NRDC

CASE STUDY

TECHNOLOGY PILOT TO PREVENT FOOD WASTE IN BALTIMORE SCHOOL KITCHENS

Serving roughly 90,000 meals on an average school day, the Baltimore City Public School System (BCPSS) has deepened its commitment to food waste reduction in recent years in partnership with the City of Baltimore and NRDC (Natural Resources Defense Council).

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School cafeteria team preparing Grab & Go meals in a BCPSS kitchen in 2020.

Baltimore's Food Waste and Recovery Strategy (2018) outlines an ambitious goal: "attaining 90% food and recyclable waste diversion in Baltimore City K–12 schools by 2040."[1] To work toward this goal, the department of Food and Nutrition Services (FNS) of Baltimore City Public Schools has identified several strategies to reduce waste across kitchens and cafeterias in the district's roughly 175 schools. Throughout the course of daily operations, staff have identified many opportunities for waste reduction. Elements of FNS's food waste efforts to date include:

- Plate waste audits to gauge total waste volume at select schools

- A commitment to Farm to School educational opportunities for students of all grades, including hands-on vermicomposting activities

- Professional development opportunities for food service staff on food systems and food waste

- Transition to digital meal tracking and procurement tools to ensure more efficient inventory management across school campuses.

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These strategies link to other sustainability initiatives in BCPSS cafeterias, including a recent transition to compostable trays and cutlery and the adoption of greener cleaning products.[2]

FNS strategies stretch across all tiers of the U.S. Environmental Protection Agency's Food Recovery Hierarchy, touching on points throughout the life cycle of a school meal.[3] However, most of FNS's efforts to date revolve around waste prevention, as source reduction is recognized as the most environmentally and economically impactful category of interventions.

In assessing opportunities to prevent food waste, FNS staff identified frequent electrical outages and malfunctioning of refrigerator and freezer units—due to weather-related events, old equipment, and unknown causes—as major drivers of food waste. Outages often occurred outside operating hours (e.g., in the evening, on weekends, or during breaks), and with no remote monitoring equipment or malfunction alert system in place, staff learned of outages only after it was too late to rescue refrigerated or frozen food.

From late summer through the first half of the 2020–2021 school year, FNS staff logged approximately 120 service requests related to temperature variations in schools' cold storage units (walk-in or reach-in refrigerators, freezers, or milk coolers). Though not all of these service requests led to outright food spoilage, many necessitated the disposal of all refrigerator and freezer contents due to food safety concerns. In addition to food waste, outages led FNS to incur costs of professional cleaning services in the most serious cases of spoilage (in 2020, FNS spent $22,123 on cleaning services to address such cases), as well as the costs of repair and restocking.

To prevent waste due to outages in the future, FNS identified a simple technological intervention for its cooling units: temperature and humidity sensors linked to a data dashboard. This type of monitoring software is broadly used in the hospitality industry but had never been used in the kitchens of Baltimore's public schools. With support from NRDC, FNS purchased and installed ComplianceMate™ sensors in 43 refrigeration and freezer units at 13 schools and the FNS warehouse.[4] Sites with a history of frequent machine outages were prioritized in the pilot site selection process.

Now, at these sites, wireless sensors designed to function in insulated, stainless steel units transmit temperature and humidity information to the dashboard, automatically generating alerts for FNS operations staff when temperature and humidity levels deviate from a designated range. Alerts

Fresh fruits prepared for Grab & Go meal service in a BCPSS kitchen in 2020.

allow maintenance staff either to address issues immediately to restore equipment functionality or to access inventory in the malfunctioning units quickly enough to allow safe food rescue. Even when outages occur outside business hours, staff have a food rescue plan in place that aligns with the FNS Hazard Analysis Critical Control Points policy, which outlines safe temperature ranges for various food types.

In the first quarter after these sensors were installed (December 2020 to March 2021), sensor alerts flagged out-of-range temperature incidents at six of the twelve schools with pilot sensors. In these cases, thanks to the early warning, the FNS operations team requested repairs immediately and arranged for the transfer of inventory to functional cooling units wherever necessary.

Given the success of the pilot, FNS staff plan to install temperature and humidity sensors in units across all sites in the Baltimore school district by the end of 2022. They anticipate continued savings in terms of staff time, food product, and cleaning costs.

ENDNOTES

1   Baltimore Office of Sustainability, "Baltimore Food Waste & Recovery Strategy," 2018, https://www.baltimoresustainability.org/wp-content/uploads/2018/09/BaltimoreFoodWasteRecoveryStrategy_Sept2018_FINAL.pdf.

2   Baltimore City Public Schools, "Sustainability," https://www.baltimorecityschools.org/sustainability (accessed March 10, 2021); "New Compostable Trays Arrive in Baltimore City Schools," WBALTV, August 14, 2018, https://www.wbaltv.com/article/new-compostable-trays-arrive-in-baltimore-city-schools/22729147#.

3   U.S. Environmental Protection Agency," Food Recovery Hierarchy," last updated December 2020, https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy.

4   For each school, costs were as follows: batteries and installation, $250; sensor, $99; annual monitoring fee, $625; and Gateway/Wi-Fi/Ethernet, $275. For one sensor, the total cost was $1,249, plus $99 for each additional sensor per site. Each site had two to eight sensors installed.