From single-use to reuse.

What more than three years of deposit-based reuse in a canteen reveals about economics, operations and the environment, and how to succeed with the transition in your own canteen.

CASE STUDY

3 years of reuse in a canteen in Oslo

90,000
SINGLE-USE UNITS REPLACED PER YEAR

~100%
RETURN RATE AFTER THREE YEARS OF OPERATION

2,000
FEWER WASTE COLLECTIONS PER YEAR

5.4 tonnes
WASTE AVOIDED PER YEAR

€13,600
LOWER OPERATING COST PER YEAR FROM 2027

GRIN SMART COLLECTION SYSTEMS AND TECHNOLOGY

Automated AI-powered return infrastructure engineered for circular packaging. Provides real-time telemetry, automated refunds and zero cashier friction.
Plug-and-play setup · 4G connected · Packaging agnostic

Reuse beats single-use in practice, not just in theory

In March 2023, the canteen replaced single-use packaging with a deposit-based reuse system, as the first canteen in Norway. Three years later the system is in regular operation across several locations, with a documented return rate of close to 100 per cent. This white paper summarises what the operation has taught us about economics, day-to-day running and environmental impact.

The main finding is simple: **a complete reuse system costs less to operate than the single-use packaging it replaces**. When all mapped costs are included (washing, packaging wear, technology and deposit transaction fees, waste handling and refuse charges), reuse is cheaper in daily operation. With the announced tax increases on single-use packaging taking effect from 1 January 2027, the saving will be larger still. Even with the investment in machines and packaging included, the economics hold up: in the tax scenario, the entire set-up is paid back during the second year of operation.

On top of this come the environmental effects that do not appear in the financial accounts: 5.4 tonnes less waste per year, which means around 2,000 fewer waste collections, an estimated 6 tonnes of CO2e saved annually, and operating data that can be used directly in sustainability reporting.

ABOUT THE CASE

Location: A central, high-traffic canteen in Oslo, operating with reuse since 2023.

Partners: The partners are anonymised in this paper, but they include end location, facility management and GRIN. The project is supported and partially funded by Handelens Miljøfond.

System: Reusable packaging for food and coffee with a deposit (€6.90/2.80), returned in GRIN's Revore smart collection machines. Pilot launched 15 March 2023, in continuous operation since, extended with cups and new locations in 2026.

Volume: Around 90,000 single-use food containers are replaced annually. The canteen circulates approximately 1,000 reusable food containers; cups were added in 2026 and are kept outside the figures used here.

Reuse competes with single-use on price

The most common objection to reuse is that it costs more. When you look at the full picture, the results from this canteen show the opposite. Single-use packaging is not free to operate: it is bought continuously, fills the waste bins that require frequent emptying and triggers refuse charges. Reuse shifts the cost from buying single-use and handling waste to washing and technology.

The table shows all mapped operating costs for the canteen (EUR per month, excl. VAT):

Operating cost per month	Single-use	Reuse
Purchase of single-use packaging (7,500 units)	€2,083	–
Waste handling (collection, 5 min per round)	€450	–
Waste disposal fee (€185/tonne)	€83	–
Washing of packaging (€32/hr)	–	€1,208
Washing consumables (detergent etc.)	–	€3
Replacement of worn packaging	–	€32
Technology: operation, service and software	–	€741
Deposit transactions (€0.06 per return)	–	€194
Total 2026	**€2,616**	**€2,178**
Example single-use tax increase from 2027	+ €694	–
Total from 2027	**€3,310**	**€2,178**

Source: Joint cost mapping carried out by the project partners, August 2026. Price of single-use packaging €0.28 per unit. The case is limited to food packaging; cups were added in 2026 and are kept outside the figures. The reusable container has several compartments and therefore replaces more than one single-use packaging per use. Amounts converted from NOK at 10.8 NOK/EUR.

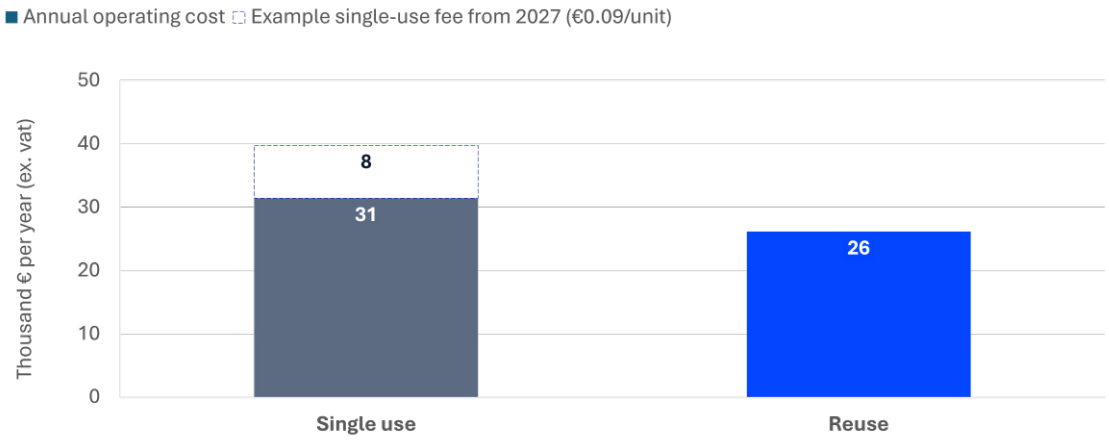

Figure 1 · Annual operating cost for the canteen: single-use versus reuse, current situation and with an example single-use tax increase of €0.09/unit.

Even at today's prices, reuse is the cheapest to operate, by around €5,300 per year. The announced tax increase from 2027 will hit the single-use line directly, while the cost of reuse will stay flat. At a tax of €0.09 per food container, the difference in operating cost grows to around €13,600 per year.

What about the investment?

A complete set of accounts must also include what the reuse system costs to establish. In this case the set-up cost was €22,300:

Set-up (one-off cost)	Amount
Smart collection machines: 2 units at €7,700	€15,400
Reusable packaging: approx. 1,000 food containers	€6,900
Total set-up	**€22,300**

Washing trays and drying racks come in addition and depend on the kitchen set-up. Machines can alternatively be leased.

Figure 2 shows how the investment pays back, in two scenarios. Without a tax increase, the investment pays back in around 4.2 years and the savings keep growing by around €5,300 per year. With a tax increase of €0.09 per container, the investment is paid back in less than two years, with an annual saving of €13,600.

For accounting purposes the investment can be depreciated over 5 years, which gives a saving in the profit and loss account from the first month.

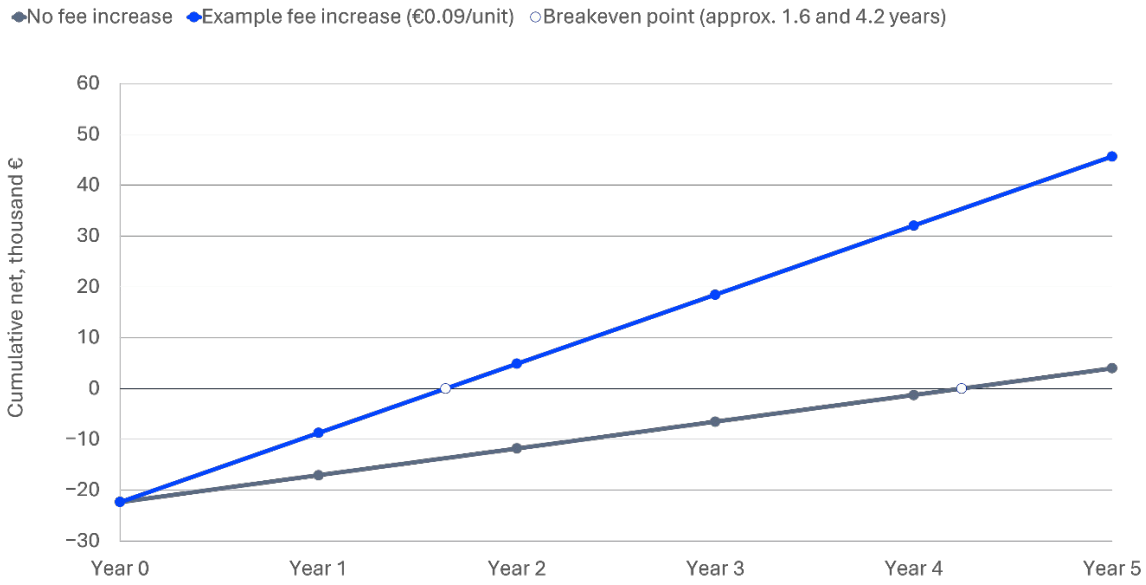

Figure 2 · Accumulated net saving with reuse 2026–2031 when the full set-up cost of €22,300 is included, with and without an example tax increase. The rings mark the points at which the investment is paid back.

The figures are conservative

- **The single-use price is set low.** €0.28 per food container is at the lower end of the market; many organisations pay €0.37–0.46. At €0.46, the annual operating saving grows to around €21,900 already in year 1.
- **The tax risk sits with single-use.** The EU packaging regulation (PPWR) and extended producer responsibility will make single-use packaging more expensive going forward; reuse removes that exposure.

> HOW THE ECONOMICS STACK UP
>
> Reuse can already be cheaper than single-use in daily operation today, depending on volume and the price paid per single-use container. Once the announced tax increases take effect in 2027, even more scenarios will show a positive business case.

The deposit keeps packaging circulating by itself

The reason the system works in practice is that it is very simple and follows a familiar process. The guest does what everyone in Norway already knows how to do: pays a deposit on purchase and gets it back on return. No app, no QR code, no registration and no extra systems at the till.

	Step	How it works
1	Purchase	The deposit is added to the price as a separate line in the canteen's existing till system. No rebuilding, no extra handling at the counter.
2	Use	Food and coffee are served in reusable packaging. Lids make it easy to take away, and reduce food waste and spillage in the canteen area.
3	Return	The guest returns the packaging in the smart collection machine and taps a card or phone. The whole return takes 10 seconds.
4	Circulation	The deposit is refunded automatically. The packaging is washed in the canteen's dishwashing line and put back into circulation.

The canteen already has the washing capacity

The transition does not require a new kitchen. Washing reusable packaging fits into the canteen's existing dishwashing line and takes 15–30 seconds per container on average, based on our surveys. This includes logistics to and from the smart collection machines, washing and the serving area. In return, a large part of the waste handling disappears: in the canteen building that means 2,000 fewer collections per year, equivalent to around 170 working hours previously spent moving rubbish from bin to container.

+ ~20 sec / ~€0.16
WASHING PER CONTAINER

– 2,000 collections / 170 hrs
WASTE COLLECTION PER YEAR SAVED

A high deposit gives a high return rate

The deposit is the engine of the system. In this canteen the deposit was set at €6.90 per food container and the return rate is close to 100 per cent, documented by counting the remaining packaging after three years of operation and by software running throughout. The experience across GRIN's projects is unambiguous: the higher the deposit, the higher the return rate. The average across the GRIN fleet is 96 per cent, well above the threshold of 83–91 per cent where reuse beats single-use on environmental footprint.

> WHY THE DEPOSIT WORKS
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> The deposit is a built-in reward for returning that actually works. No awareness campaigns, no reminders. The economics do the job. Packaging that is not returned leaves unredeemed deposits behind, which fund the replacement packaging.

Measurable impact you can report on

The environmental gain from reuse is not a claim: it can be counted in kilos, collections and CO2, and is logged automatically by the system. For the canteen in this case:

90,000
SINGLE-USE UNITS REPLACED PER YEAR

5.4 tonnes
RESIDUAL WASTE REMOVED PER YEAR

~6 tonnes
CO2e SAVED PER YEAR (LIFE CYCLE ANALYSIS)

The waste disappears, literally

Single-use food packaging is cardboard laminated with plastic. Contaminated with food residue, it cannot in practice be recycled; virtually all such packaging goes to incineration. Reuse removes this entire waste stream: 60 grams per food container, 5.4 tonnes per year in total in this case. The reusable packaging, made of polypropylene, withstands at least 500 washes and is recycled at end of life.

The climate accounts stand up to scrutiny

Based on published life cycle analyses (LCA), each reused food container saves 62–70 grams of CO2e and each cup 32–38 grams compared with single-use, including production of the reusable packaging and washing with the Norwegian electricity mix. For the volumes in this case that gives a net saving of around 6 tonnes of CO2e per year. The sources we have used are independent and peer-reviewed: Varabuntoonvit et al. (2024), Hitt et al. (2023) and Eunomia/Zero Waste Europe (2023).

The climate gain depends on the packaging actually being returned; the threshold for a positive result is an 83% return rate for cups and 91% for food containers. The deposit system delivers well above this: ~100% in the locations included here, and 96% on average across GRIN's projects.

> VALUE IN REPORTING
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> Return rate, volume and waste reduction are logged automatically per return and collected in your dashboard. The figures can be used directly in climate and waste reporting: CSRD/ESRS, Scope 3, Eco-Lighthouse and ISO 14001, and provide visible, documentable environmental measures for employees, guests and the wider public.

How to make the transition from single-use to reuse work

The recommendations below are distilled from several years of operation in this case and from experience in GRIN's other projects, from hospitals and universities to airports, arenas and fast food.

1. **Set the deposit high enough.** The deposit is the single factor that matters most for the return rate. €6.90 in this case has delivered close to 100% return. A low deposit gives low return, and then both the economics and the environmental effect disappear.
2. **Integrate the deposit into the till.** The deposit is entered as a line item in the existing till system. Buying should feel like buying a bottle of soft drink: no app, QR code or registration for the guest. Extra systems also create extra maintenance and service needs and lengthen queues at peak times.
3. **Place the smart collection machines in people's natural flow.** Returning should happen on the route the guest is walking anyway, between the serving area and the exit. We often see returns as people are heading home. Plan the emptying and washing logistics behind the machine at the same time.
4. **Use the dishwashing line you already have.** Size the staffing at 15–30 seconds per container depending on the distance to the machines and the washing/drying set-up. Invest in washing trays and drying racks. Several projects also use drying powder on plastic packaging to reduce drying time.
5. **Prevent wear.** The biggest source of wear in practice is metal cutlery against plastic: offer suitable cutlery, and budget 5–6% annual replacement. Choose packaging colours that are not stained by the food you serve.
6. **Food packaging and cups in happy union.** Food packaging carries the economics; cups lift the environmental effect. There is nothing stopping your project from removing single-use entirely. If you need reusable cutlery, a deposit on this is easy to set up.
7. **Clarify roles and cash flows early.** The building owner, the canteen operator and the technology supplier must know who owns the deposit account, who pays for washing and who captures the saving on single-use purchasing. The gain often lands somewhere other than the cost. Agree the split so that the outcome is win-win.
8. **Measure from day one.** Return rate, volume and waste are logged automatically. Use the figures in sustainability reporting and in your communication: documented impact builds internal support.
9. **Free takeaway?** In this project takeaway was free for the guest. However, many canteens now charge for single-use packaging, and for the economics of reuse it is important that the charge is carried over from the single-use system. Alternatively if the take-away service is entirely new- charging for take-away should be considered as an additional revenue stream.

Typical timeline for a canteen

From signed agreement to full operation normally takes 6–8 weeks when mcollection machine sare available in stock: site survey and sizing, installation and training of canteen staff and/or local partners. The collection machines only requires a power socket: the machines are delivered with built-in 4G and are monitored remotely by GRIN.

Norwegian technology developed for reuse at scale

GRIN supplies deposit-based collection systems for reusable packaging, designed and manufactured in Norway. The Revore machine is plug-and-play, recognises packaging using artificial intelligence and refunds the deposit directly to card or phone. The system is packaging-agnostic: the customer is free to choose packaging and supplier.

150+	3m+	96%
MACHINES INSTALLED IN EUROPE	RETURNS COMPLETED	AVERAGE RETURN RATE

Customers include: SiO, with Norway's largest reuse project for takeaway (17 machines at the University of Oslo, OsloMet and others), Akershus University Hospital, Oslo University Hospital, Avinor (Oslo Airport) and KFC Netherlands (89 restaurants). GRIN has also delivered systems for collecting electronics in Spain, Slovenia and Belgium in partnership with Johnson & Johnson.

Sources

- **Economics:** Joint cost mapping for the canteen by the project partners.
- **Climate:** Varabuntoonvit et al. (2024), Environmental Engineering Research; Hitt, Douglas & Keoleian (2023), Resources, Conservation and Recycling; Eunomia/Zero Waste Europe (2023), Assessing Climate Impact: Reusable Systems vs. Single-use Takeaway Packaging.
- **Return rate:** Counting of remaining packaging in the case after three years of operation; operating data from the GRIN fleet.

The figures apply to the canteen in this case and depend on local organisation, volume and purchase prices. Climate figures are LCA-based estimates with ranges. Get in touch for an impact calculation based on your own volumes. Amounts are converted from NOK at an exchange rate of 10.8 NOK/EUR.

Exploring reuse in your operations?

Get in touch to learn more about our smart collection systems and technology.

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See the machines in use.
Find film of the machines at YouTube.com/@grin-main