



## **Analysis of Milk Dispensers and Milk Cartons for Auburn School District**

**Prepared by King County Green Schools Program  
with support from City of Auburn (January 2021)**

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### ***Executive Summary***

Milk cartons represent a significant contribution to the solid waste generated by schools. Milk carton disposal presents challenges for custodians when students discard milk cartons that are not empty in garbage containers or recycling bins. Liquids in garbage or recycling collection bags can cause spillage when the bags are removed from collection bins, can increase the weight of bags for custodians who must lift the bags, and can create strong odors in dumpsters. When milk cartons with excess liquids are placed in outdoor recycling dumpsters or containers, excess liquid may result in contamination notices or extra fees from recycling haulers.

In the Pacific Northwest, we know of two school districts that have implemented bulk milk systems in which bags of milk (from 3 to 5 gallons each) are placed in multi-spigot dispensers. The milk is served in durable cups which are washed after each use in school dishwashers along with other durable serving-ware such as trays. Olympia School District in Thurston County, Washington and Canby School District in Clackamas County, Oregon are using milk dispensers to reduce wasted milk, collection costs, and energy use.

This report analyzes existing data on ASD milk carton purchases and solid waste and finds there is the potential for ASD to reduce costs by using a bulk milk system instead of single-use milk cartons. Savings may be achieved through reduced garbage collection costs, milk waste reduction resulting in less milk purchased, and lower energy costs.

In Clackamas County, after switching from milk cartons to a bulk milk system, the average elementary school saved \$3,000 per year in milk purchasing costs due to milk waste reduction. Based on data from Clackamas and Thurston counties, as well as a review of 2018-2019 ASD milk data, the clearest potential for savings in ASD results from milk waste reduction and downsizing outdoor garbage collection dumpsters. In Olympia School District and Canby School District, bulk milk dispensers resulted in less milk waste and increased milk consumption, which can have positive impacts on student nutrition. Less milk is wasted because students can take the quantities of milk they want, and students report milk tastes better from dispensers than from cartons.



*Figure 1: Washington Elementary School and Arthur Jacobsen Elementary, Auburn School District, Lunch waste collection, November 2019*



*Figure 2: Example of 3-spigot milk dispenser and squat 9.7 oz durable cup.*

### **Benefits of milk dispensers**

- Milk dispensers and durable cups (which can be used and washed and used again for many years) use fewer natural resources compared to single-use milk cartons.
- Milk dispensers reduce milk waste by 10% - 40%. In schools with milk dispensers, students choose how much milk to take in their cups. Students report that milk tastes better from dispensers than cartons. The result is less milk waste as well as increased milk consumption.
- After switching to milk dispensers, outdoor dumpsters can be downsized to reduce costs.
- Significant cost savings are possible due to schools experiencing a 40% reduction in milk waste after implementing a bulk milk system.

- Reduction of floor space needed for serving milk because milk dispensers have a smaller footprint than most milk carton coolers.
- Reduction in costs for milk carton cooler repairs and maintenance.
- Electricity for milk dispensers costs less than electricity for milk carton coolers.
- Reduced custodian work: Removing cartons reduces custodian work because either the school's recycling or garbage bins are emptied less frequently.

#### Challenges associated with milk dispensers

- Staff time will be needed to plan and pilot a new system.
- Staff education and training will be needed about the rationale for switching to a bulk milk system and how to set up and use a bulk milk system.
- Student education will be needed about the new system.
- Budget will be needed to pay for startup costs, including purchase of bulk milk dispenser equipment and supplies, since cost savings would not be realized in the first year. (City of Auburn may be able to allocate some of its King County grant dollars to help with these purchases.)

We recommend the ASD switch from milk cartons to milk dispensers in all schools with dishwashers. This will have a positive environmental and fiscal impact over time. Here are three ways this could be achieved: (1) a pilot program in several schools, followed by a district-wide launch (in all schools with dishwashers); (2) first making this change in all secondary schools, followed by a district-wide launch; or (3) district-wide launch at all ASD schools.

#### Key Terms

Term	Definition
Bulk milk	Milk delivered and stored in 3-, 5-, or 6-gallon bags to be used in conjunction with a milk dispenser. Also available as bag-in-box.
Bulk milk system	The system of milk delivery to students that includes milk dispensers, bulk milk bags, durable cups, and other needed equipment and supplies.
Carton	The half pint single-use paper carton that contains a serving of milk.
Durable cup	A reusable, washable plastic cup.
Labor	The time spent by employees for a task or project.
Milk dispenser	A metal milk dispensing unit powered by electricity that distributes cooled milk from bags (ranging from 3 to 6 gallons each) inside the dispenser into a durable cup.
Milk waste	Milk that is purchased but not consumed. For milk cartons, this includes milk that students do not drink once a carton is opened, as well as milk cartons taken by students but not opened and not returned to a Food Share Table or donation cooler.
Resource conservation	The efficient use of natural resources that results in a reduced impact on the environment.
Solid waste	All waste generated at schools, including garbage, recyclable materials, and compostable materials.

## Summary of Benefits, Savings, and Costs

The following chart provides a summary of benefits, savings, and costs pertaining to milk cartons and milk dispensers. The savings and costs in this report are estimates. For each section, the savings and costs will vary depending on the distributors, negotiated contracts, and existing equipment in a school. If additional materials such as pitchers and carts are purchased, this will add to the cost. Further details on the benefits, savings, and costs are in the body of this report.

Benefits and Savings	
Solid waste costs	Eliminating milk cartons can reduce garbage collection fees. Schools also may save costs on bag liners. We estimate that milk cartons account for approximately 16.6% of the total solid waste in ASD by volume. For outdoor 4-yard, 6-yard, and 8-yard garbage containers, cost savings are possible when the collection container is downsized. For 30-yard and 40-yard containers, cost savings are gained predominantly through a reduction in weight. In schools where milk cartons were <u>not</u> collected for recycling, eliminating milk cartons would result in downsizing outdoor trash dumpsters, with savings ranging from \$432 to \$1,226 per year for individual schools. For schools that recycled milk cartons, an increase in solid waste fees is expected when students return to school in fall 2021 because milk cartons will no longer be collected with recyclable materials and will be placed in the trash. This trash increase will result in some schools requiring more frequent trash collection and/or larger outdoor dumpsters – and that will increase costs. Preventing these cost increases district-wide could, conservatively, amount to an annual savings ranging from \$28,900 to \$126,200. Exact savings will depend on the current and projected numbers and sizes of solid waste containers. <sup>1</sup> (See page 7 for more information.)
Milk waste	Schools in Clackamas County and Thurston County reported 10% -40% reductions in milk waste. In Clackamas County, the average elementary school saved approximately \$3,000 on milk purchases per year. Savings will vary based on negotiated bulk milk prices and the milk waste reduction achieved. <sup>2</sup> (See page 11 for more information.)
Energy	Energy saving costs have the potential to be one source of savings. However, the savings can vary depending on the equipment currently used in a school. Milk dispensers use less energy than coolers used to store milk cartons. We estimate that an average school in Auburn may save \$10 - \$35 each year on milk cooling costs if it switches from a carton cooler to a milk dispenser. As a reference, Washington Middle School in Olympia School District estimated \$120 in savings per year due to replacing the school's milk carton cooler with a milk dispenser. <sup>3</sup> (See page 11 for more information.) Additional savings will be realized in costs and fees associated with maintenance, repair, and replacement of ASD's current milk carton coolers.

<sup>1</sup> Both the Oregon DEQ analysis, *The Environmental Milk Dispensers in Schools – The Environmental Case*, and the *Just Use a Cup* article from the Trash Talk- Quarterly Newsletter of Thurston County Solid Waste Division, list reduction of waste volume as a major benefit. Olympia High School saved \$1,700 in one year on recycling costs.

<sup>2</sup> *Just Use a Cup*. Spring 2013. Olympia School District newsletter. The article states “A typical elementary school that serves 450 meals a day ends up throwing away about 5 to 6 gallons of milk daily or about 1,000 gallons of milk each school year. A similar school with a dispenser only generates 1 to 2 gallons of wasted milk each day, reducing milk waste by more than 700 gallons a year.”

<sup>3</sup> *Just Use a Cup*. Spring 2013. Trash Talk- Quarterly newsletter of Thurston County Solid Waste Division.

Labor	Clackamas County shared that milk cartons were up to 50% of the Canby School District's lunch waste stream, and the elimination of single-use milk cartons resulted in custodial staff not having to empty waste containers as frequently. The hours required to service lunchroom waste containers were reduced for custodial staff and the absence of milk in the waste stream also reduced odor problems. <sup>4</sup> The potential for labor savings should be compared with the potential for labor costs, which is addressed below. (See page 13 for more information.) Additional time savings may occur because less staff time will be needed to refill milk carton coolers.
Environmental impacts	Life Cycle analysis performed by the Oregon Department of Environmental Quality estimates that milk dispensers have between 9% - 23% less overall environmental impact than milk cartons. <sup>5</sup> As of October 2021, Waste Management (the hauler serving ASD and its schools) will not accept milk cartons in the recycling stream. Discontinuing the purchase of single-use milk cartons and transitioning to milk dispensers will prevent school milk cartons from entering the landfill and help conserve natural resources such as wood pulp that go into producing milk cartons. <sup>6</sup> Compared to single-use milk cartons, milk dispensers results in a 9% - 23% reduction in environmental impacts. (See page 13 for more information.)
<b>Costs</b>	
Start-up equipment	Clackamas County reported the cost of purchasing equipment for milk dispensers as \$4,241 in 2014 for an elementary school with 400 students. In schools with additional students where two dispensers are needed, this cost may be closer to \$7,650. <sup>7</sup> This does not include costs noted in other sections of this report. (See page 10 for more information.)
Inventory replacement	Schools in Clackamas County and Thurston County did not report any replacement quantities. This does not appear to be a major cost for schools in those counties. (See page 14 for more information.)
Bulk milk	The cost of bulk milk compared to the cost of single-use milk cartons will vary depending on the contract. The cost will also depend on the amount of milk waste reduction. (See page 11 for more information.)
Water	Water use and utility costs will vary by school depending on the equipment used. Schools with Energy Star equipment or newer dishwashers will see less cost increase if additional loads are run to wash cups. (See page 12 for more information.)
Labor	Staff in Clackamas County reported minimal increased labor for kitchen staff related to its bulk milk system. <sup>8</sup> Planning and setting up a new program will require staff time. (See page 13 for more information.)

<sup>4</sup> Refer to the [Milk Dispensers in Clackamas County Schools](#) and *Just Use a Cup* for more information. Website link: Milk Dispensers in Clackamas County Schools: <https://www.clackamas.us/recycling/milk.html>

<sup>5</sup> [Milk Dispensers in Schools – The Environmental Case](#). October 23, 2018. Oregon Department of Environmental Quality.

<sup>6</sup> [Just Use a Cup](#). Spring 2013. Trash Talk- Quarterly newsletter of Thurston County Solid Waste Division.

<sup>7</sup> This includes two 3-spigot milk dispensers, two industrial carts for dispensers, 600 durable cups, 17 dishwashing trays, two carts to move trays of cups, and six additional milk crates.

<sup>8</sup> Website link, Milk Dispensers in Clackamas County Schools. Refer to FAQ section, "How much time does it take to wash all of the dishes?": <https://www.clackamas.us/recycling/milk.html>

## Recommendations

The estimates in this report suggest that switching from individual milk cartons to a bulk milk system provides opportunities for significant cost savings in the long term. It is expected that the ASD could recuperate the cost of equipment and setup in two to four years provided the milk dispensers reduce milk waste and result in reduced collection frequency and/or size of outdoor garbage dumpsters or containers. For comparison, Clackamas County elementary schools experienced savings beginning in year two.

One way to move forward is to conduct a pilot program in selected schools. Alternatively, the ASD could launch a district-wide milk dispenser program (in all schools with dishwashers) in August/September 2021 as students return to school facilities. While both options have benefits, we recommend that ASD switch to milk dispensers district-wide (in schools with dishwashers) starting August/September 2021.

Whether the district moves forward with a pilot program, district-wide launch, or a hybrid of those approaches, data from the first year of milk dispenser operation can be used for a cost/benefit analysis of milk dispensers. If a limited pilot is conducted, the ASD Food Waste Assessment Report (prepared by King County Green Schools Program in September 2020) suggests that some schools are open to participating in a pilot. A pilot involving schools with employees who are invested in testing a bulk milk system is more likely to succeed. An additional practical consideration is that any school using milk dispensers will need to have a dishwasher able to accommodate trays for durable cups.

The ASD Food Waste Assessment identified the following four major questions from employees that would need to be addressed prior to district-wide implementation.

1. Are spills an issue?
2. How would a bulk milk system work in schools where lunch is eaten in classrooms or other location(s) outside a central cafeteria?
3. Do milk dispensers slow down lunch lines?
4. Is additional labor required to implement a bulk milk system?

To address these questions, we recommend that staff be provided with information and data from schools and districts using milk dispensers and that they have access to support staff that can answer questions as they arise. The King County Green Schools Program and the City of Auburn's Sustainable Auburn education team will assist with information sharing and support.

We also recommend the district work with schools and King County Green Schools Program to track the following data.<sup>9</sup>

- Garbage collection costs
- Milk purchases
- Equipment costs
- Energy costs
- Water costs
- Labor cost (for both custodial and child nutrition employees)
- Inventory replacement (i.e., any replacement of cups, trays, or pitchers)

Two critical steps in launching the milk dispenser program will be to: (1) identify schools with dishwashing equipment able to accommodate durable cups; and (2) provide support and education for

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<sup>9</sup> Olympia High School developed a tracking worksheet that can be adapted to an ASD pilot program.

staff and students to help ensure program success. The King County Green Schools Program and City of Auburn can help provide such support and education. After information is generated from the first year of the program, the district can assess the cost savings and determine any revisions needed for the second year.

### **Comparative Analysis of Single-Use Milk Cartons and the Bulk Milk System**

This section includes a detailed comparative analysis of single-use milk cartons and a bulk milk system. The results of the analysis are summarized in the *Summary of Benefits, Savings, and Costs* above. The analysis includes the following components.

- The cost of milk cartons in the solid waste stream (page 7)
- Equipment costs: Start-up cost for a bulk milk system (page 10)
- Comparison of purchasing costs for milk cartons and bulk milk (page 11)
- Evaluation of utility costs for milk cartons and a bulk milk system (page 11)
  - Cooling milk
  - Washing durable cups
- Review of labor considerations for milk cartons and a bulk milk system (page 13)
- Review of environmental impacts (page 13)
- Additional considerations (page 13)

#### **The Cost of Milk Cartons in the Solid Waste Stream**

Milk cartons represent approximately 16.6% of the garbage generated by ASD schools.<sup>10,11</sup> In one school year, ASD generates an estimated 1,239 cubic yards of milk cartons weighing approximately 56 tons.<sup>12</sup> On average, in one school year, a single school in ASD generates 54 cubic yards of milk cartons which results in approximately 2.4 tons of garbage.

District Volume of Milk Cartons	District Weight of Empty Milk Cartons	Average School Volume of Empty Milk Cartons	Average School Weight of Empty Milk Cartons
1,239 CU. YD.	56 tons	54 CU. YD.	2.4 tons

As a reference for one year, the table below shows the total annual volume and weight of ASD waste (including disposed garbage and recyclable materials; compostable materials were not included for this review because milk cartons are placed in either garbage bins or recycling bins).

<sup>10</sup> Data was collected for a two-week period, during the 2018-2019 school year, from 18 schools on the number of milk servings provided to students. This number was adjusted to account for the number of schools in the district. We estimate there are 1,784,685 milk cartons generated in a 180-day school year. This is 6% above the number listed in an invoice sent July 2020 to ASD. Using the number of milk cartons and information on the average weight and curbside volume we calculated the volume in cubic yards and the weight in tons. For weight calculations we assumed the milk cartons were empty. The curbside weight of 1 cubic yard was estimated to equal 90 lbs. Calculations assume 180 days in a school year and exclude summer months. Soy milk and lactose-free cartons were excluded as the quantity of those types of milk consumed in ASD would not warrant purchase of a milk dispensing unit for those types of milk.

<sup>11</sup> Website link, waste profiles: [https://www.waste360.com/mag/waste\\_profiles\\_garbage\\_aseptic](https://www.waste360.com/mag/waste_profiles_garbage_aseptic). The numbers in the profiles in waste were used for the calculations in footnote (1).

<sup>12</sup> To estimate the waste generated by school facilities, district data was used from the second quarter of 2019-2020 (October 1, 2019-December 31, 2020). District administrative facilities were excluded from this number. During the second quarter there were 53 school days according to the planned calendar. This number was used to estimate the total in a 180-day school year. Since the summer months are excluded, the number is conservative.

	Total District Waste Volume	Total District Waste Weight	Average School Waste Volume	Average School Waste Weight
Garbage	7,467 CU. YD.	1,120 tons	325 CU. YD.	49 tons
Recycling	11,923 CU. YD.	477 tons	518 CU. YD.	21 tons

Recycling collection service is provided at no additional charge as part of Waste Management’s garbage collection service. However, starting in October 2021, Waste Management will no longer accept milk cartons in ASD recycling containers. Therefore, in the 2021-2022 school year, if the district continues to provide individual milk cartons, Auburn schools must increase garbage collection service capacity in order to dispose of milk cartons in garbage containers. It is likely that ASD garbage collection costs will increase significantly as students return to school facilities in fall 2021. Depending on the current size of outdoor garbage containers, some schools will need to increase their garbage collection container sizes and/or their collection frequency, both of which will result in higher collection costs for ASD. Other schools may experience an increase in per ton garbage fees. The elimination of milk cartons could prevent these cost increases and result in significant savings. At Olympia High School in Thurston County, for example, the facility realized an annual cost savings of \$1,700 by eliminating milk cartons.

With few exceptions, schools generally use one of two strategies for garbage collection. The first strategy is used mostly by elementary schools due to their smaller populations. These schools predominantly schedule a single garbage pick-up per week of either a 6-yard or 8-yard garbage container. This pick up takes place regardless of fullness of the container. Elementary schools using 6-yard and 8-yard containers with a once per week pick-up schedule have the potential to realize cost savings through elimination of milk cartons when they are able to downsize their outdoor garbage collection container. For schools where the garbage container is, on average, 80-90% full, a 16.6% reduction in waste volume from eliminating milk cartons would likely allow the school to downsize its container. For schools where the garbage container is over 90% full on average, eliminating milk cartons would need to be paired with additional actions and policies to reduce the volume of garbage in order to downsize. Additional actions could include collection of compostable materials, increased recycling, and other waste reduction efforts. Cost savings of reduced container sizes are included in the table below.

	Downsizing from 8-yd to 6-yd container	Downsizing from 6-yd to 4-yd container	Downsizing from 4-yd to 3-yd container
Annual Savings for Average Elementary School	\$ 1,226.20	\$1,396.50	\$673.80



Figure 3: If a school's garbage dumpster is regularly 80-90% full (including milk cartons) at pick up, then it is likely the school can reduce its garbage container size after transitioning to a bulk milk system.

The second strategy is used primarily by larger secondary schools. Middle schools and high schools typically use 30-yard or 40-yard containers that are hauled on-call and are charged by the ton. The cost savings of eliminating milk cartons are included in the table below for the 30-yard and 40-yard garbage containers. The estimated cost of milk carton disposal for the average school was calculated using the average volume and weight of milk cartons in the waste stream.<sup>13</sup> These estimates are likely conservative because they do not include the weight of any leftover milk in the cartons, which would contribute to the weight and therefore to the tonnage fee. The elimination of milk cartons for these larger on-call containers would result in more guaranteed cost savings due to less frequent pick-ups and lower tonnage fees.

	30-yard Compactor	40-yard Compactor	30-yard Dumpster	40-yard Dumpster
Annual Cost of Milk Cartons in Garbage for Average Middle or High School	\$432	\$422.82	\$680	\$609

It is worth reiterating that starting October 2021 ASD schools that previously recycled milk cartons will need to place them in the garbage. For an Auburn school which previously recycled milk cartons, cost savings potential due to eliminating milk cartons can be estimated by assessing the additional amount of space needed in the trash dumpster to accommodate the disposal of milk cartons. The increased trash may result in the need for a larger dumpster, more frequent collection, or both. The increase in garbage container size and collection comes at a cost of hundreds of dollars per billing cycle per school. The anticipated increase in trash collection fees moving forward will be tens of thousands of dollars annually for the ASD. The table below assumes a 10-month school year when trash collection is highest. The rates are based on estimates from the 2020 Commercial Solid Waste Reports from the City of Auburn.

	Average Additional Rate to Upgrade One Container Size	Average Additional Rate from Weekly to Biweekly Collection	Additional Rate Per School Annually	Additional Costs for ASD Annually
Estimated Monthly Cost Increase	\$126	\$423	\$1,260-\$5,490	\$28,980-\$126,270

<sup>13</sup> The 2020 commercial solid waste rates for City of Auburn were used for this calculation. The report uses the curbside density of milk cartons for dumpsters and the landfill density for compactors from the waste profiles website. For calculations on container reduction, savings are calculated for the 10 months school is in session since billing is monthly. Website link, waste profiles: [https://www.waste360.com/mag/waste\\_profiles\\_garbage\\_aseptic](https://www.waste360.com/mag/waste_profiles_garbage_aseptic)

### Equipment Costs: The Start-up Cost for a Bulk Milk System

This section analyzes the start-up costs of implementing a bulk milk system. Note, milk dispensers are available as 1-, 2-, or 3-spigot dispenser. All schools in our study utilized a 3-spigot dispenser. Clackamas County, Oregon, provided information on the cost of equipment to implement the milk dispenser distribution system for an elementary school of approximately 400 students (see table below).<sup>14</sup>

Equipment for One Elementary School	Cost
3-spigot stainless steel milk dispenser	\$2,517
Industrial cart for dispenser	\$560
400 Durable cups: ~\$30 for case of 36	\$325
Dishwasher trays: 17 trays for 25 cups each	\$400
2 carts to move dishwasher trays with cups to and from kitchen	\$268
3 specialized milk crates: to simplify changing milk bags during lunch	\$171
<b>Total</b>	<b>\$4,241</b>

Thurston County, Washington provided estimated equipment costs for middle and high schools.<sup>15</sup> Secondary schools in Thurston County ordered two 3-spigot milk dispensers and 6 milk crates, which cost approximately \$5,653. As a reference we include the average number of cartons served per day in ASD schools so schools may assess whether they need one or two 3-spigot dispensers. The average elementary school serves 431 milk cartons, an average middle school serves 470 milk cartons, and the average high school serves 350 milk cartons in a single day. Given these numbers, a single 3-spigot milk dispenser holding approximately 15 gallons of milk at a time will need to be refilled once each day to meet the average school's demand for milk. The only reason for a school to invest in a second milk dispenser would be to expedite lines in the lunchroom. It is worth noting no reports about bulk milk systems from other school districts mentioned wait time as an issue.

Specialized milk crates are an optional purchase; however, many schools purchase them because they facilitate the loading of the milk dispensers. The milk crates are reusable plastic crates specifically designed to hold the gallon bags of milk in the dispensers.

<sup>14</sup> Website link, Milk Dispensers in Clackamas County Schools: <https://www.clackamas.us/recycling/milk.html>

<sup>15</sup> We used numbers for equipment from quotes for the dispensers and milk crates. Other numbers were adjusted based on the per day milk consumption at middle and high schools within Auburn.

### A Comparison of Milk Carton and Bulk Milk Purchasing Costs

This section analyzes the purchasing costs of milk cartons and bulk milk. Milk dispensers rely on the use of bulk milk in 3-gallon, 5-gallon, or 6-gallon bags. Due to weight and loading needs, all schools researched used 3- or 5- gallon bags. Milk can be dispensed from a gallon bag or bag-in-box, although that creates cardboard waste for recycling and an extra step of removing the empty milk bag from the box before disposal. Reports from Thurston County, Washington and Clackamas County, Oregon showed a 10% to 40% reduction in milk waste when they implemented a bulk milk system. Below are tables showing the estimated cost of buying bulk milk in 5-gallon milk bags compared to buying milk cartons at the district level and for the average school.<sup>16</sup> The tables compare the annual average cost of purchasing bulk milk in the scenario where there is no change in milk waste, a 10% reduction, and a 40% reduction. Significant cost savings are possible when implementation of a bulk milk system results in less milk waste. Schools and districts can work with their milk vendors to better understand the cost of bulk milk since prices will vary based on the contract and whether schools use 3-gallon or 5-gallon bags.<sup>17</sup>

	Annual Cost for the Average School			
	Milk Cartons	Bulk Milk, 0% Waste Reduction	Bulk Milk, 10% Waste Reduction	Bulk Milk, 40% Waste Reduction
<b>White Milk</b>	\$4,655.46	\$4,371.81	\$3,934.63	\$2,623.09
<b>Chocolate Milk</b>	\$9,598.32	\$12,026.45	\$10,823.80	\$7,215.87
<b>Total Milk</b>	<b>\$14,253.78</b>	<b>\$16,398.26</b>	<b>\$14,758.43</b>	<b>\$9,838.95</b>

	Annual Cost for the ASD			
	Milk Cartons	Bulk Milk, 0% Waste Reduction	Bulk Milk, 10% Waste Reduction	Bulk Milk, 40% Waste Reduction
<b>White Milk</b>	\$107,075.59	\$100,551.63	\$90,496.47	\$60,330.98
<b>Chocolate Milk</b>	\$220,761.45	\$276,608.24	\$248,947.41	\$165,964.94
<b>Total Milk</b>	<b>\$327,837.04</b>	<b>\$377,159.87</b>	<b>\$339,443.88</b>	<b>\$226,295.92</b>

### A Comparison of Milk Carton and Bulk Milk System Utility Costs

In this section, the report considers utility costs. The utility costs impacted by this transition are the energy cost to cool milk and the water and energy costs to wash durable cups.

#### Cooling Milk

Data from Thurston County shows that milk dispensers used less energy to cool milk than traditional milk carton coolers. Washington Middle School in Thurston County expected to save \$120 a year in electrical costs for cooling milk. The table below highlights potential energy costs and savings based on a 512 half-pint carton capacity cooler, a 1,024 half-pint carton capacity cooler, and a 3-spigot milk

<sup>16</sup> The cost of white and chocolate milk was calculated using prices in the July 2020 ASD invoice. The average cost of white milk was \$0.1789 and the average cost of chocolate milk was \$0.1861. The cost of 5-gallon bulk bags with dispensers was based on a [2017 contract from the Washington Department of Enterprises](https://apps.des.wa.gov/priceinfo/dairy.aspx?date=NA) and used average numbers for 1% milk (\$12.86 per 5-gal bag) and 2% chocolate milk (\$17.85 per 5-gal bag). White milk is more cost effective in bulk, while chocolate milk by this estimate is more expensive. The cost of fat-free chocolate milk may be different from 2% chocolate milk. Schools may be able to negotiate more favorable contracts and the price could also differ for 3-gallon milk bags. The cost is calculated for a 180-day school year and does not include summer months. Website link, 2017 contract from the Department of Washington Enterprises:

<https://apps.des.wa.gov/priceinfo/dairy.aspx?date=NA>

<sup>17</sup> The substitution of milk cartons with bulk milk in plastic bags results in the generation of plastic bag waste that would be placed in the garbage; however, a single 5-gallon bag of milk is equivalent to 80 milk cartons.

dispenser. The average potential annual savings by school is relatively small, ranging from \$10.80 to \$35.64, depending on the cooling units currently in use and the number of milk dispensers needed.

The table below highlights the differences in energy use of carton coolers and milk dispensers, with the assumption that coolers run for 24 hours per day for 180 days.<sup>18</sup>

Cooling Equipment	kWh/School Year	Yearly Energy Cost/Unit
Beverage Air Milk Cooler- 512 Carton Capacity	1,093 kWh	\$109.30
True TMC Milk Cooler- 1024 Carton Capacity	1,342 kWh	\$134.14
Silver King 3-spigot Milk Dispenser	985 kWh	\$98.50

Currently ASD schools use two to six carton coolers each and ASD currently spends tens of thousands of dollars each year maintaining and repairing milk carton coolers. It is also worth noting that the footprint of the carton coolers is generally larger than the space needed for a milk dispenser. Transitions to milk dispensers would result in cost savings for electricity and for maintenance and repairs for milk carton coolers, and more efficient use of cafeteria and lunch line space.

#### Washing Durable Cups

Durable cups used with milk dispensers require dishwashers to wash and sterilize the cups. Dishwashers use both electricity and water. The number of any extra loads run each day will impact utility costs, which will vary by school depending on the dishwashing equipment and the number of additional racks, or loads, if any, that are run to accommodate the cups.

It is worth noting that schools in Thurston County found efficient ways to load dishwashers to limit the number of additional loads needed to wash the additional durable cups.

A School Nutrition Foundation study from November 2009 found that the type of dishwasher had a significant impact on energy and water use. Newer model dishwashers (i.e., “replacement” dishwashers) which use less water and energy reduced water use and energy by nearly half, resulting in substantial reductions in the overall energy, solid waste, and global warming potential for the serving ware systems analyzed in the study.<sup>19</sup>

If additional racks or additional loads are run to wash durable cups, then schools that use Energy Star equipment or that have newer dishwasher models will see less cost increase than schools with less energy-efficient equipment.

For examples of dishwasher energy use, see the Life Cycle Environmental and Cost Analysis of Disposable and Reusable Ware in School Cafeterias, Including Dishwasher Operation Prepared for School Nutrition Foundation, November 2009 in the appendix, table 1-2. Energy and water use for school

<sup>18</sup> The figures in the table assume the utility rate is based on the Washington State rate of \$0.10 kWh.

<sup>19</sup> *Life Cycle Environmental and Cost Analysis of Disposable and Reusable Ware in School Cafeterias, Including Dishwasher Operation* 2009. School Nutrition Foundation. Website Link: [https://www.thegreenteam.org/wp-content/uploads/2014/04/Warewash\\_Study-Summary.pdf](https://www.thegreenteam.org/wp-content/uploads/2014/04/Warewash_Study-Summary.pdf)

dishwasher operation was based on manufacturer's analysis of dishwasher models used by surveyed schools and validated using the U.S. EPA ENERGY STAR commercial dishwasher calculator.

### **A Review of Labor Considerations for Milk Cartons and the Bulk Milk System**

While labor costs will vary by school, other districts have found there are minimal increases in labor when comparing the use of milk dispensers with the use of milk cartons. In Canby School District, kitchen staff reported that the time needed to wash cups was negligible. Staff washed dishes in between other tasks and no additional time was required for cup washing.<sup>20</sup>

Across the schools and districts reviewed, after switching from milk cartons to milk dispensers, custodial staff have reported lighter loads of garbage and fewer trips to the dumpster. Some schools even reported cost savings in custodial labor after switching to milk dispensers.<sup>21 22</sup>

### **A Review of Environmental Impacts**

The Oregon Department of Environmental Quality (DEQ) conducted a comprehensive Life-Cycle Analysis of Milk Distribution options in 2018.<sup>23</sup> Information from implementation of programs in Thurston County, Washington and Clackamas County, Washington was integrated in DEQ's analysis of the climate impacts of milk cartons and milk dispensers. Their analysis included milk production, the production of the materials needed for different distribution options, electricity use, and water use. Climate impacts that were considered included acidification, ecotoxicity, eutrophication, global warming, human toxicity, fossil resources, and smog.<sup>24</sup> Across these different climate and environmental impacts, the use of milk dispensers resulted in a 9% - 23% reduction compared to single-use milk cartons.

### **Additional Considerations**

This report acknowledges that there may be differences not accounted for between the counties and schools that use milk dispensers and ASD, and that those differences could impact implementation of a bulk milk system. Differences may include student body size, room for equipment in cafeterias (the amount of space needed for a 3-spigot milk dispenser is approximately 38" x 12" which is smaller than the area needed for most milk carton coolers), dishwasher capacity, and school culture. For instance, some schools in ASD have lunch in classrooms. Concerns regarding students carrying milk cups through hallways to their classrooms could be addressed by each classroom having a pitcher of milk in the classroom at lunch time. (See frequently asked questions below.) Depending on what is currently in use at a school, there may be additional start up and maintenance costs not addressed in this report.

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<sup>20</sup> Website Link, Milk Dispensers in Clackamas County Schools (Refer to FAQ section, "How much time does it take to wash all of the dishes?"): <https://www.clackamas.us/recycling/milk.html>

<sup>21</sup> *School Waste Prevention Frequently Asked Questions*. June, 2014. The real cost savings are in recycling collection costs, custodial labor, and energy use.

<sup>22</sup> Website link: School Milk (Dispensers, Information compiled by Thurston County, Washington- Milk Dispenser video); <http://www.youtube.com/watch?v=T7VZWDQcYGw>

<sup>23</sup> *Milk Dispensers in Schools – The Environmental Case*. October 23, 2018. Oregon Department of Environmental Quality.

<sup>24</sup> Definitions of certain terms. Acidification is when the ocean becomes more acidic due to absorbing carbon dioxide. Acidification has high impacts on shellfish, coral reefs, as well as other ecosystems and species. Ecotoxicity is the potential for biological, chemical or physical stressors to impact ecosystems. Eutrophication is when there is an excess of nutrients in lakes and other bodies of water that results in plant and algae growth and the death of animal life due to a lack of oxygen.

Included below are potential additional costs based on equipment schools may wish to use.

- Replacement cups
- Cup lids
- Pitchers for transporting milk to classrooms (averaging \$5-\$10, with lids)
- Additional rolling carts for pitchers to be delivered to classrooms (averaging \$100-\$200)

### ***Frequently Asked Questions on Bulk Milk System Implementation***

The chart below lists frequently asked questions on bulk milk system implementation. The chart integrates questions from Thurston County, Clackamas County, and the Auburn Food Waste Assessment Report regarding Bulk Milk Implementation.

Will students spill milk?	Studies have found no evidence that, across age ranges, milk dispensers result in more milk spills than cartons. Schools that have implemented milk dispensers have reported there are fewer spills. <sup>25,26</sup> Districts which implemented milk dispensers and durable cups recommend the squat 9.2-ounce durable cups, especially for elementary schools. <sup>27</sup> While not mentioned in studies reviewed for this assessment, schools could offer cup lids for classes or grade bands that are more prone to accidents or spills.
Will durable cups be thrown away?	Schools using durable utensils and trays are likely to have systems in place that support the implementation and <i>reuse</i> of durable cups. <sup>28</sup> Similar to other durable wares, schools using milk dispensers and cups have found that the solution to cups ending up in the trash is student education.
Do milk dispensers slow the lunch line?	While no school directly addressed this concern, it is worth further discussion. One report noted that students are already in an orderly line to get their food so the risk of bumping into each other or jostling is limited during the serving of lunch and the dispensing of milk. <sup>29</sup> For classes that eat lunch in the classroom and have lunch aids available, Clackamas County provides a successful model. Lunch aids fill pitchers from a central milk dispenser, then bring pitchers to each classroom and pour milk for each student. Students then can ask for the quantity of milk they will drink.

<sup>25</sup>The Milk Dispensers in Clackamas County Schools FAQ website states “In fact, some school personnel have reported fewer spills with milk dispensers.” Website link, Milk Dispensers in Clackamas County Schools, section “Won’t students spill milk?”: <https://www.clackamas.us/recycling/milk.html>

<sup>26</sup> *School Waste Prevention Frequently Asked Questions*. June, 2014. The Olympia School District in Thurston County. The document states “Custodial and lunchroom staff at some of the schools with dispensers have told us there are fewer spills and no schools have told us there have been more spills.”

<sup>27</sup> *School Milk Dispensers*. Information compiled by Thurston County, Washington.

<sup>28</sup> There are no exact numbers on replacement rates, but Olympia School District reports very little inventory loss in *Milk Dispensers - Frequently Asked Questions*. The Milk Dispensers in Clackamas County Schools FAQ states that “Students pour their unfinished milk into a bucket, then place the cup upside down in the dishwashing tray. This process needs to be taught and reinforced, but it quickly becomes habit for the kids.”

<sup>29</sup> *School Waste Prevention Frequently Asked Questions*. June, 2014. The Olympia School District in Thurston County.

Is it hard to load bulk milk bags into the dispensers?	Schools using bulk milk bags have suggested using 3-gallon bags of milk rather than 5-gallon bags when lifting weight is an issue for staff. Milk weighs 8.6 pounds per gallon. A 5-gallon bag of milk weighs 43-45 lbs. and a 3-gallon bag weighs 25-27 lbs., depending on the fullness of each bag. Additional suggestions include using utility carts, having two people load milk, and setting specific milk weight limits when ordering milk bags.
Will we meet USDA requirements?	The schools with bulk milk systems in the Olympia and Rochester districts have passed their Office of Superintendent Public Instruction (OSPI) audits. No issues were raised about their bulk milk systems. <sup>30</sup> The USDA Offer versus Serve (OVS) policy requires that fluid milk must be offered with every school meal, but states that students may decline milk. <sup>31</sup> An additional solution to address serving size concerns is that a school can purchase cups with a “fill to” line to show the quantity of milk provided in a half-pint milk carton. <sup>32</sup>
How do we balance out the start-up cost of milk dispensers?	The Clackamas County School Milk Dispenser Project found that milk purchasing savings (\$18,000 for 2,600 students) covered the cost of equipment (\$25,690) in just under a year and a half. Depending on current equipment in a school and cost savings achieved due to reduced milk waste and reduced energy, ASD could cover initial equipment and materials’ costs in two to four years.
Are there greater risks for food safety with bulk dispensers?	Provided a school uses a commercial dishwashing unit that sterilizes durable cups, the reuse of cups does not pose a risk. With respect to milk, the milk dispensers include cooling units that keep milk cool and at safe temperatures. It can be argued that the dispensers maintain a more stable temperature because, unlike traditional carton coolers, they are not continually opened and closed causing temperature fluctuations.
Is additional labor required to implement a bulk milk system?	Staff time will be needed for training and to plan and pilot milk dispensers. In Canby School District, kitchen staff reported that time needed to wash cups was negligible. Thurston County kitchen staff found efficient ways to load dishwashers to limit additional loads for washing cups. Less staff time may be needed to refill milk dispensers compared to refilling milk carton coolers. Districts with bulk milk systems noted that custodial labor for servicing cafeteria waste containers is reduced because with no single-use cartons in recycling or garbage bins there is less material for custodians to empty at the end of each meal period. Reports mention the weight of waste bags is reduced because of reduced liquids, which also reduces odors and can potentially reduce the need to double-bag containers to address liquid waste.

<sup>30</sup> *School Waste Prevention Frequently Asked Questions*. June, 2014. The Olympia School District in Thurston County. Refer to “How can you ensure federal reimbursement if students aren’t taking cartons?”

<sup>31</sup> Rules and Regulations, Department of Agriculture Food and Nutrition Service. Thursday, January 26, 2012. Page 10, Federal Register, Vol. 77, No. 17. Website link:

[https://schoolnutrition.org/uploadedFiles/About\\_School\\_Meals/FederalRegister-newregulations.pdf](https://schoolnutrition.org/uploadedFiles/About_School_Meals/FederalRegister-newregulations.pdf)

<sup>32</sup> Milk Dispenser Pilot – an unincorporated King County school grant opportunity from Waste Management

## Summary of Resources

### Auburn School District, Washington

Dairy Fresh Farms, Inc. - Customer Sales & Returns spreadsheet  
 City of Auburn 2020 Commercial Solid Waste Rates  
 Milk Use spreadsheet for two weeks in 2018-19 – from ASD  
 ASD Service Levels Spreadsheets for solid waste collection 2019-2020 – from City of Auburn

### Clackamas County Schools, Oregon

Milk Dispensers - Frequently Asked Questions  
 School Milk Dispenser Project slides  
 Trash Talk article “Clackamas County cafeterias modeling ‘green lunchrooms’”  
 Milk Dispensers in Clackamas County Schools. Video

Federal Register / Vol. 77, No. 17 / Thursday, January 26, 2012 / Rules and Regulations, Department of Agriculture Food and Nutrition Service.

[https://schoolnutrition.org/uploadedFiles/About\\_School\\_Meals/FederalRegister-newregulations.pdf](https://schoolnutrition.org/uploadedFiles/About_School_Meals/FederalRegister-newregulations.pdf)

### King County, Washington

Milk Dispenser Pilot – an unincorporated King County school grant opportunity proposed by Waste Management in collaboration with the King County Green Schools Program  
 School Milk Dispensers and Reusable Cups to Replace Single-use Milk Cartons: Summary from King County Green Schools Program

Life Cycle Environmental and Cost Analysis of Disposable and Reusable Ware in School Cafeterias, Including Dishwasher Operation. School Nutrition Foundation. [https://www.thegreenteam.org/wp-content/uploads/2014/04/Warewash\\_Study-Summary.pdf](https://www.thegreenteam.org/wp-content/uploads/2014/04/Warewash_Study-Summary.pdf)

Milk Dispensers in Schools - The Environmental Case. Summary of Oregon DEQ Screening-Level Life Cycle Assessment of Milk Distribution Options. October 23, 2018; [https://www.thegreenteam.org/wp-content/uploads/2014/04/Warewash\\_Study-Summary.pdf](https://www.thegreenteam.org/wp-content/uploads/2014/04/Warewash_Study-Summary.pdf)

### Milk Cooler Specification Sheets

Beverage Air- SM34HC Single Access, Cold Wall- School Milk Coolers. Models SM34HC-S and SM34HC-W  
 Silver King- Milk Dispenser. Models SKMAJ1-SKMAJ2-SKMAJ3  
 True Manufacturing Co., Inc U.S.A. Food Service Division- Model TMC-58-HC

### Thurston County-Olympia and Rochester Schools, Washington

School Waste Prevention Frequently Asked Questions, June 2014  
 Trash Talk- Quarterly newsletter of Thurston County Solid Waste, Spring 2013. “Just Use a Cup”.  
<https://www.co.thurston.wa.us/solidwaste/publications/trashtalk/Spring2013.pdf>  
 Milk cartons removed from the waste stream spreadsheet  
 Milk Dispenser and Cart Quotes- June 2012  
 Milk Dispensers - compiled information