

NERC and metroSTOR Webinar Summary and Transcript

Why Multifamily Recycling Fails: and how cities are rethinking the system

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Webinar Summary

Session Summary

The webinar outlined the principles supporting the emergence of drop-off programs as the enabling infrastructure for many municipal organics programs, and two real-life examples of this at work.

Correctly designed deposit points can do so much more than house food scraps: they help prevent contamination, create accountability, improve data and service planning, and support program expansion without the same loss of quality often seen in open systems.

For municipalities trying to move from pilot activity to a scalable, durable organics collection program, that makes controlled access less an optional feature and more a practical foundation for long-term performance.

1. Accessibility starts with location

The first requirement for participation is that residents can actually reach the service. Placement matters: bins need to be near where people live, visible, safe, and practical for servicing. A move from transfer-station drop-off to more local satellite sites reflected this.

2. Convenience depends on ease of use

Once residents reach the site, the container must feel easy and intuitive. Participation improves when systems reduce friction - clear multilingual instructions, easy opening mechanisms, good physical design, and a resident journey that does not make organics harder than trash.

3. Control is what prevents contamination.

Convenience alone is not enough, especially for food scraps. Controlled-access enclosures add accountability at the point of deposit and reduce contamination. The similarity of organics composition to trash means that contamination is difficult to prevent through signage alone.

4. Feedback makes education more effective

Once a controlled-access system is in place, communication becomes much more targeted. Because use can be linked to specific participants, the program can communicate directly with the resident responsible for contamination rather than sending generic reminders to everybody.

5. Scalability depends on keeping admin costs low

A major advantage of controlled-access infrastructure is that it helps programs grow without requiring an increase in manual oversight, and even sign-up and charging processes can be automated.

6. Data strengthens planning, servicing, and program support

The data layer then monitors registrations, usage patterns, the impact of outreach and promotion and prioritizes servicing. This kind of visibility is valuable not just for reporting but for day-to-day decisions about siting, service levels, investment, and future expansion.

7. Making programs sustainable

Infrastructure is what helps behavior endure. Cleanliness, functionality, and reliability keep residents coming back. Economics are crucial; systems that reduce transportation and disposal costs are more likely to survive and expand over time.

metroSTOR Webinar Transcript

Sophia Leone:

Good afternoon everyone, and welcome. I'm Sophia Leone, Development and Program Manager at the Northeast Recycling Council, and I'm excited to welcome you to today's webinar, Building Better Systems: Infrastructure That Drives Recycling Behavior.

This session explores the critical role of infrastructure in driving behavior change in recycling and composting programs. Education raises awareness, but it's infrastructure that removes barriers, creates accountability, and helps ensure that better behaviors actually stick.

Speakers will highlight successful food waste diversion programs in the United Kingdom, Washington, D.C., and Connecticut. Presentations will touch on program results, successes, challenges, accessibility components, the element of tourism, and the technology utilized to support these programs.

I would like to thank our presenting sponsor for this webinar, metroSTOR. metroSTOR provides secure, controlled-access infrastructure for waste, recycling, and organics programs. They work with cities and housing providers to increase participation, reduce contamination, and keep waste systems clean through better-designed drop-off and storage systems.

Chris Snow:

Thank you so much, Sophia. Very much appreciate the opportunity for the United States Composting Council to assist with this webinar.

Our first speaker today is Nigel Deacon. He is the Business Development Director for metroSTOR North America, a company that provides secure, controlled-access infrastructure for waste, recycling, and organics programs. He works with cities, housing providers, and campuses to improve participation, reduce contamination, and keep waste streams clean through better-designed drop-off and storage systems. Nigel focuses on how infrastructure design can support behavior change and help communities achieve more effective recycling and composting outcomes. Nigel.

Nigel Deacon:

Thank you, Chris, and I appreciate the opportunity to participate in the webinar today.

I'm Nigel Deacon, Director and Founder of metroSTOR. For the past 12 years, we've been developing waste and recycling containment solutions in the UK, and for the last three years in North America, mainly in the Northeast, with clients including the New York City Housing Authority, Boston Housing Authority, and the D.C. government.

At the heart of what we do is a very simple mantra: we make it easier for people to do the right thing and harder for them to do the wrong thing. I discovered a couple of years ago that there was, in fact, a whole field of behavioral science built around this exact idea, which was reassuring!

People often say that Europe is far ahead of North America on waste diversion, and in some parts of Europe that is certainly true. But I would also say, from a UK perspective, that we're still fighting many of the same battles as you are. What we do have now, as of last month, is mandated recycling and organics collection from every residential building across England. In many places, service provision was already in place, partly because landfill tax changed the whole economic model around 20 years ago. In simple terms, disposing of trash became far more expensive than diverting material into recycling streams.

So there is an important lesson here: policy matters, economics matter, and service provision matters. But none of these on their own guarantees behavior change. Giving people a service is only the start. The harder question is: will people actually use it properly and consistently?

Nowhere is that more obvious than in multifamily housing. In single-family homes, there is generally a higher level of ownership, visibility, and accountability. But in multifamily settings, you often have shared spaces, shared containers, transient populations, different languages, limited storage space in the home, and no one really taking responsibility for the outcome.

So if the system is inconvenient, the message confusing, the bins dirty, or the containers easy to misuse, people will default to the path of least resistance. We all do. It's a human trait. So that's why I believe infrastructure is not just a backdrop to recycling behavior. It is actually one of the main determinants of that behavior. The way I would put it is this: If you want participation, you must reduce friction. If you want quality, you must have the right controls. If you want improvement over time, you must give feedback.

One of the clearest examples in the UK is high-rise residential buildings with trash chutes. Historically, many of these buildings were designed around a very simple resident journey: open a door, drop your bag down the chute, and walk away. From the resident's point of view, it is a very frictionless system. The problem is, it is frictionless for trash only. If recycling requires going downstairs, going outside, finding another bin store, reading complicated signage, opening a heavy door, or dealing with dirty containers, then the system has already made the decision for all but the most dedicated residents.

We can tell people that they should recycle. We can tell them why they should recycle. But when push comes to shove, if one option is effortless and the other is inconvenient, the effortless one wins almost all of the time. So when those disposal journeys had to be rethought, what became very clear was that the design of the system had been driving the behavior all along. Once residents had to use shared disposal points rather than just a trash chute, the question became: how do you design that new journey so that recycling and organics are not the hardest options?

That meant thinking more carefully about co-location of streams, visibility, ease of deposit, signage, aperture design, cleanliness, and secure but simple access systems. The lesson for me was this: systems produce the behavior they are designed for. If trash is the easiest thing to do, you get trash. If recycling is equally easy and more intuitive, you get more recycling. If organics are controlled properly, you get cleaner organics.

The strongest lever for participation is ease, which means removing friction from the action that you want to encourage. In practice, the barriers are often ordinary things: no recycling bag in the apartment, recycling bins farther away than the trash, heavy lids, dirty handles, poor lighting, confusing signs, or openings that are physically awkward to use. These sound like small details, but they shape daily behavior. So wherever possible, we try to make the desired action simple and intuitive: place recycling and organics alongside trash, not on a separate journey; use clear graphic signage; make apertures easy to reach; reduce the need to touch dirty surfaces; and avoid requiring unnecessary unlocking or opening of doors.

If you want people to participate, the system has to work with human behavior, not against it. But participation alone is not enough. You can make a system very easy to use and still end up with contamination. So after removing friction to encourage participation, we often add some intentional friction back in to protect quality. That might mean controlling the size and shape of openings.

Food scraps are a good example of where control becomes even more important. Unlike bottles or cans, food scraps cannot be distinguished by size or shape alone, so if you want a cleaner stream, you usually need another layer of control. That is where access control can help. Residents register and unlock the food scraps container using an app or an ID card attached to their pail. This creates accountability without making the whole system hostile or difficult. Sometimes that reduces volume slightly at first, but often what is falling away is contaminated material. Once you have a cleaner stream and better visibility of usage, you can rebuild participation much more effectively than if you are dealing with an open, contaminated system.

The third piece is feedback. If you know who is using the service, how often, and where the problems lie, you can intervene far more intelligently. Instead of generic education, you can provide targeted nudges. You can say: “You were one of the best participating buildings last month,” or “Usage has dropped off — do you need more liners or a replacement pail?” Or: “This location is seeing repeated contamination, so let’s focus outreach activity there.” That link between the residence, the disposal point, and the service data is very powerful in turning a static waste enclosure into part of a managed system.

These principles apply beyond housing too. In areas where curbside collection is not viable for every stream, robust drop-off infrastructure becomes essential. But if those containers are unsecured, hard to use, or vulnerable to dumping, wildlife, scavenging, or contamination, that service quickly breaks down. The same applies in alleys, service yards, and commercial settings. Shared container infrastructure only works if it is secure, with easy access for legitimate users and some degree of accountability.

So my main message today is very simple: education matters, policy matters, and collection service matters. But if the infrastructure is inconvenient, unclear, insecure, or easy to misuse, better behavior will always be harder to achieve and harder to sustain.

Again: if you want participation, reduce friction; if you want quality, add the right controls; if you want continuous improvement, create feedback. That is the lens I would offer from my experience in the UK and North America. Thank you.

Ashlea Smith Sabeti - Washington, D.C.

Chris Snow:

First up, we have Ashley Smith Sabeti. She is a Program Analyst with the D.C. Department of Public Works, Office of Waste Diversion. She presently focuses on food waste source separation in the District of Columbia and oversees the Department of Public Works food waste drop-off program. Ashley.

Ashlea Smith Sabeti:

Hi. Thank you so much. I appreciate the introduction. Ashley Smith here, D.C. DPW, and let’s dive into it.

I’m sure that many of you on the line are familiar with the District of Columbia, but D.C. governs like a city, a county, and a state. As the nation’s capital, we are home to more than 700,000 taxpaying Americans, over 350,000 homes, and 60,000 businesses. We also see annually about 27 million visitors, so tourism is a major part of our economy.

When it comes to waste management, specifically the disposal of organic waste, we have regional access to composting. Like many other densely populated cities, the D.C. area relies on disposal capacity in the surrounding jurisdictions. We have access to facilities in Howard County, Maryland, to the northeast; a large anaerobic digestion facility in Prince George’s County, Maryland; and, to the west, Prince William County, Virginia, with a major organics composting facility.

So why focus on food waste? I know I may be preaching to the choir here, but food waste is the single most common material sent to landfills, comprising approximately a quarter of the municipal solid waste stream. It generates methane, which is a very potent greenhouse gas, attracts and sustains rodent populations, and certainly can be put to better use through donation and composting or anaerobic digestion.

And what are some of the access concerns to composting that unify us? People have time constraints, physical challenges, technical barriers, and preconceptions. D.C. has been building out a mix of food waste diversion options. There are the weekend food waste drop-off events, and then there are the smart bins, which provide 24-hour access. We're always concerned about where material is going to go, but having 24-hour access to food waste drop-off makes composting possible for thousands of residents who otherwise would not have access to a DPW collection service.

Households in the District of Columbia that have three units or fewer receive services from the D.C. Department of Public Works. However, households in buildings with four units or more - which actually make up the vast majority of housing in D.C.; there are about three times as many apartments and condos as there are single-family homes - generally do not receive that same city service. So truly, 24-hour access makes composting possible for thousands of residents. There are a total of 44 food waste drop-off options. The 31 smart bins are different from the 13 weekend food waste drop-off events, but this mixture has really been beneficial.

The smart bins have also helped us with rodent mitigation. Washingtonians are concerned about rodents, and so are we at the Department of Public Works. Taking food out of the trash carts that are in alleyways and placing it into locking steel enclosures with a rodent-resistant design is key to helping stem the tide. If we are providing shelter and food for rodents, we are going to keep having that problem.

Another benefit of the smart bins is that much of D.C. is walkable. It is very common for residents to be car-free, so having a distributed network of bins within walking distance is really a game changer. Ideally, these smart bins should be nearby and should be placed near population densities, including areas with large numbers of multifamily dwellings. We have really seen heavy usage of these smart bins because of that placement strategy.

And in terms of how the smart bin works, here is a bit of the anatomy of the smart bin. As you can see, there is a latch. We have a keypad where people can enter an easy-to-remember code to open the bin. There is also a QR code that directs passersby to the website to download an app to open the bin. So there is access by keypad as well as by app. There is a foot pedal on the front. On all four sides we include language. The left-hand side and right-hand side are identical except that one is in English and one is in Spanish. Then facing the road, there are seven languages advertising food waste. Unlocking a smart bin is simple. As I mentioned, you can use the keypad or the app. On the app, users can select a bin that is near them on the map, identify the one that is very close by, and then unlock it directly from the application.

From the administrator's perspective, this gives us a very different level of visibility. We can see how many users are registered, and we can also see usage patterns and days when usage is higher than others. Sunday is a major day in Washington, D.C. for people to drop off food waste. We also saw a dramatic increase in usage just before a snow emergency. Maybe you could call it "panic composting," but we were very happy to see that people were able to empty their food waste before the city was essentially shut down.

Reliable data is revolutionary. The sensors have been a big help, especially in prioritizing service during emergencies. During that winter storm, we were able to direct our crew to bins that were filling up. Whereas the typical program is twice-per-week service, before the snow emergency we were seeing some of these bins starting to overflow, and we were able to direct the crew in order to prevent that from becoming a problem.

There were some bins that we needed to service three times in one day.

When it comes to placing smart bins around the city, there are some key points to consider. This is still a living document for us, but what seems to be working is locating these smart bins near high-density living, making sure they are community-recommended, focusing on geographic distribution, safety and visibility, and serviceability. You want locations where staff or contractors can actually approach the bin, where there is enough space for doors to open, and where the area is proximate to points of interest. The area should feel lively. Accessibility and clearances are critical, because if people cannot physically access the bin, they are not going to use it. We have also found that co-locating smart bins with trash containers has meant lower amounts of contamination in the organics stream.

And I will add, because this is such an important point, that there should not be architectural barriers, real or perceived. That includes topographical barriers. If you are putting a bin at the top of a hill, or behind a curb, or somewhere that a wheelchair user cannot roll up to without a problem, then that is a barrier. This is so important. We are very proud that the next set of bins we are ordering and installing will be ADA-compliant. They are going to be a little bit shorter, they will have both a foot lever and a hand lever, and they will follow the requirements in the latest ADA standard. So accessibility is important on multiple levels - both low-tech and high-tech - between the keypad, the app, and 24-hour access.

Some other lessons learned: maintenance issues are going to happen, and so having a maintenance plan is essential. Inspiration brought the residents to the bin. Cleanliness and functionality will keep them coming back. Convenient location is something we really harp on, but the convenience of actually using the bin is also going to help keep that habit going. And being on the cutting edge requires time and attention, so making sure that there is a dedicated person on your team to help dispatch, to work with your maintenance team when there is an issue with the bin, and to communicate with residents is really important. There are going to be many questions, and you want to help as many people as you can so that they can develop that composting habit.

And just to speak briefly to the weekend events, because they remain an important part of the mix: the setup for the weekend events is essentially a booth at a farmers' market — a tent, a table with informational materials, a clean tablecloth, a spatula, hand sanitizer, and paper towels for users during the process of tipping their home container into a rolling cart. There is a friendly face there for them to talk to and ask questions. The team members at the weekend food waste drop-off events are long-time composters, so it really is a community site. It is a place for people to come together and ask their most pressing composting questions.

Chris Snow:

Now we'll move on to our third presenter, Jennifer Heaton-Jones, Executive Director of HRRRA. Jen launched the state's first municipal food scraps curbside program in 2014. Under her leadership, HRA operates nine municipal drop-off sites and 20 satellite metroSTOR container locations.

Jennifer Heaton-Jones:

Thank you, Chris. Hello everyone. Thank you for having me. I'm excited to share our story.

I plan to cover the history of my collection program, the various collection models we've implemented, how we've managed the cost, what cost challenges we've experienced, and how we have actually pivoted and not given up. Through innovative solutions, we are striving to build a better system when it comes to food waste diversion.

So this is the western side of Connecticut, where I oversee 14 municipalities, mostly rural, with one small city, Danbury, very much smaller than Washington, D.C. Connecticut is predominantly private subscription only. Some of the larger cities provide municipal curbside collection, and residential organics are not mandated in Connecticut to be source-separated. However, we do have a large-generator law of 0.5 tons per week and large schools will be mandated in July 2026.

HRA currently has 29 drop-off locations, 20 are satellite containers and nine are municipal drop-off locations. We have access to three commercial processors, we have built two municipal aerated static pile systems and we are in the process of building two in-vessel composting systems.

We started really small in 2013. I had a goal to get to the state's 60% diversion by 2024. I thought I had plenty of time. Well, ten years goes by really fast. Over time, the waste crisis in Connecticut became more severe. We produce 3.5 million tons of municipal solid waste, while we only have capacity for 2.7 million, and we are reliant on out-of-state disposal of nearly a million tons of waste.

Back in 2014, we started with curbside collection in the small rural town of Bridgewater, Connecticut. It's a very small population, 882 residential homes. It's located near one of the state's only permitted composting processors, and we partnered with a local private hauler who owns 95% of the routes within the town of Bridgewater. We ran the pilot for 18 months. It was free for residents to participate. And this is key, because I learned a lesson right there: don't ever offer anything for free if it isn't going to stay free.

The goal of the pilot was multifaceted: to evaluate residents' willingness to participate, measure contamination levels, analyze operational consistency, and quantify the volume and quality of material collected. Bridgewater, being a small rural town, offered an ideal test environment due to its scale and the ability to closely monitor results. The pilot structure emphasized ease of participation by providing simple instructions and weekly Friday collection to establish predictable routines.

Metrics from the early implementation phase showed promise. Participation reached approximately 16% of households in the small town, which was an impressive rate for a voluntary organics program. Even more notable was the weekly set-out rate, which climbed as high as 98% among participating households, indicating strong commitment from those who opted into the program. Contamination remained relatively low, demonstrating that well-informed and motivated residents can reliably source-separate food scraps and maintain the quality necessary for efficient processing.

Collectively, these findings validated that organics collection was operationally feasible and was well received when offered at no cost. This phase also highlighted the importance of consistent education, convenient collection schedules, and clear program expectations to achieve high-quality material and reliable participation. But nothing is free, and after the pilot ended, someone had to pay — either the town or the individuals. When we attempted to transition from a free pilot to a paid subscription at \$5 a week, nearly all participation stopped. That was \$20 a month per household for the participants. For those who were participating, that would have been an annual cost of \$34,000, and we couldn't absorb that. If the entire town participated, it would have been a \$212,000 cost that no one was willing to pay in a very small rural town.

So then we pivoted. Moving forward from 2013–14 to today, we now have nine municipal transfer-station drop-off programs across the region. The one consistent complaint from residents was the limited operating hours of our transfer stations and/or the distance from the center of town, making them inconvenient. So in 2025, HRA decided to invest in satellite containers. We strategically placed 20 units across the region, providing 24/7 access for residents.

After researching several options for containers, we chose metroSTOR. We chose them not only for their price point, but for their simplicity. These containers are locked at all times. They do offer either a keypad or PIN-code version, like Washington, D.C. uses, or an app version. We chose the app access. Users use their cell phones or a Bluetooth device. We found that some of our seniors who don't have a smartphone but do have an iPad can still open the bin. Then it's operated by a foot pedal, and we have clear instructions on our website explaining how to download the app and get started.

By using the app, we were able to ensure that residents are signed up for the program and have paid for the service. Depending on the municipality and how we are managing cost, it collects their contact information so we can communicate with them about any issue with the bin — whether it is temporarily closed or whether we need to communicate with them about contamination.

We installed our own monitoring system using a cellular-connected camera mounted inside the unit. We were able to catch, in real time, what is happening at the bin, pinpoint the user with the material that is deposited, and communicate directly with them to remind them what can and cannot go in the bin. Instead of sending out a mass email, we just communicate with that one resident, because we know it was them. It is providing direct education. The data we collect has also been really useful for us in building a better system of collection - allowing us to know if promotions are working, how often participants are utilizing the container, and how often we need to have the bin serviced.

Beyond collection, since the beginning of our organics program - whether through curbside or drop-off - we've given residents compost each spring as a thank-you and as an incentive to participate. This isn't free compost. We historically had to buy it from the processor that receives the collected material, essentially another cost to run the programs, but nonetheless an important one because it helps us get buy-in from the residents. Our collection costs in setting up these programs consistently included caddies, kitchen bins, bags, transportation, disposal, and then buying compost back. The biggest cost is obviously transportation and disposal, which depending on the vendor has cost us around \$150 to \$250 a week per location.

The cost challenges of all nine drop-off programs and the 20 satellite locations are similar across the region. The distance from the municipal transfer station to the commercial processor adds a lot of cost to a program when you're trying to promote cost savings for municipalities through diversion. But the truth was, it never saved us money. We really wanted to prove that, and throughout the history we were really struggling to show that it saved money. Although the per-ton fee for organics versus municipal solid waste is cheaper, the added municipal operational-management cost changed the equation.

Between 2015 and 2020, HRA and participating municipalities observed a steady increase in the cost associated with transportation and disposal and the processing of organics collected at transfer-station drop-off sites. So while drop-off programs offered lower operating cost than curbside collection, the reliance on commercial processors still required ongoing expenditures for hauling and tip fees, and these expenses continued to rise due to the limited processing capacity within Connecticut. Logistically, the distance between the transfer station and available composting or AD facilities is very expensive. These pressures made it clear that the existing regional organics model, while environmentally beneficial, was not financially resilient.

So I recognized that without a change in the collection and processing strategy, rising costs could eventually jeopardize municipal participation and undermine the progress made in diverting food scraps from the waste stream. So here was my next pivot. In 2021, we were awarded a USDA grant to build the state's first permitted solar-powered aerated static pile composting system, and the goal was to prove municipalities can become financially self-sustainable from food-scrap collection. The first system was built in Ridgefield, Connecticut, and due to its success, we built a second one in Newtown in 2024.

Using Newtown as an example, they experienced an average loss of \$3,000 a year to operate a collection program for organics. When they implemented a pay-as-you-throw program at their transfer station, folks disposed of more food scraps, so the loss increased. Here is where we proved success: when we built the ASP system in Newtown, we took away the transportation-and-disposal cost in October 2024, and that is where the program moved into cost savings. To date, nearly \$8,500 in cost savings has been shown for Newtown.

Now, this isn't a big city. We're not talking about California or Washington, D.C. These are small rural communities, and every dollar really counts. This includes not only the cost savings from transportation and disposal, but also the savings on brush and leaf disposal. Before the ASP system, the town also paid for the disposal of brush and leaves for decades. That went away. With the ASP system, we need that mulch and those leaves for the carbon source, adding additional value to the system.

The implementation of the solar-powered ASP produced measurable financial, operational, and community benefits. Most importantly, it eliminated the two largest cost drivers associated with organics collection: transportation and external tip fees. By processing all the material on site, municipalities no longer needed to contract for hauling services or pay per-ton disposal fees, resulting in substantial long-term cost avoidance. Much of the funding came from grants, but because of the success, I now have more municipalities willing to invest their own money for the long-term gain. I'm hoping my story will inspire other communities to invest, knowing there is a return, even if you don't have a grant.

As we look to grow more collection access with satellite collection bins, we did receive another Connecticut DEEP grant last year, and we are expected to expand our satellite containers by at least another 20, if not more. We know we need to be smart about how we manage cost. Each town on its own is paying to collect and dispose of this material, and that adds up. So with another Connecticut DEEP grant, we are purchasing our own regional truck to pool our resources to collect material from the satellite containers. For municipalities that don't have an ASP composting system, we are partnering with other member municipalities to share the network and save money.

As HRA expands access to more collection points, we also plan to evaluate the feasibility of expanding on-site composting and infrastructure to other transfer locations, including assessing available space, staffing capacity, funding opportunities, and projected participation rates. By scaling the model where appropriate, HRA can reduce transportation needs even further while ensuring localized benefits across the region. Data tracking will play a key role in the program's future. HRA aims to standardize reporting of participation rates, contamination levels, finished compost output, and cost-avoidance metrics, and this information will support program refinement, guide municipal decision-making, and inform future grant applications.

Q&A

Chris:

Thank you very much, Jennifer. Three great presentations, and we've had a good number of questions starting to come in, so we'll start to go through those.

Q1. The biggest pushback I hear about recycling right now is that it doesn't make a difference - that most recycling is never actually recycled. Recycling rates vary wildly from state to state here in the U.S. How do we respond to that?

Jennifer: That's a question HRA gets often, whether the topic is mixed recycling or organics, and it really comes down to public education and showing people that the system does work. When you show a video of a material recovery facility and people can see that the material is actually being sorted, baled, and sold as a commodity, or when you show how food scraps are being processed locally or by a commercial processor and explain the benefits of that, it changes minds. It's really about public education, outreach, and making sure people understand that it is real.

Ashlea: I would add that people are smart, and it's important to speak to them directly, be transparent, and give a nuanced answer, especially for those who have been put off by what they've heard elsewhere. Showing the numbers helps too. If you have tonnage data or other concrete figures you can share, that can be very useful.

Q2. How did you pay for the cost of curbside collection?

Ashlea: This is a budget line item. It is funded through the D.C. budget, specifically, I believe, through the general fund. I'd be happy to provide more detail if anyone wants to follow up, but broadly speaking, it is funded through the D.C. budget.

Q3. How do you keep the area around the smart bins clean?

Ashlea: The fleet in the District of Columbia is large, and we have thousands of people using the bins each month, so they can get a little dirty. Having a maintenance plan in place is important, whether that means weekly or biweekly cleaning, using products that are gentle enough for the equipment but still effective for sanitizing. But I would also say there is an element of elbow grease here. They don't clean themselves.

Jennifer: I'd just add that there's the outside of the bin, and then there's the inside of the bin. The town or municipality where the bin is located is responsible, just as it is for the surrounding area, for keeping the outside clean. As for the inside, the vendor servicing the containers either swaps in a clean container when emptying them, or in some locations the units are self-managed. In those cases, we use a garbage bag inside a large 55-gallon container with a bungee band, and that gets removed. The plastic bag provides an extra layer of protection and helps keep the bin clean. These are all things we've learned over time - the hard lessons you pick up through experience. There are definitely tricks to keeping them clean, and some of these questions may inspire us to create a best-practices Q&A for using a metroSTOR satellite container.

Nigel: The nature of food waste means you need a regular cleaning program in place. I'd also add, anecdotally, that we've found smart bins tend to attract less illegal dumping around them. That may be psychological, but I've seen it quite consistently.

Q4. What was the setup for the D.C. compost weekend seasonal drop-off event?

Ashlea: The setup for the weekend events is essentially a booth at a farmers' market. There is a table with a clean, pressed tablecloth and informational materials. There's also a spatula, hand sanitizer, and paper towels for users to use while tipping their home container into a rolling cart. There's a friendly face there for them to talk to and ask questions. The team members we have at the weekend food waste drop-off events are long-time composters, so it really is a community site. As I mentioned, there are 13 of them across all eight wards, and they provide a place for people to come together and ask their most pressing composting questions.

Q5. How does a smart bin function?

Nigel: The smart features cover a range of functions. One is a fill-level sensor, which measures how full the bin is, helping prevent overflow and making servicing as efficient as possible. Then there is controlled access, which allows us to know who is using the container, what time of day they use it, and how often. So there are quite a few monitoring capabilities built into the system.

Q6. How do you determine the placement for the organic smart bins throughout the city? Was there an optimal radius for accessibility and encouraging usage?

Ashlea: In my opinion, this is one of the most important questions to answer: what is your placement strategy? I've spoken with several jurisdictions over the past year, and the strategy differs from place to place. What we have found is that placement near population density - for example, near clusters of large multifamily buildings - makes a real difference. We also look for major points of interest. You want the area to feel lively, and you want people to feel safe when they're using the bin. In this next round of installations, we're balancing that with geographic distribution and also looking at areas where there has been higher rodent pressure. Whatever is measurable for you is worth using. I like to joke that we had a 28-point rubric, which probably tells you how seriously we took the decision. But this will vary depending on where you're installing the bins and what your budget is. We installed 31, but you may not need that many, especially if you already have other programs in place. I'd be happy to connect with anyone who wants to talk that through in more detail.

Jennifer: I'll just add, because our communities are rural, it's very different from Washington, D.C. One of our standards was that the location needed to be well lit. We're in New England, and with daylight savings time it gets dark by 4:30, so we wanted to make sure every site had lighting. All of our locations are on municipally owned property, which created some constraints in finding the right sites. But wherever we placed them, the bins had to be easy to access by vehicle, because in rural areas people are driving to them, not walking. Residents needed to be able to pull up, park, and safely get out of the car to use the bin. We also wanted them to be located in the center of town. The feedback from residents had been that transfer stations were inconvenient, either because of location or hours, so we did not want these sites to be out of the way. We wanted them to be central, in places residents were already visiting regularly.

Q7. What do tourists do? Do you really expect them to download an app to throw away a banana peel?

Ashlea: In the District of Columbia, it has actually been delightful to see tourists standing in front of the bin, downloading the app, reading the website that is clearly advertised on all four sides, and learning all about it. I love being a fly on the wall — or standing nearby to answer questions. But yes, it does happen. The bin is intended for residents, but there is no restriction on who can use it. And if this can happen successfully in D.C. and serve as a model for other jurisdictions, that's wonderful. So yes, people do download the app, even if they were not the original intended user.

Q8. Do the bins fill up faster than you can empty them?

Jennifer: I would recommend getting the sensor if you don't already have some sort of monitoring system, such as a camera. We had that happen once - lesson learned. We didn't have the sensor installed, the bin filled up, and we only discovered it because a user let us know through the app. We were able to remedy the situation quickly, but we would have known sooner if the sensor had been in place.

Q9. What percentage of contamination do you typically see in the DPW smart bin?

Ashlea: We observe contamination with every pickup. Occasionally there is some misplaced material - for example, someone may put in a bag of trash - and we can pull that out and place it in a trash can. But overall, the contamination rate is very low by weight, perhaps less than 1%. The most common contaminants are plastic bags - and I should clarify, non-compostable plastic bags. Compostable bags are allowed in our scheme. Non-compostable produce stickers are also very common. Their size and weight may be small, but that doesn't mean they aren't impactful. That's why we emphasize it in our signage and on the website, asking people to stop and check whether their bag is actually compostable, and making it very clear that non-compostable plastics are considered a contaminant.

Jennifer: I would echo that we've seen very little contamination as well. The number one issue is non-compostable bags. One interesting thing we've found is that curbside organics collection tends to be much more contaminated than drop-off programs. That's been fascinating over the last 12 years. You might assume it's the same residents, but for whatever reason, when people set material at the curb for collection, contamination is higher than when they make the effort to go to a drop-off bin and use it more intentionally.

Q10. What was the approximate cost of producing the smart bins used by Washington, D.C.? And what vendor did your department use for those?

Ashlea: As mentioned, the bins are manufactured by metroSTOR. The set currently installed was supplied through a local Certified Business Enterprise, so that answers that part of the question. In terms of cost, I should note that we selected a variety of accessories for our bins, so the cost of the units installed in the District of Columbia may be higher than in other jurisdictions.

Nigel: As a rough guide, I would say \$3,000 to \$4,000, depending on the specification, quantity, and how much maintenance and how many elements of the platform are included. That's just a general guide.

Sophia: All right. Thank you so much, everyone, for joining us today, and thank you to our speakers and moderator. We hope today's webinar has offered valuable perspectives on food waste diversion. A brief survey will pop up after this webinar concludes, and we would appreciate it if everyone could take a few moments to share your feedback. We received a lot of questions, and there were many we didn't get to. I noted all of them and will circulate them to our speakers, with the hope of getting responses sent out along with the recording and presentation materials. We look forward to seeing you at future webinars and events, and we hope everyone has a wonderful rest of the day. Thank you so much.

Post-event Q&A

Q1. Here in California, where food waste composting is mandatory, many residents say the biggest barrier to putting food scraps in the green bin is the belief that it attracts flies and rodents, whereas putting food scraps in the black bin does not. Given this perception, how do you persuade them to use the green bin?

Ashlea: There are similar concerns in D.C. While the level of concern may vary, giving residents the option to place food waste in rodent-proof containers, like we do in D.C., can help address those worries. We have also sized our curbside collection containers to be smaller and easier to clean - only seven gallons - and they include animal locks. Our communications also focus on cleanliness to prevent odors, which are what attract flies and rodents. I would encourage people to review the FAQs on our website, as that information may also be helpful.

Q2. How is the D.C. food waste program funded? Is the funding sustainable?

Ashlea: D.C. DPW's food waste diversion programs are funded through the D.C. budget, specifically through the General Fund.

Q3. How does D.C. handle compostable plastics in its composting efforts? Does the department accept them, and if not, how do you sort through what is compostable and what is not?

Ashlea: Our guidance to residents is that we accept food waste, food-soiled paper, and BPI-certified compostable bags, including paper bags and compostable plastic bin liners, provided they are BPI-certified. Food-soiled paper can also include BPI-certified compostable fiber products that are food-soiled, such as paper napkins, coffee filters, bags, and greasy pizza boxes. Our guidance does not include compostable plastic food packaging, except for BPI-certified compostable plastic bin liners.

Q4. Does D.C. do waste characterization studies? And can it also measure capture rates?

Ashlea: Yes, D.C. does characterization studies of diverted materials. Our most recent characterization study was of single-stream recycling.

Q5. What was the approximate cost of producing the smart bins used by Washington, D.C.? Also, what vendor did the department use?

Nigel: As a rough guide, the enclosures are approximately \$3,000 to \$5,000, depending on specification and quantity.

Q6. How much does each smart bin in D.C. cost, from initial investment to ongoing monitoring? How is the technology working for D.C.? Any major glitches?

Nigel: As above, the enclosure itself is roughly \$3,000 to \$5,000 depending on specification and quantity, with ongoing monitoring typically in the range of \$200 to \$400 per unit per year, depending on the services included and the number of units.

Q7. Who empties these bins, and what type of processing is used — land-based composting or anaerobic digestion?

Jennifer: In the Connecticut program, the bins are currently emptied by a paid compost vendor. That arrangement is temporary, until HRRR receives funding for a regional truck, at which point they will be emptied by HRRR. Depending on the location in the region, the material is sent either to a commercial composting processor, an anaerobic digestion facility, or a municipal ASP system that we operate. The goal is ultimately to have all of the material processed at a municipal system.

Q8. How do Ashlea and Jennifer see their programs scaling to counties with more than one million residents and hundreds of square miles, or to states with more than 20 million residents?

Jennifer: The larger the population, the more locations and types of collection systems are needed. In the Connecticut program, these bins are intended to expand collection capacity. They are an extension of existing curbside collection, municipal drop-off, and backyard composters who also want a way to dispose of dairy, bones, cooked food, and similar materials. I would not imagine trying to serve a population of one million using only these types of bins.

Q9. I noticed that all of the drop-off composting materials are in plastic bags. Wouldn't paper bags be better?

Jennifer: In the Connecticut program, participants are only allowed to use compostable bags that we provide or recommend. At the moment, the 64-gallon carts inside the metroSTOR enclosures are lined with a heavy-duty plastic bag, and in some locations a 65-gallon compostable bag is placed inside that plastic bag. This is required by the current service provider. The compostable bag, made by BioBag, is what gets removed from the cart, not the plastic bag. The plastic bag acts as a protective liner and reduces how often the cart needs to be washed. That plastic liner will be discontinued once we have our own truck servicing the units.

Q10. Does anyone have comparative per-ton costs for managing food waste versus trash?

Jennifer: The comparison depends on the local tipping fees for municipal solid waste versus organics. In the HRRRA region, organics are typically cheaper per ton - about \$65 versus \$111 for MSW - but transportation still has to be paid for, and that accounts for most of the cost.

Q11. How does the municipal solar-powered ASP composting system work? Who manages it? Is it located at the transfer stations? How much space does it take, and how many staff does it require?

Jennifer: The system uses a blower that pushes air through pipes on a timer, with the blowers powered by solar. The material sits on the pipes for 30 days. After that, the pipes are removed and the material is moved onto another set of pipes. Moving the material helps mix it and create a more homogeneous pile, which then sits on the pipes for another 15 days. The forced air and the correct carbon-to-nitrogen ratio help accelerate decomposition.

Yes, the two ASP systems we operate are located at municipal transfer stations. They take up about a quarter of an acre, and it generally takes one to two staff about four hours per week to run the system.

Q12. On the regional collection cost slide, what is the name of the system or device attached to the truck that picks up the cart?

Jennifer: The truck shown in the slide is a retrofit truck using Perkins equipment.

Q13. What is the largest municipality, population-wise, that you've worked with to implement the ASP system in order to drive down transportation and disposal costs? And how much space is required for the ASP solution?

Jennifer: The town of Newtown, Connecticut, has a population of approximately 27,000 people. The ASP system at the transfer station is currently about an acre, though it will likely expand as the program grows.

Q14. In developing the food waste collection program, was PFAS an issue when considering the use of PLA bags and/or accepting soiled paper products?

Jennifer: In the Connecticut program, we only allow compostable bags made by BioBag. We do not allow all soiled paper products. Paper towels used only for food are accepted, but not those used with cleaning products. PFAS will always be a concern, but we do our best to restrict what is accepted into the program.

Q15. Did you say that costs went down for waste management after implementing regional ASPs?

Jennifer: Yes. The town of Newtown experienced cost savings once it implemented its ASP system.

Q16. What education and outreach strategies did your programs find most impactful?

Jennifer: Social media.

Q17. How many households or people per bin?

Nigel: There is no hard and fast rule, because there are so many variables, including participation rate and travel distance. The good news is that it doesn't really matter at the outset. You start with as many units as you can afford and then scale up as demand increases. You can also accommodate a considerable increase in participation without adding more units simply by increasing collection frequency.

Q18. You mentioned the first few months after installation may show lower use. Is there also any trend in vandalism or misuse at that stage? And what strategy is used to educate the nearby population when a bin is first installed?

Jennifer: In Connecticut, we did not experience - and still do not experience - vandalism. When we launched the bins, we held a ribbon-cutting, invited people from the neighborhood, the mayor, and other local elected officials, contacted the press, took lots of photos, and pushed everything out on social media.

Q19. What privacy concerns have you encountered with cameras inside the bins, and how have you handled them?

Jennifer: We haven't encountered any significant privacy issues. Residents in Connecticut also have the option of using a local transfer station for drop-off instead of the smart bins. The camera does not capture images of people - only of the material being deposited.

Q20. Have you involved grocery stores as drop-off locations? There is a natural connection to food waste, and many already serve as recycling drop-off points.

Nigel: Some of our clients do have units located at grocery stores, and it works well.

Jennifer: In the HRRR region, we have a separate program for large generators. The metroSTOR units are for residential use only.

Q21. Can the bins be located in a parking lot so they are accessible from both sides? I'm thinking of buffet lines - it moves faster if there are lines on each side. Also, how often are the bins emptied, how much capacity do they have, and do people leave material outside if they are full?

Nigel: The enclosures are accessible from one side only and accommodate 32-, 48-, or 64-gallon carts. We do recommend optional fill sensors in high-volume applications so servicing can be optimized and overflow avoided.

Jennifer: In the HRRR Connecticut program, the bins are mostly located in parking lots. Regardless of location, they are designed for one user at a time. The enclosure we purchased holds a 64-gallon container. They are emptied every few days. No, we have not had any issues with bins being too full or with residents leaving material outside the enclosure.

Q22. Nigel, how do you see metroSTOR systems and principles working in places like Africa, where there are established reuse systems for plastic and glass bottles, repair is common, and dumps on curbsides seem to consist largely of film plastics and organics, but there may be no single-stream curbside service?

Nigel: I'm not familiar enough with the situation in Africa yet to answer with confidence. We can work with all common dumpster and roll-cart sizes, but it sounds as though the first step in some places may be getting those systems in place.

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