is there enough money for the pilot?
    - What are the different phases?
    - Who are the community partners?
- Look at the Supply Chain and how sorting technology is being addressed at the MRFs to increase efficiency and diversion from disposal
- Consider further evaluation on MRFs international commodity markets with emphasis on high volume and high-quality markets
- Focus groups with MRFs, manufacturers and researchers with priority issues that identify clear opportunities for having real impact like mattresses, textiles, and organics
- Collaborate with Mass Robotics, Mass Collaborative (note: Amazon Headquarters and robotics link)
- Consider further evaluation of small scale and local infrastructure opportunities for addressing waste at the source of generation
- Further discussion on barriers and local solutions to global issues
- Recycling infrastructure for EV batteries: EPA grants are available
- Continue regional partnerships
- Consider further evaluation of regional databases, including assessment of machine learning, advanced AI, unique permutations (1000+ inputs), data science/mining, etc.
- Build a network of recycling businesses in MA with emphasis on refurbishing and remanufacturing if possible (e.g., dental chairs)

Test R&D and see if it is scalable. Asking the right questions would be critical in that process.