



The Business Case for Transitioning to **Bulk Milk Dispensers** from Single-Use Milk Cartons in K-12 Schools

In 2019, World Wildlife Fund (WWF) launched its [Food Waste Warrior](#) (FWW) program to help K-12 schools reduce food waste and increase students' understanding of the food system's environmental impacts. As part of this launch, WWF worked with 46 schools across 8 states to pilot its free lessons and toolkits, which included student-led cafeteria waste audits to identify commonly wasted lunch items. The results of these pilots were analyzed in a study that estimated up to 530,000 tons of food is wasted each year in K-12 schools—translating to almost 1.9M MT CO₂e of greenhouse gas (GHG) emissions, 20.9 billion gallons of water, and \$1.7 billion in costs.¹

This study additionally found that one of the most commonly wasted items in school lunches is also one of the most iconic: **milk**. WWF projects that up to 45 million gallons of milk are wasted annually in schools. This not only represents a loss of nutrition, but also the environmental and financial resources that go into producing, transporting, cooling, and storing milk. In fact, each gallon of milk produced in the US requires 17.6 pounds of CO₂² and a whopping 144.2 gallons of water.³ That means that wasted milk each school year emits the equivalent of over 77,000 gas-powered vehicles⁴ and uses nearly 10,000 Olympic swimming pools worth of water⁵—which is only made worse when milk waste is then sent to landfills or incinerators, where it produces additional methane GHG emissions.

The reality is that educators and schools across the country are struggling to resume normal food service operations as they emerge from the pandemic and grapple with new policies and procedures, staffing shortages, supply chain disruptions, and rising food prices. Yet even in the face of these challenges, reducing food waste can offer schools and their food service teams a practical approach to reduce costs and help improve student nutrition.

One priority solution that can address milk waste is transitioning to bulk milk dispensers (BMDs) from individual cartons. **There is growing evidence that doing so can: (1) reduce packaging and milk waste, (2) lower school costs (for milk purchasing, disposal, and refrigeration), and (3) help improve nutrition by increasing overall milk consumption.**

The following business case is an abbreviated summary of the key findings from a [comprehensive research](#) study by Triangle Associates and WWF, intended to help K-12 schools assess the feasibility of installing bulk milk dispensers as a cost-effective solution to reduce food waste and support their sustainability efforts. It provides schools with practical guidance on how to build a business case for BMDs, project potential savings, and overcome common barriers (summarized in the call-out box below).

KEY BENEFITS OF BMDS

- ◆ Significant reduction of solid waste generated at schools during meals
- ◆ Increased consumption of milk and reduced milk waste by students
- ◆ Reduced school environmental impacts and greenhouse gas emissions
- ◆ Increased student ownership in food service choices and portion size
- ◆ A flexible, low-waste approach to comply with free-and-reduced lunch requirements

COMMON CHALLENGES

- ◆ Initial set-up costs for materials
- ◆ Adjusting to new milk delivery systems including:
 - Changes to milk provider contracts for bulk milk bags
 - Training food service, nutrition teams, and custodial teams for meal service
 - Training students and staff on the use of dispensers and reusable cup return
 - Navigating concerns around extra labor to clean-up cafeteria spills or mishaps related to BMDs (though it's important to note that many case studies found that BMDs did not create an increase in spills⁶)

FIGURE 1. A BAG OF BULK MILK BEING LOWERED INTO A DISPENSER AT A SCHOOL IN THE AUBURN SCHOOL DISTRICT, WA IN 2022.⁹

◆ WHAT ARE BULK MILK DISPENSERS?

Reusable, refillable, and insulated multi-spigot containers that can hold 3-5 gallon bags of cooled liquid milk, from which students and teachers can serve themselves in a school cafeteria (often with reusable cups). **An average elementary school with 450 students, for example, will likely require two 3-spigot dispensers and a startup cost closer to \$12,000.** (including reusable cups and dishwashing trays). Many schools need multiple dispensers and might require additional costs like tables and carts to move bags of milk. One elementary school averaging 450 students, for example, typically requires two 3-spigot dispensers leading to a startup cost closer to \$12,000. Although the upfront cost of a BMD can be a hurdle, there is evidence that the cost of one dispenser can be recouped throughout the life of the bulk milk dispenser. For instance, the Canby School District in Oregon recovered the expenses of implementing one BMD in 2 years, between milk purchases going further (with less waste and higher consumption) and reduced disposal costs.⁷



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The Case for Bulk Milk Dispensers in Schools

“This is source reduction; you’re not recycling something because you don’t use it in the first place.”

CHILD NUTRITION SUPERVISOR, OLYMPIA SCHOOL DISTRICT, WASHINGTON

After reviewing 13 pre-COVID case studies on BMDs in K-12 schools across nine states in the US (see map below, Figure 2)—and performing numerous post-COVID interviews with school food service directors, child nutrition supervisors, waste reduction staff, teachers, and education coordinators—four key factors were identified as the most critical for schools to consider when transitioning to BMDs. Those factors were: the potential for lower (1) waste hauling fees, (2) milk purchasing costs, (3) refrigeration costs; and (4) the required up-front costs to install BMDs.

To help schools and districts assess the feasibility of transitioning to a BMD, Triangle Associates developed a simple [Cost Savings Estimate Calculator](#) based on the best practices and reference data from the 13 case studies in the [full report](#). This tool allows schools to project potential packaging and milk waste reductions, refrigeration cost savings, and start-up costs based on their existing infrastructure and available resources.

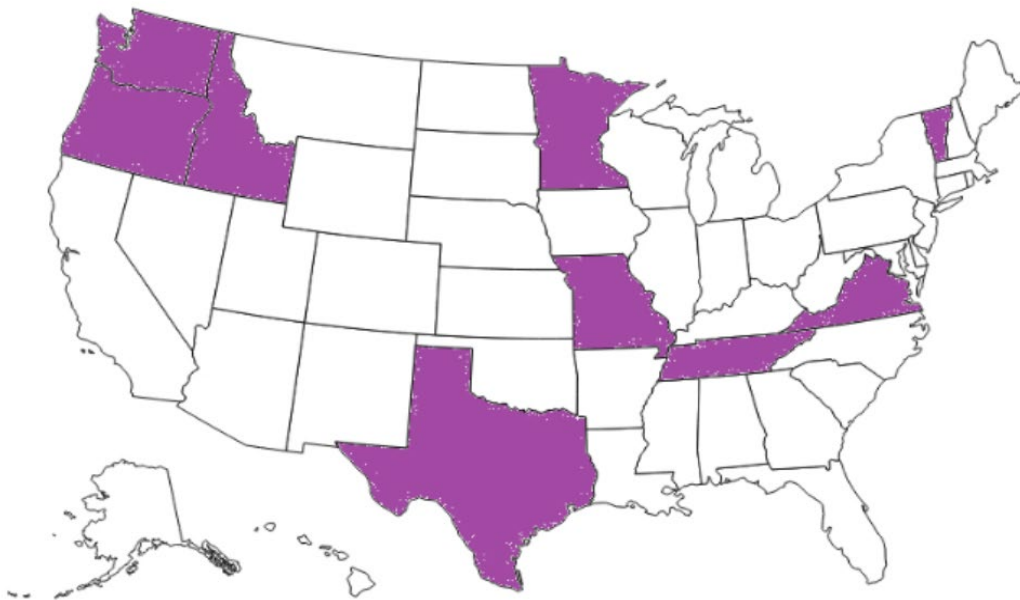


FIGURE 2. A MAP OF WHERE THE 13 CASE STUDIES (USED FOR THIS BUSINESS CASE) ON BMDs TOOK PLACE NATIONALLY.⁹

SAVING ON DISPOSAL COSTS BY REDUCING MILK AND MILK CARTON WASTE

“Trash pickup went from once per day to twice per week.”

FOOD SERVICE DIRECTOR, POPLAR BLUFF SCHOOL DISTRICT, MISSOURI

One immediate benefit BMDs can offer is lowering schools’ trash disposal and recycling fees. The following are just a few examples of these waste savings that schools realized after transitioning to BMDs:

- ◆ An Oregon middle school in Marion County saw their annual milk carton waste nearly drop in half from 32,000 to 17,000 cartons over the course of a school year, avoiding two six-yard dumpsters of waste from being generated.¹⁰
- ◆ This same middle school saw their annual average of milk waste decrease by 83% from 250 gallons to 43 gallons of liquid milk over the course of a single school year.¹¹
- ◆ The Clark County Green Schools program compared daily milk waste averages before and after a BMD was installed in each of their schools, finding potential savings of 548 gallons of milk from being sent to the landfill each year.¹²
- ◆ Each school year since 2017, Olympia School District in Washington has removed 400,000 milk cartons from their waste stream after installing BMDs in 10 of their 19 schools,¹³ with Olympia High School in the district reporting an annual cost reduction of \$1,970 in waste collection fees since their transition in 2014.¹⁴
- ◆ Bluestone Elementary School in Virginia experienced a 91% reduction in their annual packaging waste, enough to fill about six bathtubs in compacted waste.¹⁵

An important note to consider is **many waste haulers are in the process of ending milk carton collection for recycling**, creating a significant increase in carton waste being sent to the landfill that had previously not been accounted for with schools. For schools that are experiencing new waste coming from cartons, BMDs are a potential leverage point to reduce waste generation, associated hauling costs, and remaining recycling fees from milk contamination.



FIGURE 3. SINGLE-USE DISPOSABLE MILK CARTONS ARE EITHER COLLECTED FOR RECYCLING OR DISPOSED OF IN THE TRASH. PHOTO FROM MEAL SERVICE WASTE SORT STATION AT A SCHOOL IN AUBURN SCHOOL DISTRICT, WA IN 2020.¹⁶

THE POTENTIAL TO LOWER MILK PURCHASING AND ENERGY COSTS, WHILE INCREASING OVERALL MILK CONSUMPTION

"It comes down to what I call the three T's: taste, temperature, and trash," explained Chartwells food service director, "...and the reduction we can make daily in terms of trash is just astronomical."

FOOD SERVICE DIRECTOR, POPLAR BLUFF SCHOOL DISTRICT, MISSOURI

In addition to decreased packaging and milk waste, BMDs have the potential to reduce school milk purchasing and energy costs, while increasing overall milk consumption and helping to improve nutrition in the process.

The potential to save on energy is observed through a reduction in refrigeration costs as BMDs often require less energy to store and cool milk than traditional milk carton coolers. The following are a few examples of how BMDs can contribute to school savings beyond the trash bin:

- ◆ The average elementary school in Clackamas County saved \$3,000 on milk purchases per year while seeing an 80% increase in a la carte milk sales once BMDs were installed.¹⁷
- ◆ Washington Middle School reported annual savings of \$120 a year in refrigeration costs from replacing the school's milk carton cooler with a BMD. This same report observes additional savings in fees associated with maintenance, repair, and replacement of milk carton coolers.¹⁸
- ◆ New London-Spicer High School in Minnesota saw their energy usage for milk cooling drop by 50% after installing BMDs.¹⁹
- ◆ Despite these successes, the impact BMDs have on purchase costs isn't always straightforward and will vary by school. For instance, after two BMDs were implemented at Bluestone Elementary School in Virginia, daily milk consumption rose by 52% when data was collected two weeks after implementation, at the same time that daily milk waste rose by 14%. While a 'larger volume' of milk was wasted per day, overall milk waste decreased by 6% (given that milk consumption increased by a wider margin) and carton waste decreased by 91%. This example illustrates that even with an overall reduction in milk waste, the total purchasing cost of milk can increase as students take and consume more. However, given the data was collected only shortly after implementation in this case, it is likely that milk consumption will moderate as students become more accustomed to self-serve.²⁰

Challenges

START-UP COSTS AND OTHER KNOWN CHALLENGES

“Within the first two months of their new bulk milk dispensing cooler being installed the school has experienced more benefits than just waste reduction. Students—especially younger ones—reported enjoying the taste of the bulk milk more and...despite initial up-front costs, the school is now beginning to see a cost savings of \$0.10 per unit of milk served.”²¹

VERMONT SCHOOLS, VERMONT

The primary hurdle for most schools to install BMDs is the startup cost. BMDs require changes in service and upfront funding that vary depending on a school's infrastructure and available resources, which may not be feasible for every school. In addition to start-up costs, the most significant barriers to entry cited across the case studies and interviews were:

- ◆ Schools and districts that need to purchase equipment such as an industrial dishwasher (to handle the increased quantity of reusable cups).
- ◆ Availability and ordering time for milk bags have been delayed due to COVID-19.
- ◆ Additional work and labor is required by kitchen and custodial staff to: (a) lift three to five gallon milk bags, (b) maintain dispensers and reusable dining ware, and (c) renegotiate milk contracts. However, this can be offset by the reduced work associated with set-up and disposal of milk cartons.
- ◆ Whether there are savings for a school will depend on the school priorities and infrastructure.

Two schools in Vermont found that traditional milk cartons required less labor and preparation time than BMDs in their specific operations. Even after taking into account the waste savings of the BMDs, it was ultimately more cost-effective to continue serving milk cartons to students.²²

- ◆ Dispensers can cause initial confusion around National School Lunch Program (NSLP) compliance. Standard USDA requirements observe that students be offered all five food components for reimbursable meals (vegetables, fruits, grains, meats/meat alternatives, and fluid milk). However, students are only required to serve themselves three of these. **From the case studies and interviews for this report, no concerns were cited by staff and teachers related to meeting NSLP requirements.** It's nevertheless important to verify each school or district's Offer Versus Serve requirements as a proactive mechanism to determine where best to set up the BMD in the cafeteria.

RECOMMENDATIONS TO OVERCOME KNOWN CHALLENGES

To help mitigate these concerns, schools that successfully implemented BMDs recommend engaging a wide set of stakeholders (influential teachers, parents, staff, administrators, as well as students) in the pre- and post-implementation stages to:

- ◆ Partner with local dairy councils, non-profits, community groups, governments, and corporations for potential financial support and technical assistance.
- ◆ Leverage the [Cost Savings Estimate Calculator](#) to build a business case that projects potential cost savings against start-up costs.
- ◆ Integrate BMDs into larger sustainability strategies and include food service teams in the planning process for zero-waste and sustainability goals.²³

- ◆ Deliver training on the benefits, challenges, and use-applications of BMDs with school staff, teachers, and students, and address questions pre-implementation (such as concerns around spillage, refilling bags, and other new labor requirements).
- ◆ Host a launch event to help build excitement and awareness alongside school sustainability/green teams and student clubs.
- ◆ Work with green teams and student clubs to help track data when conducting milk waste audits. Research shows when schools begin to measure and reduce their food waste, they also begin to transition away from single use plastics and disposable items to reusable products.²⁴

Conclusion

School food programs provide an estimated 275 million half-pint carton servings of milk to students each day throughout the school year. Traditionally, this milk is served in cartons, resulting in packaging waste and milk waste if the carton is left unfinished. As noted earlier, it's estimated that **45 million gallons of milk is wasted each school year, which comes out to roughly 32 cartons per student every year.**

Comparatively, **milk waste from BMDs is much lower at roughly 4.5 cartons per student**²⁵—saving 248 gallons of water and 30 pounds of CO₂e per student annually. To put those savings in context, that's equivalent to almost 1.5 times the amount of water the average person consumes on a yearly basis and 33.8 miles driven by a gas-powered vehicle. While this impact may at first appear small, with 49.5 million students

attending K-12 schools in the US, this would be the same as taking over 145,000 gas-powered vehicles off the road each year.²⁶

BMDs offer schools a practical pathway to lower their annual costs while also achieving environmental reductions in waste, GHG emissions, and energy use. Students prefer the flexibility to serve themselves only what they need, which helps to reduce waste and increase overall consumption of a key and nutritious staple of the NSLP—at a time of growing food insecurity. Despite the trade-offs of new upfront equipment costs and labor requirements, the potential return on investment and benefits of BMDs provide K-12 schools with a straightforward approach to reduce waste and achieve their larger sustainability objectives.



COST SAVINGS ESTIMATE CALCULATOR

Endnotes

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- 14 “Should we say goodbye to the school lunch milk carton?” (Seibel, 2019) <https://thecounter.org/milk-carton-dispenser-food-waste-usda-school-lunch-nsfp-oregon-washington-olympia-vancouver/>
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