Montana Pollution Prevention Program
Case Study: Cool Earth Creamery
Prepared by: Nick Nelson, 2025 Intern

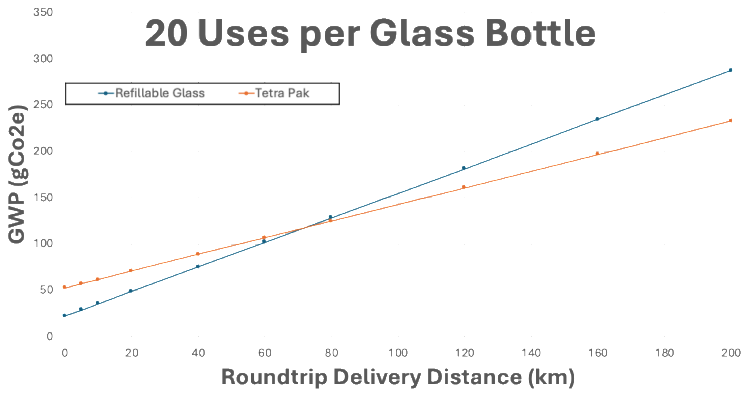
Company Profile: Cool Earth Creamery is a plant-based milk company based in Missoula, MT. It has been in operation for 4 years and currently employs between 5 and 7 employees. Devin Morales, P.E., the owner and founder, has turned his technical background as an engineer with the forest service toward creating delicious and satisfying non-dairy alternatives using simple, local, high-quality ingredients. Cool Earth's primary product is oat milk in a returnable glass bottle, and they are launching a new gelato product this summer. They are expecting significant demand and growth with the gelato launch.

Internship focus areas:
Although Cool Earth Creamery has had an eye for efficiency and reduced waste from the start, Devin is looking to continuously improve the operation in this regard. As such, I focused my time with Cool Earth on evaluating their processes from start to finish and noting opportunities for increased efficiency and reduced resource consumption. Some highlights include switching to more efficient pressure cooking instead of oven baking to cook sweet potatoes for their gelato recipe, installing a variable frequency drive on one of the pumps to equalize an uneven flow rate a step of the production process, and a simple change in dishwasher programming that would save thousands of gallons of water per year.

Recommended P2 Actions	One-time Cost to Implement ($)	Annual Savings from P2 Actions ($)	Resources Conserved	Barriers to Implementation	Plans to Implement in the next 5 years?
25-qt Pressure Cooker	$700	$300+ in direct electricity savings. Reduce process time by ~50%. Cooler facility by eliminating waste heat from oven.	3125+ kWh electricity/year	Minimal	Yes, this year
Replace Disposable Plastic Caps with Reusable Silicone Caps	$2,550	$6,084	Eliminates ~440 lbs of plastic waste/year	Innovation- to design caps and develop capping and cleaning system	Yes, next year
Changes to Dishwasher Cycle Steps	$0	Missoula commercial water rate= $0.0031/gal 22,000 gal x 0.0031= $68	Up to 22,000 gallons water/year	Food safety. Swab testing to ensure same level of cleanliness.	Yes, immediately for crates, after testing for glass

Seal Water Recycling System	$2000-$4000	Missoula commercial water rate= $0.0031/gal 10,000 gal x 0.0031= $31	Up to 10,000 gal water/year at current production rates	Cost	Potentially in next facility expansion
Install a hanging spray nozzle at sink	$200	Missoula commercial water rate= $0.0031/gal 5600 gal x 0.0031= $17.36	~5,600 gal water/year	Minimal	Yes
Install VFD for pump 1 to match Centrifuge/Chiller Flow Rates	$0 (Have an unused VFD onsite)	Free up an operator for 1-1.5 hrs/week	Some small electricity savings	Minimal	Yes

Workflow: 2-3 days/week of downtime for oat milk and gelato production processes could be eliminated if the bottle washing operation were moved to a secondary facility. The resource savings are harder to quantify but would be substantial vs. upsizing entire facility.



Note: GWP at 0km represents emissions from packaging production and shipment to creamery

Packaging:
Returnable glass seems like it should always be the more sustainable packaging choice, but life cycle analysis studies have shown that Tetra Pak cartons can have a lower impact when delivery distances are high, as transporting the heavier glass uses more fuel. I charted global warming potential (GWP) vs Delivery distance of 1L of oat milk in Tetra Pak vs. returnable glass at varying re-use cases (Single use, 5, 10, 20, 30). Higher use rates are crucial for reduced emissions. My analysis showed that at 20-30 uses, returnable glass can outperform Tetra Pak at a delivery radius of ~70-90km. This can serve as a useful data point for Cool Earth as it plans to expand-for example, they may choose to limit their oat milk to local sales, while expanding to more distant markets with the new gelato product that uses a backyard-compostable packaging.

Cool Earth was also interested in exploring alternatives for the disposable plastic caps on their glass bottles. Some innovation will be required to achieve this, as I did not find a commercially available alternative to be readily available. One option is to design and implement a returnable silicone cap that would be washed alongside the glass bottle and re-used. Based on a quote that I obtained from a food-grade silicone manufacturer, it seems that if silicone caps were reused a minimum of 4 times, they could be a cost savings vs. disposable plastic caps. Devin intends to explore this option next year.