

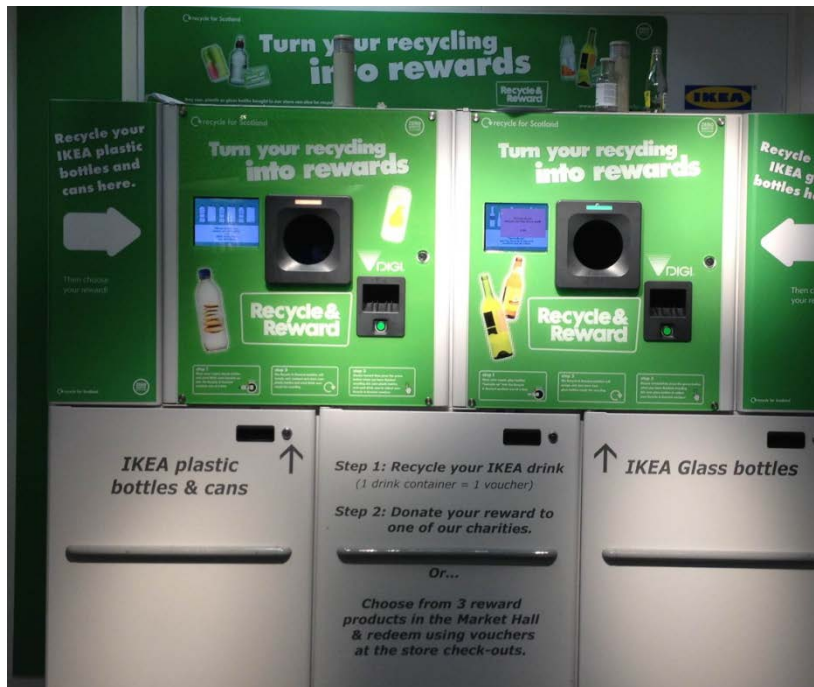
Report



Spring 2015

Recycle and Reward Pilot Project Report

IKEA Edinburgh and
Glasgow



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Zero Waste Scotland works with businesses, individuals, communities and local authorities to help them reduce waste, recycle more and use resources sustainably.

Find out more at zerowastescotland.org.uk

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Zero Waste Scotland would like to extend their thanks to IKEA for hosting a pilot and to IKEA and Reverse Vending Corporation and for all their assistance with the monitoring and reporting process.

1 Executive summary

Zero Waste Scotland supported a number of Recycle and Reward pilot projects in 2013. Each site has a separate report on its performance, and an overview report is also available.

Recycle and Reward machines were installed at the IKEA stores in Edinburgh and Glasgow, at the former in the restaurant area and at the latter in the exit area. The machines provided vouchers for use against the cost of new items bought in store, or they also allowed a donation to a charity, hence providing an incentive to recycle. Halfway through the pilot, Edinburgh introduced enhanced incentives. A wide range of communications were employed to raise customer awareness.

In terms of the scheme's headline performance:

- The capture rate in the Recycle and Reward machines (of the relevant container sales during the pilot) was 3.7% at Edinburgh (up to 26 May) and 6.6% in Glasgow (across the whole pilot). During July and August the capture rate at Edinburgh was probably in excess of 6%, although consistent sales data were not available. Weekly return rates peaked at over 20% in both stores, but as the overall figures show, this was not sustained.
- Only 0.23% of all store customers used the machines in Edinburgh and 0.07% in Glasgow (although the data exclude possible repeat visits and/or repeat machine use). This is somewhat deceptive, as the true target audience was limited to those purchasing the targeted product lines; the capture rate above is likely to give a more realistic impression of take-up in this regard.
- Fewer than one fifth of customers in IKEA Edinburgh and fewer than one tenth of customers in IKEA Glasgow were aware of the Recycle and Reward machines despite the prominent position of the branded machines and extensive promotion.
- The waste data indicate that there was an overall increase in recycling in Glasgow and a diversion of recycling from the recycling stations and the customer trays (recycled from the kitchen 'dish' area) in the restaurant area in Edinburgh (an estimated snapshot only).
- Despite low levels of use, the schemes were popular with customers (both users and non-users).
- The scheme provided a valuable learning environment for the Recycle and Reward pilots, as it was the only large retail environment to be included, and the scheme was the winner of a Scottish Gold Green Apple Award.

The context and design of the IKEA scheme are somewhat different to the other pilot sites, and these factors both influenced performance and provide some wider insight into scheme design. In particular:

- The number of containers realistically available for collection may be lower than the sales data alone suggests (in many other sites the reverse is true). Only restaurant sales were certain to be consumed (and therefore disposed of) on site. In practice the majority of glass bottle sales were from the Swedish Food Market while the majority of plastic bottle and can sales were from the vending machines. The former will almost all be consumed off site, while the latter may or may not be taken off site.
 - In common with other pilot sites, once containers were taken away, we believe they were seldom returned to the machines. This is likely to be a feature of most "open" sites, but it is particularly relevant at IKEA, where many items are not being consumed on site, and where the frequency of return visits may be relatively low (compared to other food retail environments).
 - Materials from other sources could not be returned to IKEA (unlike some other pilot sites, which did accept externally purchased items). This was a deliberate decision to prevent a net import of empty containers (few customers will bring targeted items onto the site as products), but it will also have limited the level of take back seen.
-

More specific factors impacting performance included:

- The location of the machine at Glasgow was by the exit, rather than in the restaurant area (as at Edinburgh). For restaurant customers to carry a container to the machines would have required a high degree of familiarity with the scheme.
- Customers at Edinburgh were still able to use the existing restaurant recycling points for plastic bottles at the start of the pilot (a deliberate decision, to explore whether material was additional), though later these were covered to further explore customer reactions. Some customers may have also been aware that staff also recycled materials left on the trays, hence reducing the need for customers to recycle.
- While the machines were generally reliable, and quickly fixed if not working, the rejection of containers was an issue (specifically at the start of the pilot as new product lines were logged). This did frustrate customers and lead to some “giving up”.

Other key observations around the scheme include:

- The majority of customers thought that the initial type of reward and the size of the reward offered (10p to be redeemed against any future purchase in store) was appropriate, although voucher redemption rates were in fact low at both sites, which somewhat contradicts this survey response.
- Higher levels of incentive (vouchers being redeemable against sustainable IKEA products such as a light-emitting diode – LED – light bulb), once introduced at Edinburgh, may have been part of the reason for increased machine use (alongside improvements to the communications). There was certainly a clear decrease in the proportion of people making a donation to charity rather than selecting a voucher, from around 46% before the enhanced incentive to around 27% afterwards.
- Staff in Edinburgh noted that the machines tended to be more commonly used by younger people and that they were very popular with young children, who were often fascinated by the machines.
- The main benefits of the Recycle and Reward scheme identified by survey respondents were its being better for the environment, the reward offered to customers, and a reduction in litter. There was a difference in the perceived benefits identified by customers of the two stores, with a higher proportion of customers in Edinburgh identifying environmental improvement as the main benefit.
- Neither site is one in which litter would be expected to be a significant issue. No changes to the litter levels in the IKEA Edinburgh store were reported during the staff interviews. However, when asked what the benefits of this type of scheme might be, 15% of customers from IKEA Glasgow and 6% of customers from IKEA Edinburgh perceived (unprompted) that there would be a reduction in litter.
- The vast majority of customers in both stores, 94% in IKEA Edinburgh and 91% in IKEA Glasgow, were clear they would like the Recycle and Reward scheme to continue, despite the fact that few had used them. Some 52% of customers in IKEA Edinburgh and 57% of customers in IKEA Glasgow were also keen to see similar schemes become more widespread across Scotland.

While acknowledging that machine use had been lower than anticipated, the majority of staff also felt that the scheme had been worthwhile and that IKEA should continue with it. Staff in Edinburgh noted that the scheme demonstrated IKEA's commitment to sustainability, was good for IKEA's corporate image, and helped to raise awareness and inform the IKEA customers. They also felt the scheme required little staff involvement, was easy to administer and manage, and also saved staff time by reducing the amount of time needed to sort recyclates in store.

Staff at IKEA Edinburgh also identified a number of challenges. In particular, the Edinburgh store had relatively good recycling provision before the pilot, including for the targeted materials. Given this, some staff perceived that the scheme added unnecessary complexity. In terms of practical delivery

the machines were perceived by staff to be quite big, and thus filled shop space. Finally, fitting IKEA and Recycle and Reward branding and promotion schedules together was not always straightforward, and it could be argued that the demands for consumer attention in a serious retail environment may make it harder to promote a standalone scheme of this nature. Nonetheless, IKEA would have liked to have advertised the scheme externally more widely to their customers.

Generally, despite the fact IKEA superstores may look like large retail environments, the volume of material available at IKEA was less than at some other sites, and this, combined with quite different patterns of use, may account for the relatively low capture rate seen. Nonetheless, both staff and customers were enthusiastic about the concept. Both sites continued with the scheme for a short period after the pilot, but Edinburgh discontinued theirs, and at the time of writing we await a scheme update from Glasgow. From a pilot point of view however, the learning from the IKEA sites and contexts is extremely useful. Additionally it is worth noting that IKEA now have a national scheme for mechanised take back of light bulbs and batteries, which uses charity donations as an incentive for customers.

2 Pilot description

This section describes the pilot sites at IKEA Edinburgh and Glasgow, and the population targeted by the pilot. It then considers waste management systems in place before and during the pilot period, and then the detail of the Recycle and Reward scheme put in place, including sections on the communications. A final section describes any changes to the above introduced during the pilot period.

2.1 Background and context

IKEA is a well-known retail furniture store with outlets throughout the UK and Europe. The stores also provide restaurant facilities and food and drink sales services. Two stores were involved in this pilot project, namely Edinburgh and Glasgow. IKEA Edinburgh is located to the south of the city, close to Straiton Retail Park. IKEA Glasgow is located to the west of the city. Both stores are open seven days a week, with the restaurants opening at 09:00 to serve breakfast, before the stores open for sales. The stores close at 21:00 Monday to Friday and 19:00 on Saturday and Sunday. An ethical approach to business is a key element of the brand identity IKEA seeks to project.

Edinburgh is a franchise operation while Glasgow is directly IKEA owned. The two stores had differing recycling provision before the pilot. Edinburgh had close to 100% recycling (on the customer side) before the pilot, while Glasgow had no customer recycling at all. The idea of using reverse vending technology was perceived to fit well with IKEA's aim of increasing recycling rates and reducing waste (IKEA's ideal aim is zero waste production), as well as communicating this commitment to customers.

The target beverage containers for the Recycle and Reward pilot were those purchased only from IKEA outlets, including the restaurant and café, the Swedish Food Market shop, the bistro and the drinks vending machines located at the entrance and exit foyer. The Swedish Food Market sells Swedish speciality food including various soft fruit drinks, condiments and alcohol in bottles and cans, the restaurant sells drinks (mainly in bottles) and the drinks vending machines sell standard items such as Coke, Oasis etc. It should be noted that the IKEA bistro is essentially the takeaway counter at each store near the exit, and drinks are mainly dispensed in paper cups.



Figure 1 Restaurant offering of bottled and canned drinks; relevant Swedish Food Market products

2.2 Waste management arrangements before the pilot

In Edinburgh the customer-facing waste management system before the pilot consisted of recycling facilities for glass and plastic bottles and paper/card within the restaurant area, including:

- three recycling stations in the restaurant/café, where trays are returned by customers (placed on mobile racking) and plastic bottles, paper and card can be collected for recycling or as residual

waste (these recycling stations had relevant environmental displays around them to encourage 'green' behaviour); and

- customer trays, whereby staff separate recyclables in the kitchen 'dish' (pot wash) area, glass and plastic bottles being separated and placed in small containers in the kitchen.

Elsewhere in the store (inside and outside) there are litter bins. There is no subsequent separation into recyclables and residual waste and so this waste is taken for landfill.

Observations and discussions with staff indicated that the majority of recyclables are from the restaurant/café area and these are transferred to two 1,100-litre skips in the yard, one for glass and the other for plastic. Staff are also encouraged to recycle materials in bins in the staff restaurant/canteen, which is in a separate building from the customer restaurant. A contract waste company uplifts the glass and plastic bottle skips as and when required. See Figure 2a.

In the Glasgow store, the waste management system for the area under investigation consists of separation of glass only within the restaurant (in the kitchen dish area). There is, however, no recycling of any waste from the restaurant; all waste goes to landfill by daily Glasgow City Council uplifts. There is, however, a customer recycling point for cans, plastic and glass bottles at the returns area of the exit foyer, which is most likely to be used by customers of the drinks vending machines which are located in the vicinity.

Recycling from this exit foyer station, and from the staff restaurant/canteen, which has some recycling bins, is removed occasionally (the rate is thought to be low) to a single recyclables skip in the yard, which is removed approximately quarterly during the year. Easily separated materials from the main store waste bins (mainly paper and card) are also sometimes included in this skip. All other bins inside and outside the store are taken for residual waste disposal. See Figure 2b.

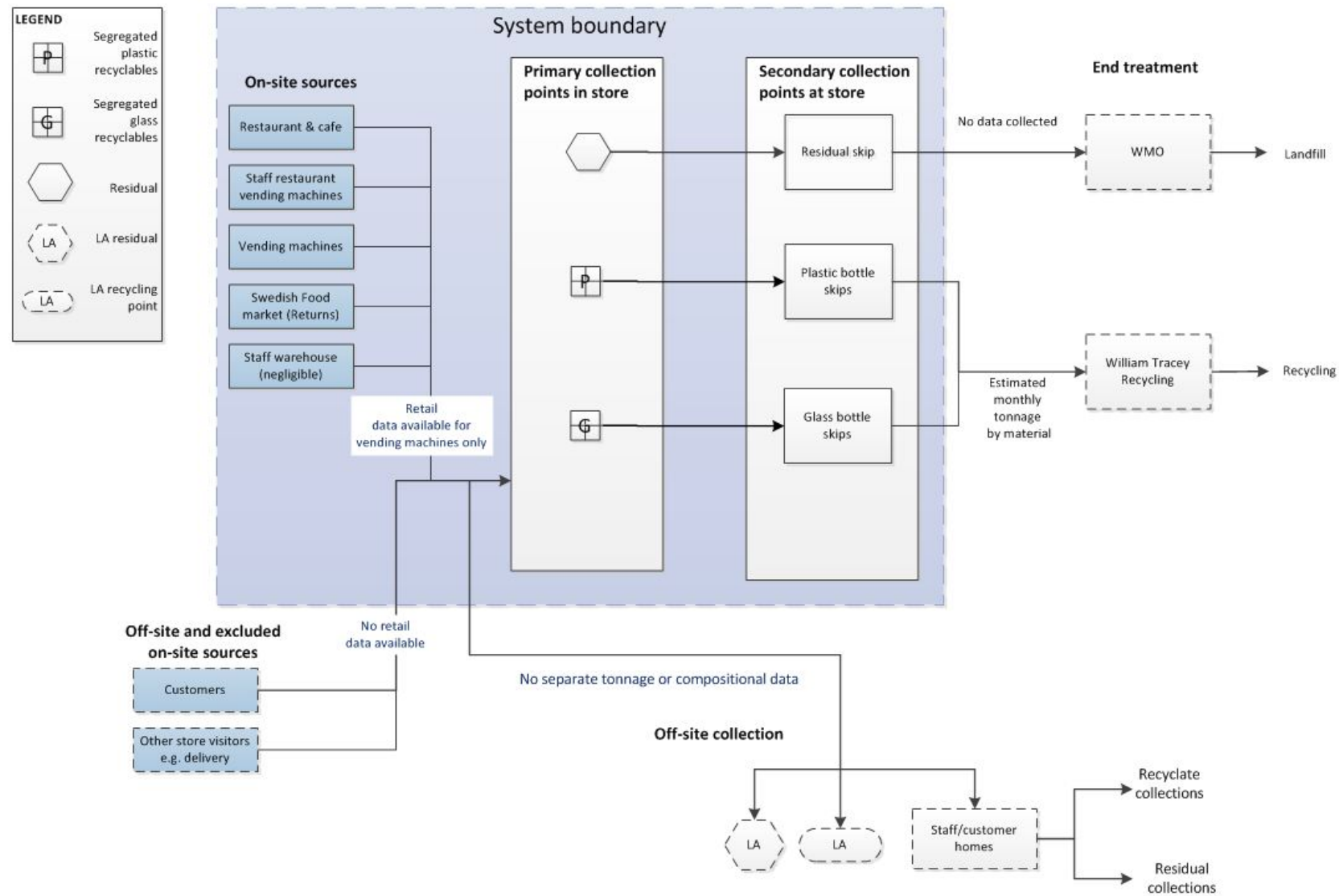


Figure 2a Edinburgh system flowchart before pilot period

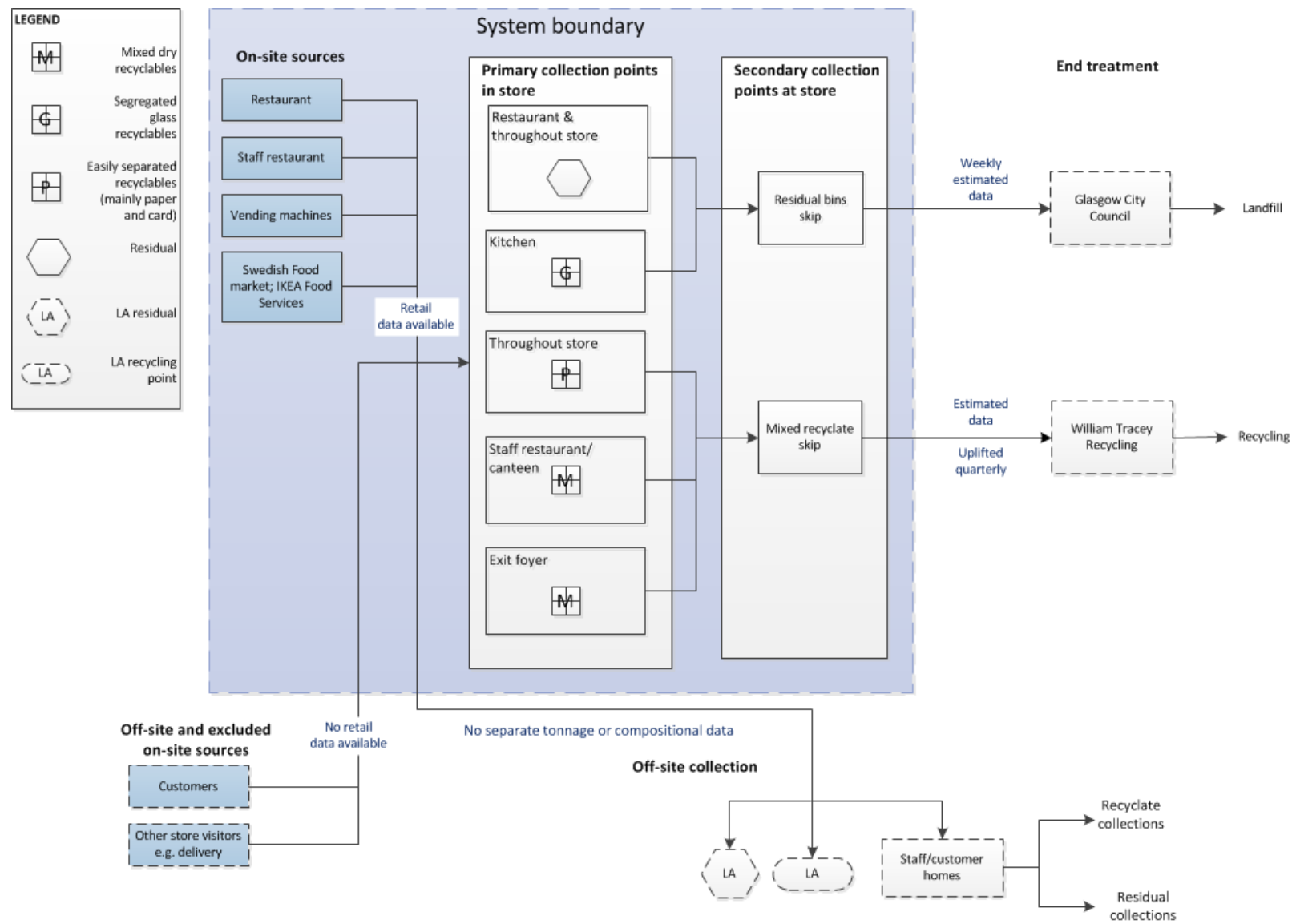


Figure 2b Glasgow system flowchart before pilot period

2.3 Target population

Only drinks containers sold in the IKEA stores could be recycled through the Recycle and Reward machines, so the audience is those visiting the store *and* buying food and drinks in these outlets. Before the pilots started, the Zero Waste Scotland communications plans identified the primary target audiences as families and other customers with children.

Daily visitor numbers were provided for part of the project period, as shown in Table 1, with around 140,000 to 210,000 visitors per month and hence around 4,700 to 7,000 per day. Staff at Edinburgh noted that on average ~80% of store customers are estimated to visit the restaurant and café. However, not all drinks in the restaurant use containers that are part of the scheme (e.g. tea, coffee, dispensed soft drinks etc.), and indeed these items are arguably a minority of purchases, so the practical audience will be significantly smaller and the scheme potential is probably best represented by the sales data of targeted containers.

Month	Edinburgh	Glasgow
January	150,743	178,001
February	144,954	147,895
March	147,100	168,807
April	156,819	194,037
May	151,400 (estimated)	160,233
June		146,379
July		183,539
August		201,265
September		211,343

Table 1 Monthly store visitors, 2013

2.4 Recycle and Reward approach

At each store, two Digi 112 series machines were supplied and installed by the Reverse Vending Corporation; one accepted glass bottles and the other accepted polyethylene terephthalate (PET) plastic bottles and aluminium cans. Containers were identified by the machines from their bar code, shape and weight. Only items purchased from the Swedish Food Market, restaurant and drinks vending machines in the exit/entrance foyers of the stores could be returned to the machines. Items without an IKEA barcode, or where the barcode could not be read by the machine, were rejected. Plastic and aluminium containers were compacted by the machine, whereas glass bottles were kept intact (to allow later segregation by colour).

The machines were installed in:

- Edinburgh in the week of 31 January 2013 and operational from 4 February (although the scheme was launched on 21 February); and
- Glasgow in the week of 31 January 2013 and operational from 23 February.

Machines were placed alongside each other, so in practice customers at each store would have seen one recycling unit. The Edinburgh machines were located on the first floor of the building in the restaurant/café area and in a prominent position (Figure 3a). This was clearly most convenient for collecting containers sold in the restaurant/café and less convenient for customers wishing to return containers purchased from the vending machines at the exit and entry to the store. Empty containers from purchases made at the Swedish Food Market on previous occasions would need to be brought back to the store and taken to the restaurant to make a deposit in the machine.

In Glasgow the Recycle and Reward machines were located in the exit foyer near to the Swedish Food Market and drinks vending machine (Figure 3b). The location of these machines made them most convenient to customers bringing returns from previous purchases at the Swedish Food Market and for users of the drinks vending machine where they had consumed drinks on site. There are often contract staff working in this area, for example, who will make use of the drinks vending machines.



Figure 3a Edinburgh machine installed in the restaurant (left at installation, right while in operation)

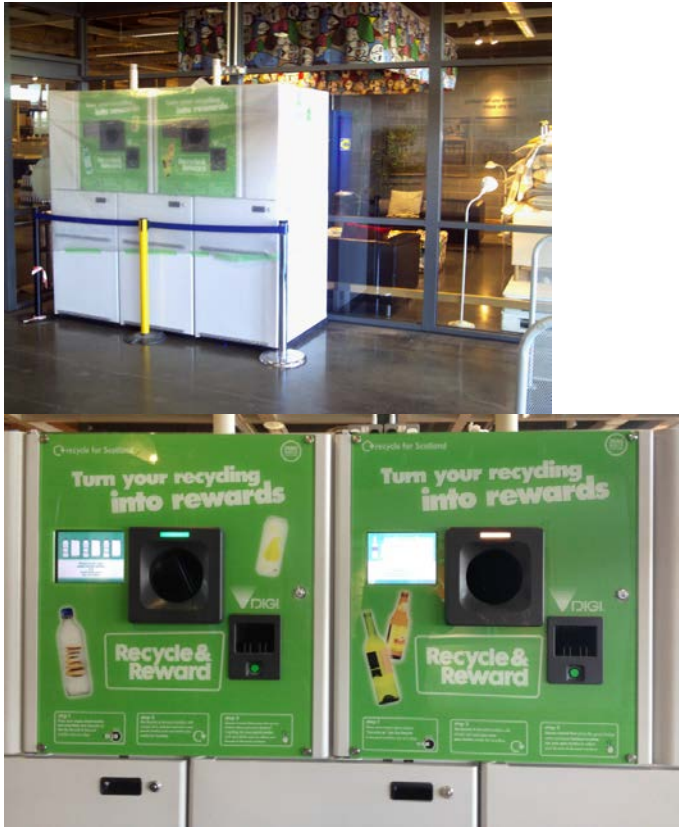


Figure 3b Glasgow machine installed in exit foyer (above at installation, below while in operation)

In Edinburgh, customers could select from one of the following three rewards for each item recycled in the machines:

- a 10p voucher redeemable against any purchases in store;
- a 10p charitable donation to WWF, Save the Children, the Woodland Trust or Unicef; or
- (only after 23 July) vouchers (multiples of the same 10p vouchers were used) to redeem any of the following sustainable products: torch (two vouchers), recycling bin (four vouchers) or LED light bulb (six vouchers).

In Glasgow, customers could select from one of the following two rewards for each item recycled:

- a 10p voucher redeemable against any purchases in store; or
- a 10p donation to one of the following charities: WWF, Save the Children, the Woodland Trust or Unicef.

The flow of materials during the pilot is as shown in Figures 4a and b.

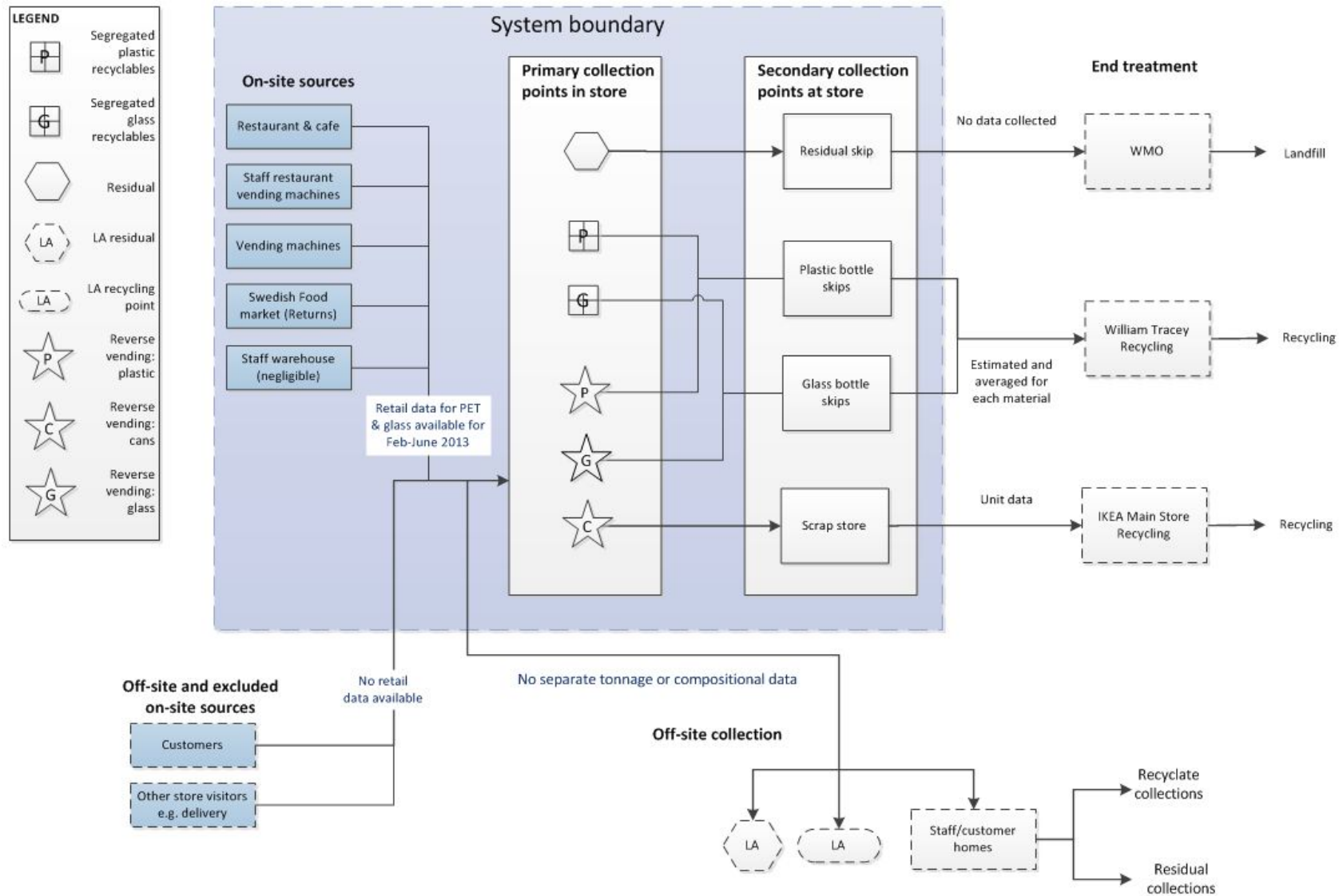


Figure 4a Edinburgh system flowchart after start of pilot period

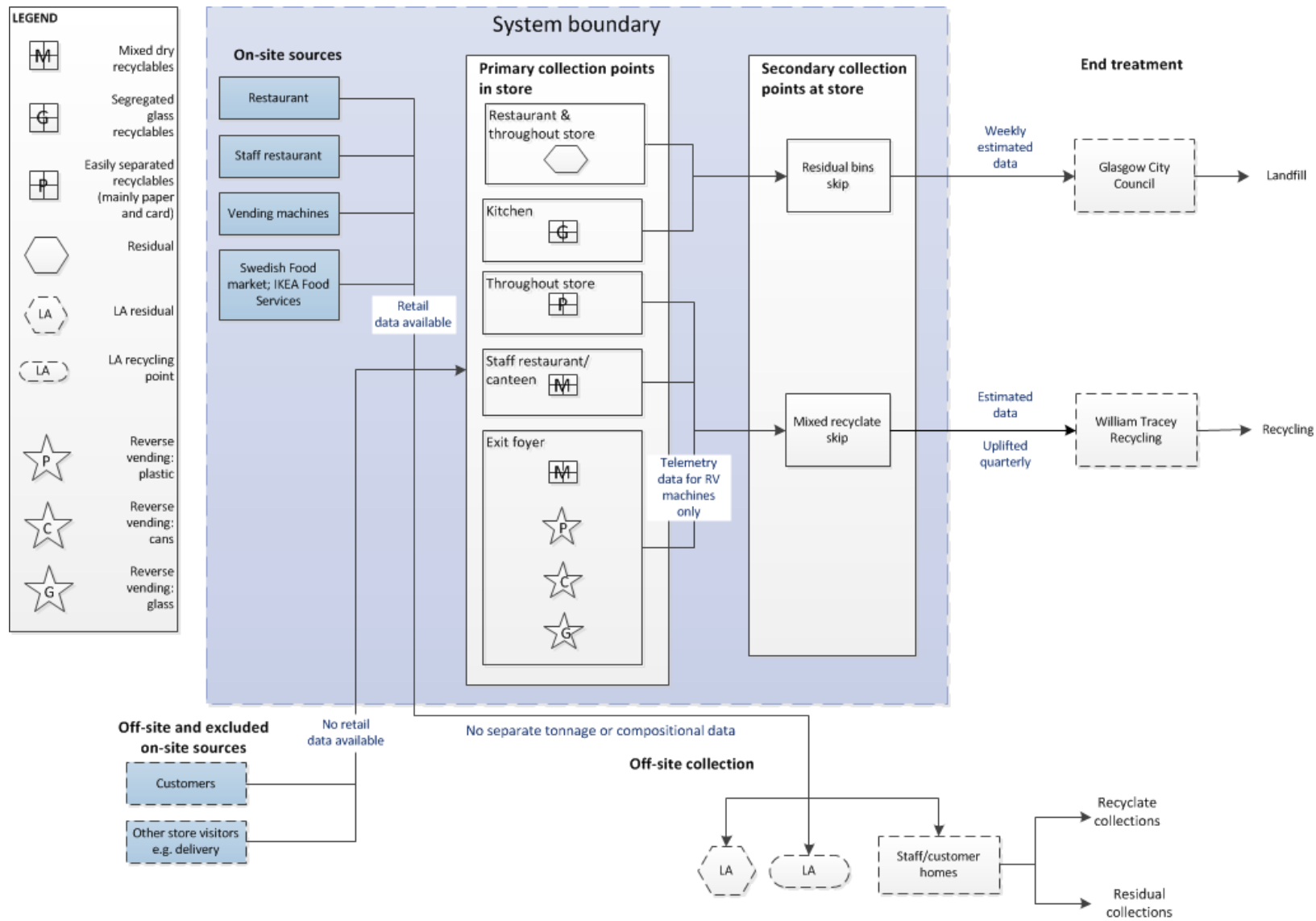


Figure 4b Glasgow system flowchart after start of pilot period

2.5 Promoting the scheme

Detailed communications plans were developed with Zero Waste Scotland and implemented by staff at the two IKEA stores to support the promotion of the Recycle and Reward schemes. As well as the branded machines, the following communication activities were undertaken to promote the schemes.

2.5.1 *IKEA Edinburgh communications*

Zero Waste Scotland provided communications support and resources to help IKEA Edinburgh develop a communications plan and timetable of activities for the pilot project. The plan was approved by Zero Waste Scotland, as were all graphics, materials and supporting text.

The purpose of the communications plan was:

- to raise awareness of the machine at IKEA Edinburgh and within the local community;
- to let customers know which materials they can recycle with IKEA;
- to encourage people to make the behavioural shift to recycling in their everyday lives;
- to update the target audience on the progress of the machine; and
- to relaunch the pilot at points throughout the year.

The plan was tied in with IKEA messaging about 'you do your bit and we'll do ours', People and Planet Positive messaging, and products to help customers live a more sustainable life at home.

2.5.1.1 **Public relations/launch**

The launch of the project was held on 21 February 2013 with a photocall and attendance by Richard Lochhead, Cabinet Secretary for the Environment and Rural Affairs, and Iain Gulland, Director of Zero Waste Scotland. The launch was featured in national and local newspapers and trade magazines and was posted on the Scottish Government and Zero Waste Scotland websites. Zero Waste Scotland produced a media briefing and Zero Waste Scotland volunteers were present to demonstrate how to use the Recycle and Reward machine and benefits of recycling waste materials.

2.5.1.2 **Communication materials**

Throughout the duration of the project, promotional signage was placed in prominent positions and in 'hot spots' in the store and restaurant (plasma screens, banners, vinyl graphics). Directional signage was placed at the Recycle and Reward machine and in the restaurant to direct customers to it. Zero Waste Scotland volunteers and IKEA co-workers undertook face-to-face verbal communication during the launch event and during weekend attendance early in the scheme to demonstrate the machine. Online communications through Facebook and the IKEA store web page contributed to ongoing communications with co-workers and the general public.

The following communication materials were used to engage with customers during the project:

- weather masters;
 - billboards;
 - meet/greet spoken communication;
 - 50cm- and 25cm-wide banners;
 - rack labels for adult/kids drinks in the restaurant, bistro and Swedish shop;
 - table talkers in the restaurant;
 - plasma screens;
 - instructional vinyl for Recycle and Reward machine;
 - wall graphic behind machine;
 - sustainability shop graphics;
 - tray stations in restaurant;
-

- coffee table communication in the bistro;
- vending machine signage;
- A3 and A4 posters;
- IKEA Family emails;
- newsletter competition;
- Facebook messages/photos, press articles; and
- contact with local schools/community groups to share information and promote the message.

The following communication materials were used to engage with co-workers during the project:

- Facebook statuses/photos;
- Yammer statuses/photos;
- message in Billy's Blog;
- information in sustainability corridor;
- plasma screens in co-worker areas;
- speaker at store morning meeting;
- signage at waste storage areas; and
- verbal updates, information and updates, IKEA inside article.

2.5.2 *IKEA Glasgow communications*

Zero Waste Scotland provided communications support and resources to help IKEA Glasgow develop a communications plan and timetable of activities for the pilot project. The plan was approved by Zero Waste Scotland, as were all graphics, materials and supporting text.

The main purpose of the communications plan was to target customers in the store, and 'Family' customers, who receive monthly emails. An initial email sent to customers before the launch was a mini-guide describing what the scheme does, how it works, where the waste goes, what materials the Recycle and Reward machine accepts etc. At IKEA Glasgow they used many different communication channels, including a 'green thread' throughout the store from the main entrance with posters, and external weather masters also having posters placed in them. The intention was for the green thread to be used as a directional tool to the machine.

2.5.2.1 Stakeholder engagement/training

Training by the equipment supplier was provided to key staff for co-workers, during the week of equipment installation in January 2013.

2.5.2.2 Face-to-face communications

Zero Waste Scotland volunteers attended the launch event to demonstrate to customers and co-workers how to use the Recycle and Reward machine and demonstrate the benefits of recycling waste materials.

The following communication materials were used in the three weeks before the launch on 25 February, on the launch day itself and over the next six weeks following the launch:

- weather masters at the entrance to the store;
- banners in the restaurant;
- rack labels in the restaurant, café and Swedish Market;
- table talkers in the restaurant;
- leaflet attached to receipt in the Swedish shop;
- A4 posters in the customer toilets; and
- website presence and ongoing emails to customers.

The rack labels and website presence were in place throughout the duration of the project.

During a review meeting on 24 May with the IKEA project team, a range of further communication materials and actions were identified that could increase awareness and engagement of customers in the project. These were implemented in Edinburgh, but not in Glasgow.

2.6 Changes during the pilot period

During a review meeting on 24 May with the IKEA project teams from both stores, a range of further communication materials and actions were agreed to be put in place, to increase awareness and engagement of customers in the project.

The new communications materials accompanied new incentives on offer (i.e. the vouchers being exchangeable for 'sustainable' IKEA products), which were available from 23 July 2013. The following changes were made at IKEA Edinburgh:

- Hanging signage was located between the restaurant and café and above the restaurant till.
- Recycling station signage emphasised that customers can donate the reward to charity or collect a number of vouchers for bigger incentives, as well as redeem individual vouchers of 10p against any purchase. The relevant receptacles at the recycling stations were sealed, to encourage use of the Recycle and Reward machine, though this may not have been consistent throughout the pilot period.
- New text on the machine voucher described the new green products available as part of the rewards, the number of drinks containers required to be recycled for each product, and how to collect the item.
- Additional machine signage and additional wording increased clarity about how to use the machine and where to place items for recycling.
- The wall to the left of the machine contained a clear message about the new incentives.
- New signage in store next to new green products and incentives promoted the scheme.
- New green products and incentives were moved to the restaurant and displayed with promotional signage.

Edinburgh's performance in the pilot did appear to improve after changes were implemented.

Recycle and Reward communications were delivered in a busy retail environment, which also included commercial promotions. This is clearly a space where customer attention is at a premium, compared to some other pilot sites. It may be the case that the target audience frequents IKEA less often than some other pilot sites (for example universities will have the same students visiting the same places almost every day). Zero waste Scotland believe these factors make the communications challenge for a standalone scheme in the context of IKEA quite significant.

3 Study method

The appendix gives greater detail on the method selected and the reasons for this. This section focuses on how it was applied in these specific locations, first describing the approach to data collection on performance, and then the approach taken to the social research (obtaining user, non-user and staff feedback at the site). A final section considers challenges encountered in practice, and the extent to which this affects the conclusions that can be drawn about pilot performance.

3.1 Performance data collection

3.1.1 *Machine throughput*

Telemetry data from the Recycle and Reward machines (accessed through the dedicated data website) provided the number of customers/transactions, the quantities of materials collected, the number and value of vouchers issued and charity donations made (Figure 5).

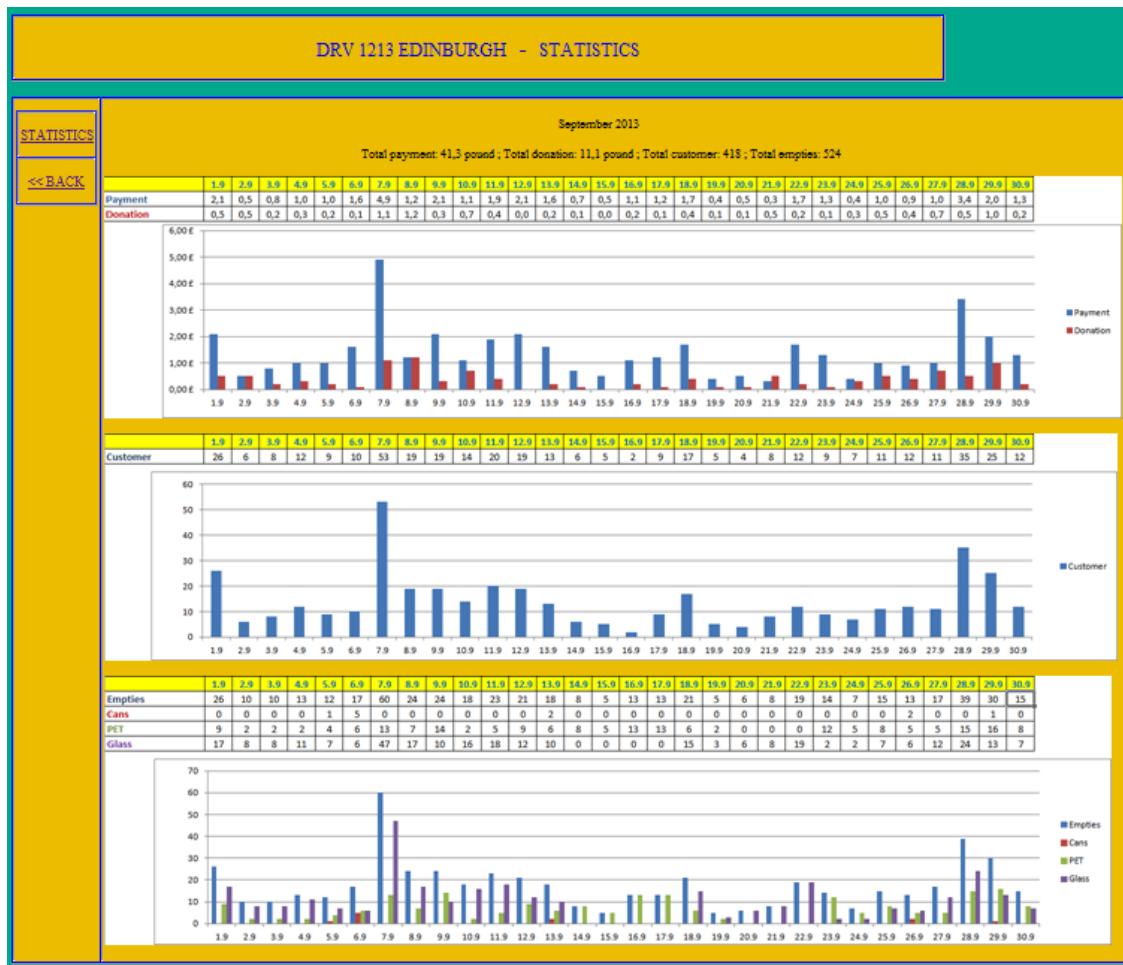


Figure 5 Example telemetry data from the Recycle and Reward machines

3.1.2 Waste and recycling data

Very few reliable pre-pilot (baseline) data were available from IKEA or its waste contractors in relation to waste recycling or residual waste quantities at either store. Consequently, SKM staff made a number of visits (three in January and February) to the stores to try and obtain an indicative measure of recycling levels before the pilot commenced.

At the Edinburgh store, visits were undertaken to assess the quantity of plastic bottles being collected in the restaurant recycling stations, the glass and plastic going through the 'dish' (pot wash) area of the kitchen, and the recyclables in litter bins throughout the store and car park. Although a spring balance was used to weigh some of this material, these data gave only a very rough 'snapshot' of existing recycling activity. The recycling stations were found to be generally contaminated, presumably as a result of members of the public incorrectly placing items in these facilities, and hence were often not suitable for recycling with other recyclable materials. All visits were in the afternoon and were snapshot observations with estimates of any previous disposal of items during the day. The visit on 3 February was at the weekend, with significantly higher visitor numbers.

The measurements from the dish area were compared with observations taken at the recycling skips in the waste yard. Using estimations of fullness/volume, average uplift rate and WRAP (Waste & Resources Action Programme) density data (Material Bulk Densities Summary Report, WRAP, January 2010), further approximate weight data were derived as shown in Table 2. The two approaches to data estimation show good agreement and hence a reasonable basis for comparison with the in-pilot data provided by IKEA from its waste contractor.

Bottles	From kitchen 'dish' area	From skip observations
Glass	17.0	17.1
Plastic	2.9	3.1

Table 2 Edinburgh: estimated weight of recyclables collected before pilot (kg/day)

The residual waste would certainly contain some recyclables from the store and car park waste/bins that were not removed by staff and placed in the glass and plastic skips; however, these quantities are thought to be negligible compared with the overall residual waste quantities. The glass and plastic waste skips in the yard at Edinburgh were also inspected, but it was established that these skips were removed only occasionally and when the bins were regarded as being full or almost full. During the pilot, some weights of the recyclables uplifted were made available, although only for a proportion of the pilot period. One visit was made in May to allow further weighing and observation of the materials in the other recycling facilities at the Edinburgh store, to allow comparison with the January/February observations.

At the Glasgow store, residual waste data were available as a monthly average before the pilot, and as more accurate weekly data during the pilot. IKEA reported approximately 160 x 240-litre bins per month of residual waste. Any recyclable materials generated in the restaurant and store waste bins are generally disposed of through this route. Using WRAP density data, this suggests that around 1.48 tonnes of residual waste was generated per week before the pilot at the Glasgow store.

The PET bottles and cans from the staff canteen/dish area and the one customer recycling station are taken to the store recycle container. From the observations and measurements taken on the one store visit on 6 February 2013 (i.e. before the pilot commenced), the following data were collected:

- staff canteen recycling – 1.26kg PET, 0.34kg cans;
- canteen dish area – zero;
- customer recycling station at returns area – zero;
- restaurant bins – two items observed;
- entrance/exit litter bins – three items observed; and
- car park bins – zero.

The visit was in the afternoon and was a snapshot including an estimate of any previous disposal of items during the day.

No further visual inspections were made during the pilot period. The material collected through the machines, as a total added to the small amount of material already being collected from the staff canteen and one customer recycling station, was weighed on removal by the waste contractor and data provided to SKM.

3.1.3 Retail and rewards data

Weekly sales data for relevant items sold in the restaurant and the Swedish Food Market, and voucher redemption figures, were provided by the sustainability staff at both sites every few weeks during the pilot. Data for store sales have been provided for PET and glass bottles only. Can sales are a very small proportion of overall sales. Vending machine sales were available for 2012 and part of 2013 and were for total units only. Observations of the vending machines show that they sell mostly PET bottles with a small proportion of cans and glass, although this will vary in time as the vending machines are provided and replenished by Britvic. Some machines are dedicated to water and are 100% PET sales.

3.2 Social research – survey, interviews and observations

The original mix of qualitative and quantitative methods planned to appraise the customer and staff attitudes, behaviour and experience of using the Recycle and Reward machines at IKEA Edinburgh and Glasgow stores were reviewed and discussed with Zero Waste Scotland midway through the pilot period. Because use was relatively low, Zero Waste Scotland decided it would not be cost-effective to gather large amounts of quantitative data. It was agreed that the survey target would be reduced from 500 surveys (250 in each store) to surveying over one day in each store and that in-depth interviews would be carried out only at IKEA Edinburgh.

The final sampling methodology approved by Zero Waste Scotland was:

- observational analysis – two days; one day in each store, on Saturday 14 September 2013 in Glasgow and Sunday 15 September 2013 in Edinburgh;
- quantitative face-to-face surveys – two days; one day in each store, on Saturday 14 in Glasgow and Sunday 15 September 2013 in Edinburgh; and
- in-depth interviews with staff in IKEA Edinburgh (six in total carried out on 22 and 29 October 2013).

To try to maximise data capture from the limited number of days allocated to both the observations and quantitative surveys, it was agreed that both of these would take place at weekends during September and between 09:30 and 17:30. The busiest times in the restaurant were breakfast and lunchtimes, so both of these were included in the sampling period. As the primary target audiences had been identified as families with children, weekend sampling during normal daily shopping hours, and not during school holiday periods, was selected as the most appropriate timing.

3.2.1 Observational analysis

The observational analysis was carried out at the Recycle and Reward machines at both sites. Only a small number of people were observed using the machines during the observation period. Eight people were observed using the Recycle and Reward machines at IKEA Edinburgh and five people were observed using the Recycle and Reward machines at IKEA Glasgow, as summarised in Table 3. This activity therefore provides some qualitative insight into user activity and behaviour, but is not suitable for quantitative analysis.

Users	Edinburgh	Glasgow
Male	2	4
Female	6	1
Total	8	5

Table 3 Profile of observational analysis sample at IKEA Edinburgh and Glasgow

During the observational analysis in IKEA Glasgow, five transactions were observed: three by individual users, one by a group of two adults and one by a parent with one child. Four of the five who actually used the machines were male. During the observational analysis in IKEA Edinburgh, eight transactions were observed: four by individual users, two by groups of two adults and two by parents with children. Six of the users were female and two were male.

This also has to be put into the context of customers at the stores, who number around 4,700 to 7,000 per day; hence the proportion of machine users observed was less than 0.15% of customers overall.

3.2.2 Quantitative surveys

In the Edinburgh store the surveyors interviewed people in and around the restaurant area where the machine was located. Participants were approached at random and invited to take part. In the Glasgow store the surveyors interviewed people in the returns area where the machine was located. Participants were approached at random and invited to take part. A total of 33 surveys were completed at IKEA Edinburgh and 46 at IKEA Glasgow, as detailed in Table 4.

Age	IKEA Edinburgh			IKEA Glasgow		
	Male	Female	Total	Male	Female	Total
18–29	1	6	7	7	5	12
30–44	4	7	11	7	9	16
45–59	3	4	7	6	8	14
60+	2	1	3	0	2	2
Not given	2	3	5	1	1	2
Total	12	21	33	21	25	46

Table 4 Age and gender profile of survey participants

The overall user profile of the surveyed population is summarised in Table 5.

Participants	IKEA Edinburgh		IKEA Glasgow	
	Number	%	Number	%
Users	0	0	1	2
Non-users	33	100	45	98
Total surveyed	33	100	46	100

Table 5 User vs non-user profile of survey participants

3.2.3 In-depth interviews

Seven in-depth interviews were conducted with staff at the IKEA Edinburgh store, each lasting approximately 45 minutes.

The following people were interviewed:

- department manager;
- marketing specialist;
- sustainability and environment specialist;
- two graphic communications specialists;
- catering supervisor; and
- advanced co-worker.

3.2.4 *Challenges encountered during the fieldwork*

3.2.4.1 **Social research**

Because rates of machine use at IKEA were relatively low, the sample size for the survey work and the observational work was very small. This information therefore adds only qualitative insight rather than quantitative results.

3.2.4.2 **Staff recycling**

Staff were asked not to use the machines unless they had made a personal purchase for their own consumption. It was established, however, that staff at Edinburgh and Glasgow were collecting customer-purchased containers that had been left on trays etc. and returning them to the machines, often many at a time. It should be noted that this was not for personal gain, as staff could not redeem vouchers, and rewards from this source were all donated to charity. However, this did skew pilot performance early on in the Glasgow store in particular; after the midpoint staff reminded not to use the machine in this way, to give a clearer data picture.

3.2.4.3 **Sales data**

Only partial pre-pilot sales data were made available. However, glass and plastic bottle sales from the restaurant and Swedish Food Market were made available during the pilot, although can sales were not available. Sales data from the vending machines were for total items only, so cans, PET and glass bottle sales could not be separately identified. These vending machines are likely to have been the greatest source of sales for immediate consumption within the store, as opposed to purchases that were often decanted (in the restaurant) or taken home (from the Swedish Food Market). The vending machine data were not complete to the end of the pilot period, limiting the 'capture rate' calculations to a certain degree.

3.2.4.4 **Waste data**

IKEA Edinburgh: As noted above, only very limited pre-pilot 'snapshot' data were available around the recyclables being collected. Records of pre-pilot removal of the glass and plastic bottle skips are very limited, with no recorded weight data. In-pilot skip removals have weights attributed to them, but the removal rate is quite irregular, depending on when they neared fullness. At Edinburgh there were only two uplifts of the PET and glass bottle skips over the entire pilot period. Despite this, the weight of material collected through the machines is small compared with the overall weight collected; hence the overall impact on recycling levels would always be difficult to detect with any level of confidence. Other recycling observations during the pilot were just snapshots for comparison with the pre-pilot observations and provided only indicative information.

IKEA Glasgow: The overall impact on recycling levels is difficult to detect given the poor quality of data before and during the pilot. The 'before' residual waste data were compared with the 'after' residual data to see if the impact of the machine recycling could be discerned, although any difference is hard to attribute to the presence of the machines given the other variables involved.

4 Pilot performance and operation

The following sections contain detailed quantitative and qualitative analyses of the schemes performance. Sections 4.1 and 4.2 compare the machine data with the reported recycling behaviours from the social research, which are broadly complementary. Section 4.3 considers in more detail the rewards issued and claimed, while sections 4.4 and 4.5 focus on the users' familiarity with the machines and how often they use them. Finally, sections 4.6 to 4.10 explore the potential wider implications of the pilot. This includes consideration of possible impacts on litter, net waste on site, any impact to sales on site, and improvements in recyclate quality. Finally we consider operational aspects of the pilot, focusing on machine reliability (both actual and perceived) and staffing implications.

4.1 Overview

Table 6 provides a summary of use at Edinburgh IKEA until 26 May 2013 and includes a comparison of relevant site sales of containers against returns to the machines to establish a theoretical 'capture rate' percentage. Further summary data are also provided on voucher issues and redemptions and referenced in the further sections below. The full pilot period at Edinburgh was until 27 September, but there are omissions in the continuity of data from 26 May 2013, with only the machine telemetry data being available throughout the whole pilot period.

Data category	Total units	% of total
Total beverage sales in relevant containers	33,265	–
Total placed in Recycle and Reward machines	1,252	3.7 (capture rate)
Vouchers issued	897	–
Vouchers redeemed	335	37.3 (voucher redemption rate)
Donations made	360	–
Number of store visitors	469,600	–
Number of transactions using machines	1,085	0.23 (of all store customers)

Table 6 Summary of IKEA Edinburgh machine use results (22 February to 26 May only)

At Glasgow the machine was operational from the official launch date of 22 February. Table 7 provides a summary of key use data until 27 September 2013, the full pilot period.

Data category	Total units	% of total
Total beverage sales in relevant containers	106,461	–
Total placed in Recycle and Reward machines	7,035	6.6 (capture rate)
Vouchers issued	1,792	–
Vouchers redeemed	351	19.6 (voucher redemption rate)
Donations made	5,245	–
Number of store visitors	1,202,155	–
Number of transactions using machines	846	0.07 (of all store customers)

Table 7 Summary of IKEA Glasgow machine use results (whole monitored pilot)

Tables 6 and 7 show that the proportion of all site visitors taking part in the scheme was extremely low, the number of transactions being only 0.23% of customer visits at Edinburgh. At Edinburgh only those using the café/restaurant where the machine was located were likely to use the machines, although staff noted that a high proportion of customers do visit this facility (80% was suggested although not verified). That said, it should be noted that not even all of the café/restaurant users are in fact potential Recycle and Reward machine users, because of their product choices (i.e. not buying drinks in bottles and cans). At Glasgow, where the machine was next to the site exit, the number of transactions as a percentage of customer visits was even lower, at only 0.07%. Overall, the data show very low rates of use by customers, as also indicated by the observations and survey data, and low capture rates from sales.

Figure 6 shows the machine telemetry data (container units) over the whole project for Edinburgh, with low rates of collection throughout. Low rates of collection were also observed at Glasgow. This seems to have been caused to a large degree by a combination of low levels of relevant sales of drinks in bottles and cans in the restaurant, where the Edinburgh machine is placed, and low levels of scheme awareness by customers (as noted in section 4.4). As further context, during the observational analysis and site visits it was noted that very few glass bottles, PET plastic bottles or aluminium cans were purchased in the IKEA restaurants on the two sites. Anecdotally, as suggested by the staff, it appeared that many customers in the restaurant purchased either hot drinks or fizzy juice in cups, both of which allowed free refills.

Several features of the pilot design and context make this case study quite different from others. In particular, the fact many sales will have been for consumption off site, and the fact that visits may be relatively infrequent, mean the material available for capture on site is probably lower as a percentage of sales than in most other pilot sites. Additionally, as the scheme only accepts containers purchased on site (a deliberate choice) there is no corresponding “import” of containers to offset this. Zero Waste Scotland believe this was a more challenging communications environment than some other schemes, in that customers are on site less frequently, and in a dedicated retail environment are exposed to many different promotional messages. In this situation, achieving prominence for the Recycle and Reward scheme is harder than in some other contexts.

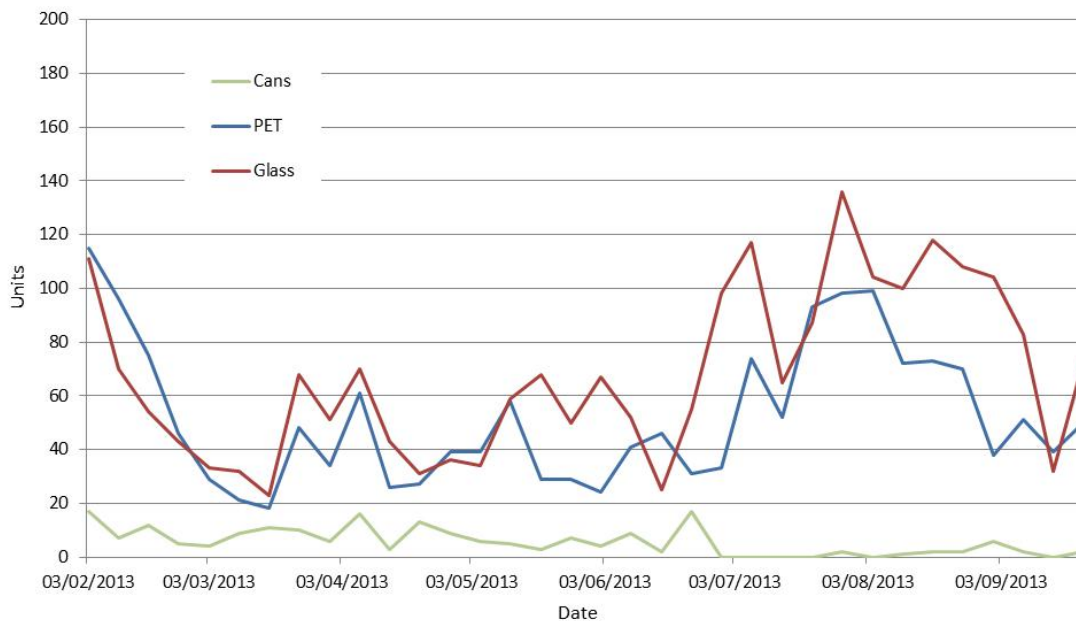


Figure 6 Weekly collected items by material, Edinburgh

The initial peak in use at Edinburgh was thought to be caused by a combination of machine testing and encouragement by the promotional volunteers of customers to get them to try the machines. Use dropped to a lower level after the initial promotional period. Incentives to increase machine use at Edinburgh were applied from 23 July with the introduction of higher-value IKEA products available on redemption of multiple vouchers. This may well have contributed to the increase in use, peaking in August, although the increase started before this change occurred, perhaps because of improved communications and the removal of the display surrounding the machine, which may have been confusing for customers. It is also believed that the existing recycling points were covered at least for some of the time from 24 May onwards, after the review of the promotional aspects, although they were seen to be open again on 15 September when the observational analysis was undertaken. This may partially help to explain a drop-off in use during September as shown in Figure 6.

A more accurate measure of use is capture rate through the machines as a percentage of relevant container sales (see Figures 7a and b). Container sales (up to 26 May, after which complete sales data ceased) were between 1,700 and 3,900 per week at Edinburgh, with returns to the machines generally around 100 units per week during this period. The average capture rate was ~3.7% across this early part of the pilot. Given that machine collections approximately doubled at Edinburgh in July and August, and assuming that sales continued at around the same level, the capture rate is likely to have increased to above 6% in July and August, bringing the overall averages higher too, although no accurate figures can be calculated for lack of sales data over this period.

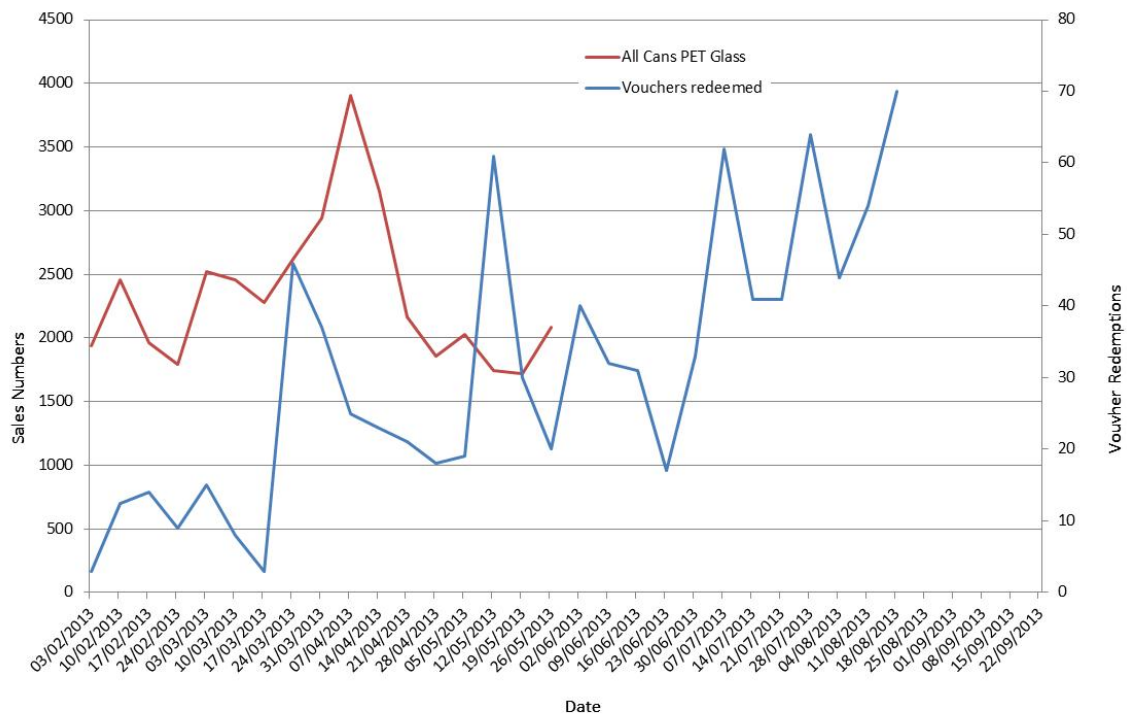


Figure 7a Weekly container sales and voucher redemptions (Edinburgh)

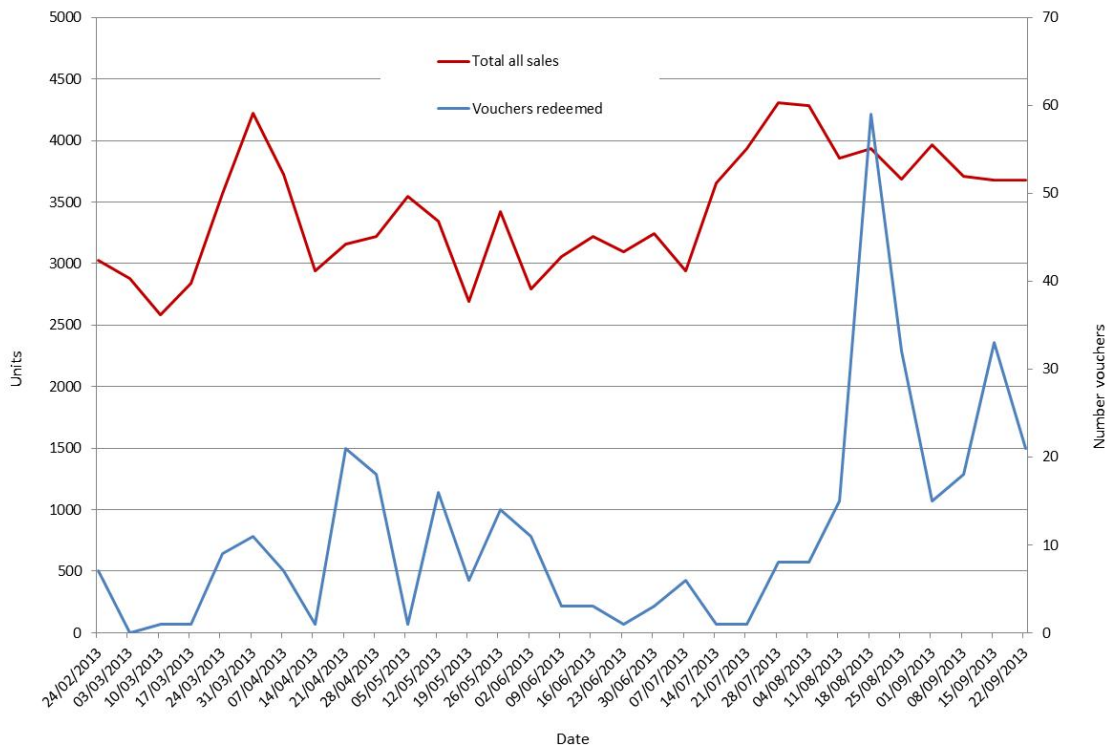


Figure 7b Weekly container sales and voucher redemptions (Glasgow)

At Glasgow, container sales were higher, between 2,600 and 4,300, and the capture rate was ~6.6% across the whole pilot period, although this was increased significantly because staff at Glasgow bulk loaded the machine by collecting containers on behalf of customers early in the pilot (see Figure 8). For the second half of the pilot at Glasgow, the capture rate fell consistently below 3%.

Overall, the data show lower rates of use by customers at Glasgow than Edinburgh (once the bulk loading by staff has been removed), and also lower rates of sales capture. Lower levels of scheme awareness among customers at Glasgow are likely to be a factor. In addition, the machine at Glasgow is located next to the exit and hence is not ideally placed for customers using the restaurant. While it is well located in terms of proximity to the vending machines and Swedish Food Market, it is thought that most of the sales here are likely to be take-away sales. Once containers left the site, we believe they tended not to come back – an issue with any site specific scheme if customers are not regular and frequent visitors.

4.2 Social research insight into items recycled

As noted earlier, a total of 33 face-to-face surveys were completed at IKEA Edinburgh and 46 at IKEA Glasgow, with only one person having used the machine at the IKEA Glasgow store. Although eight people had been observed using the machines in IKEA Edinburgh and five in IKEA Glasgow during the survey period, none of these users wished to complete the survey. The user from the IKEA Glasgow survey had used it on a previous visit. After being surveyed, three of the non-users then tried the machine.

Staff at the IKEA Edinburgh store suggested that customer use of the machines was lower than they would have liked or expected it to be. As noted above, it appears that many customers in the restaurant purchased either hot drinks or fizzy juice in cups rather than in bottles and cans. Individual members of staff had also been encouraged to use the machines if they consumed drinks containers bought in store; however, the staff interviewed also suggested that staff use of the machines had been lower than expected. The main reasons for this were identified as being:

- few staff bought cans or bottles of juice in store, as they were given free juice and hot drinks in the staff canteen;
- some staff could not be bothered to take the containers from the staff canteen to the machines; and
- some staff did not understand fully why they should use the machines, as the materials were already recycled at IKEA Edinburgh.

4.3 Rewards issued and claimed

Voucher redemption rates (i.e. claimed vs issued) were 37.3% at Edinburgh (to 26 May) and 19.6% at Glasgow (across the whole pilot) over the periods for which reliable data were available. Whilst speculative, one possible explanation for low levels of voucher redemption may be because many customers visit the restaurant and Recycle and Reward machine on the way home, and so may then misplace or forget a voucher before returning to IKEA, potentially weeks or even months later. This issue of convenience was not explicitly raised in the IKEA research, but was mentioned in the context of some other case studies (where redemption was higher, but gaps between visits will have been much shorter). Redemptions lagged behind the issuing of vouchers, probably for this reason. Redemptions also gradually increased at both sites (Figures 7a and b).

4.4 Awareness of the machines and their correct use

Awareness of the Recycle and Reward schemes among customers at both IKEA stores was low. Of the 33 surveyed in the IKEA Edinburgh store, fewer than one fifth of customers (18%, six people) were aware of the Recycle and Reward machines in store, 15% were aware that they accepted PET plastic bottles and aluminium cans and 6% knew that they accepted glass bottles. Awareness among

customers in the IKEA Glasgow store was lower. Of the 46 people surveyed, fewer than one tenth of customers (7%, three people) were aware of the Recycle and Reward machines in store.

One person at Glasgow was aware that they accepted PET plastic bottles and one person was aware that they accepted glass bottles. No one surveyed at Glasgow was aware that cans were also accepted in the Recycle and Reward machines. Paper cups were incorrectly mentioned by one person in the IKEA Edinburgh store, and cardboard was incorrectly mentioned by one person in the IKEA Glasgow store.

Of customers surveyed in the IKEA Edinburgh store, 6% (two people) were aware of specific Recycle and Reward communications activities carried out to promote the scheme in store. Both of these customers noted they had seen the branded machines, but no other types of communications were recalled. No customers surveyed in the IKEA Glasgow store were aware of any communications to promote the Recycle and Reward scheme.

It may be that the lower frequency of visits to a store such as IKEA makes communication more challenging than at some other pilot sites, such as the universities, where potential users are likely to attend very regularly. Also, most interviews conducted were with non-users, who, unsurprisingly, had lower awareness of schemes than users at all pilot sites.

During the in-depth interviews, IKEA Edinburgh staff believed that having the machines located in a prominent area and providing promotional information in the recycling stations had both been effective in promoting the Recycle and Reward scheme. The Edinburgh staff also identified all of the other communication activities that had also been used to promote the scheme and that these had been regularly reviewed and improved during the pilot. Staff also suggested the following additional communication activities that could be used to further encourage customer awareness and participation:

- increasing face-to-face communications with customers;
- tannoy announcements;
- clearer instructions on the touch screens on the machines;
- further staff training to ensure all staff understand the background to the scheme and have been fully trained in how the machines work so they can assist customers;
- adverts in the store catalogue; and
- getting local schools involved by educating the pupils about the scheme and how they help to promote wider sustainability behaviours and understanding.

Staff indicated they had faced a number of challenges in promoting the scheme within the Edinburgh store:

- The Recycle and Reward communications had to fit into the existing IKEA promotion schedule that ran throughout the year.
- The branding had to be altered to be specific for IKEA products and incorporate the brands that were sold in store, and at times it was challenging to meet the requirements of both Zero Waste Scotland and IKEA branding.
- IKEA would have liked to advertise the scheme externally more widely to their customers but, because the scheme was limited to products bought in store only, it did not want to potentially overcomplicate matters or confuse customers. The expense of providing rewards for containers brought in from off site could not be predicted, and might have been very high, and there was no desire to divert material from other recycling routes, so this option was not adopted.

It is an IKEA policy to ensure staff are informed before customers of any new initiatives. The staff believed that this was achieved.

4.5 User groups and usage practices

No statistically meaningful data were gathered on the types of users for the machines, given the small numbers of users observed. During the observational analysis in IKEA Edinburgh, only eight people were observed using the machines (six females and two males). Two of the users had young children who were attempting to use the machines. During the observational analysis in the IKEA Glasgow store, five people were observed using the machines. Four of those using the machines were male, and two of the users were young children accompanied by parents/carers. Staff noted that the machines tended to be more commonly used by younger people and that they were very popular with young children, who were often fascinated by the machines.

During the observational analysis at IKEA Edinburgh, half of the users (four people) seemed confident using the machine; the other half seemed less so, and appeared to be following instructions very carefully. During the observational analysis at IKEA Glasgow, four of the five users appeared confident using the machines. These differences may relate to first-time versus habitual users.

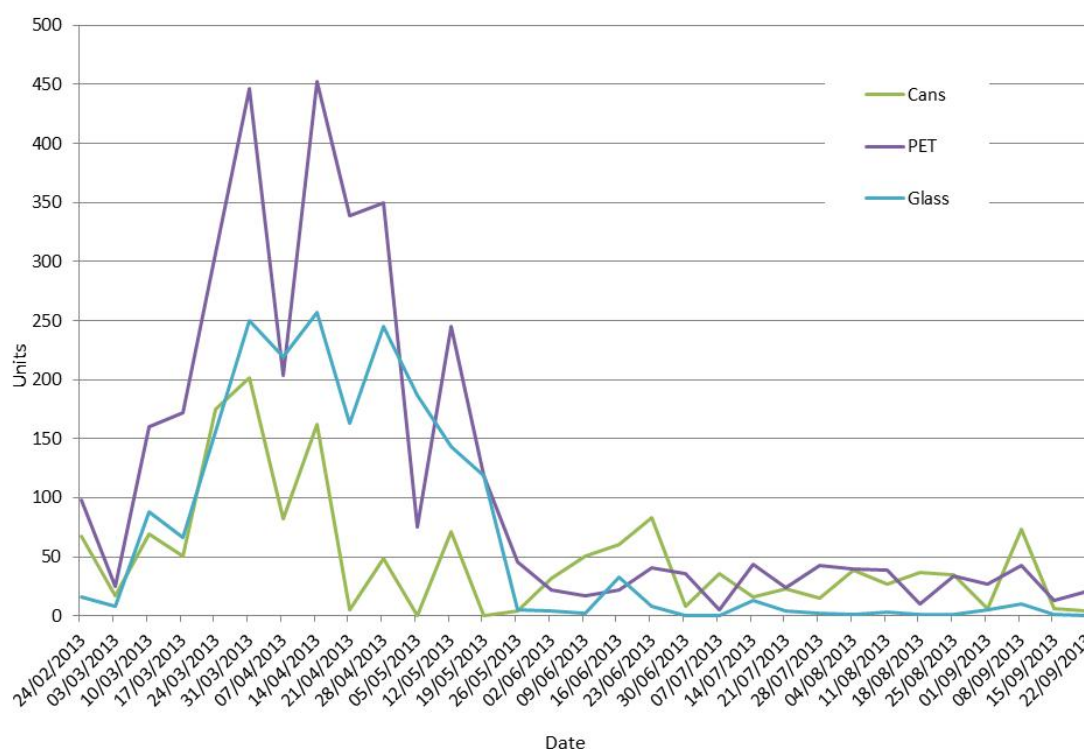


Figure 8 Weekly collected items by material, Glasgow

The actual numbers of transactions at each of the stores until 27 September 2013 were 846 in the Glasgow store and 3,522 in the Edinburgh store, although conversely the number of items collected was far higher in Glasgow than Edinburgh: 4,310 in the Edinburgh store and 7,125 at IKEA Glasgow. These figures suggest that, in the Glasgow store, multiple items are often recycled in the machines; 8.42 units per transaction at Glasgow versus 1.22 units per transaction in Edinburgh.

This could be down to machine location, whereby the Glasgow machine deals mainly with takeaway containers that are collected in bulk and returned at a later date. However, it seems highly likely that members of staff at Glasgow were recycling many items at once (early in the pilot in particular), effectively on behalf of customers (i.e. from the restaurant or store bins) rather than in relation to their

own beverage consumption. Peak use was during March and April and donations were also very high at this time, consistent with the fact that staff could not redeem vouchers. The fall-off in use followed the further training of staff, asking them not to bulk load the machines, to avoid complicating the pilot data.

One member of staff was observed inserting items from black bin bags on several occasions during the survey on 15 May 2013. This is confirmed by telemetry readings, with 233 items being recycled on that specific date, the most recorded for that month. This practice was stopped after 24 May 2013, when it became apparent that staff had continued to recycle on behalf of customers, despite being briefed not to do this. 'Normal' usage became far lower and latterly more vouchers were claimed than donations made (close to zero at Glasgow compared with a fairly steady figure throughout of around 20 per week at Edinburgh) (see Section 5.3 for further information).

4.6 Impact on litter

Given the nature of the IKEA stores, and consumption patterns for the drinks sold, littering was perhaps always unlikely to be affected by the pilot. Given the low levels of use of the Recycle and Rewards machines in both IKEA stores, the impact of the scheme on littering, in and around the stores, was likely to be negligible. No changes to the litter levels in the IKEA Edinburgh store were reported during the staff interviews. However, when asked what the benefits of this type of scheme might be, 15% of customers from IKEA Glasgow and 6% of customers from IKEA Edinburgh perceived (unprompted) that there would be a reduction in litter.

4.7 Impact on overall waste

The waste data should, in theory, give an overall indication of any changes resulting from the introduction of the Recycle and Reward machines at the two stores. However, in practice, the material associated with the targeted containers is small compared to overall waste flows on both sites.

4.7.1 *IKEA Edinburgh*

Table 8 shows the estimated data relating to the Edinburgh pre-pilot waste data (January/February) and in-pilot data (May observations).

Date	Restaurant recycling stations (kg plastic)	Kitchen dish area (kg glass)	Kitchen dish area (kg plastic)	Entrance/exit litter bins (no. of items)	Car park bins (no. of items)	No. of visitors
25 Jan 2013 (Friday)	0.7	5.3	0.3	–	–	3408
1 Feb 2013 (Friday)	0.8	14.6	1.3	10	1	4949
3 Feb 2013 (Sunday)	4.1	31.4	7.6	4	1	8575
Average of the two Fridays	0.8	10.0	0.8	n/a	n/a	4,179
23 May 2013 (in pilot; Thursday)	0	4.6	0.3	3	1	n/a
% of Friday averages	0	46%	38%	n/a	n/a	n/a

Table 8 Edinburgh estimated recycling – restaurant and store bin observations

During the Edinburgh in-pilot visit on 23 May, no plastic bottles were observed at the recycling points in the café/restaurant. There were still some customers leaving plastic and glass bottles on their trays to go to the dish area for disposal. Although based on very few measurements and observations, the data indicate a significant reduction in glass and PET being disposed of through the existing pre-pilot recycling routes, namely the recycling points and the kitchen area, presumably for diversion through the Recycle and Reward machines given that no recyclables at Edinburgh are allowed to be landfilled.

In terms of the overall weekly levels of recycling, Table 9 summarises the data for Edinburgh and also compares in-pilot recycling through the machines with in-pilot recycling off customer trays in the kitchen area.

Average daily weight estimate	Glass	PET
Pre-pilot quantities in recycling skips	17.0	3.0
In-pilot quantities in recyclate skips (uplifted by contractor May to July 2013)	18.8	1.6
Weight throughput of Recycle and Reward Machines (based on number of units)	3.2 (17%)	0.3 (16%)
23 May 2013 kitchen 'dish' area recycling	4.6 (25%)	0.3 (16%)
Total (rounded) from 'dish' area and machines	7.8 (42%)	0.5 (32%)

Table 9 Edinburgh estimated waste comparison, pre-pilot (baseline) vs In-pilot (kg/day)

These overall data suggest that there may be a small overall increase in glass recycling (around 10%) and a significant reduction in PET bottle recycling. It has to be remembered, however, that these are all estimated figures and that no historical sales data are available to make comparisons with the sale of products over the same May to July period in 2012. Both Edinburgh and Glasgow have seen a reduction in vending sales during 2013 compared with 2012. A drop in sales of drinks in plastic bottles in 2013 may well account for the reduction in average PET disposals during this May to July period.

In the lower part of the table, the estimated data show that the recycling at the 'dish' area (~25% of the total for glass and ~16% for plastic) exceeds the recycling at the Recycle and Reward machine (~17% of the total recycled for glass) by almost 50% for glass, although the weights are very similar for plastic. It should be noted that the weights through the dish area are likely to be an underestimate of the daily average, as this was based on only one visit and does not include busy weekend days.

It is interesting to note that the total of the Recycle and Reward machine and 'dish' area recyclables accounts for only around 42% of the glass and 32% of the plastic. This implies that either the 'dish' area recycling figure is a very low estimate or glass and plastic recycling is occurring via other routes, including an amount from the Recycling Stations and site bins (which is thought to be quite small because of contamination and the need for sorting) and, presumably, a considerable amount from the staff canteen.

4.7.2 *IKEA Glasgow*

The estimated data show that there has been a significant reduction (around 93kg or around 7%) in the weight of weekly residual waste produced since the start of the pilot period. Estimated weekly averages are:

- 2012 average – 1,480kg (pre-pilot baseline);
- February 2013 – 1,388kg (pre-pilot); and
- September 2013 – 1,295kg (in pilot).

The very low weight of material passing through the Recycle and Reward machines and now being recycled (around 25kg per week) cannot be wholly responsible for this reduction in the residual waste being produced. Estimated weekly weight throughputs of machines during the pilot period are 19.7kg glass, 3.4kg PET and 1.0kg cans. Natural/seasonal variations, or a reduction in vending sales, may well be a more significant cause.

4.7.3 *Impact on container sales*

During the in-depth interviews, the staff at IKEA Edinburgh did not feel that the Recycle and Reward scheme had had an impact (positively or negatively) on sales or footfall. There is a shortage of available baseline retail sales data; however, the Britvic vending machine data are reproduced here in Table 10 comparing 2012 with 2013 where data are available.

Month	Edinburgh		Glasgow	
	Baseline	Pilot	Baseline	Pilot
Jan 2012	3,113		2,742	
Feb	3,282	2,043	3,017	2,571
Mar	3,703	2,724	3,895	2,875
Apr	3,053	2,264	3,515	2,585
May	2,948	2,384	2,923	2,645
Jun	3,231	n/a	3,631	2,416
Jul	3,147	n/a	3,712	3,064
Aug	3,993	n/a	3,413	2,360
Sep	4,659	n/a	3,837	2,440
Oct	3,026		3,154	
Nov	2,927		2,978	
Dec	2,628		3,229	
Jan 2013	2,354		2,720	

Table 10 Britvic vending sales data (total plastic, glass and cans)

Both Edinburgh and Glasgow had a significant reduction in vending sales during 2013 compared with 2012, and both stores retail similar quantities, although there are four machines in Edinburgh and only three in Glasgow. The approximate monthly weight of plastic bottles from these sources would be ~56kg from Edinburgh and ~62kg from Glasgow based on 85% PET plastic, plus 10% cans and 5% glass. Each store had one water-only machine with 100% PET.



Figure 9 Example vending machine and stock

4.8 Impact on material quality

The machines were programmed to accept only the target materials, so material quality should be good. Where observed, this was the case. Given that one machine accepted glass bottles and one accepted plastic bottles and cans, there was no real scope for cross-contamination, and quality was consistently high.

During the pilot period, material from the machines was subsequently combined with existing waste management routes, so the value of the higher-quality material (devoid of contaminants) was not realised. As volumes were low, realising this value within the context of the current scheme would always be challenging.

4.9 Operational factors

4.9.1 *Machine reliability*

Overall staff felt that the machines were reliable; there had been some downtime but no major issues with the machines. Staff were able to fix small problems but were cautious about tampering with the machines in case they made the problem worse. The technicians were easy to get in touch with and quick to respond and fix any faults.

A criticism of the technicians was that staff were not told what had caused the errors and how they had been resolved; they felt that if this could have been communicated it might have either prevented some of the problems recurring or allowed the staff to fix the problems themselves, thereby negating the need to always call out the technician.

During the observational analysis in Edinburgh, the majority of items that the eight users tried to recycle were rejected by the machines; two glass bottles were rejected because the machine was out of order and five PET plastic bottles were rejected although the machine was working and the bottles bought in store. Only one plastic bottle was accepted by the machine. Only one user was able to use the machine successfully and this user collected their voucher. Staff also commented that customers got frustrated if the machines were out of order or materials were rejected and would commonly look to members of staff for help.

It is not clear if this level of rejection is representative of the pilot period as a whole. Zero Waste Scotland staff also undertook some observations and watched five users of the machine who had no

problem at all. It is known that two brands of PET plastic bottles were rejected because they were from a new range of products that had not been added to the machine bar code database. This was thought to be caused by a delay in informing the machine supplier of the product changes.

During the observational analysis in Edinburgh, two users whose items were rejected made further attempts to recycle using the machine before giving up and putting their items in the recycling stations. The other users whose items were rejected did not make further attempts to use the machines and either put their bottles in the recycling stations or took them away with them. At Glasgow, only one plastic bottle was rejected, and the user attempted to recycle using the other machine before taking the item away with them. All other items were accepted by the machines. Two users donated to charity, one user took their 10p reward; one user's voucher was not issued and for the item that was rejected no reward was given.

Staff noted that the glass bottles compartment filled quickest in the machine as a result of the glass not being compacted. This could potentially mean that the glass machine needed emptying more often than the other machines.

4.9.2 *Resourcing the scheme*

No additional manpower was allocated for the implementation of the pilot, although several IKEA staff were involved to some degree during the pilot. The staff interviewed at IKEA Edinburgh had the following responsibilities:

- department manager – involved in the initial setup of the pilot, including the selection of the appropriate communications and the rewards offered; the identification of individual staff roles; and supporting the day-to-day management and running of the scheme;
- marketing staff – management and delivery of the public relations and communications strategy to promote the scheme to customers;
- sustainability and environment specialist – involved in the initial setup of the pilot; overseeing the day-to-day management and running of the scheme; promoted the scheme to staff; ongoing basic maintenance of the machines; and responsible for the data collection and data report submission;
- graphic communications specialists – assisted with the development of the communications strategy and time plan and supported the development and implementation of the advertising and promotional Recycle and Reward communications;
- catering supervisor – trained team of catering staff in how to use the machines and perform basic maintenance; first point of contact for any issues or problems with the machines; and
- advanced co-worker – involved in the day-to-day maintenance of the machines including emptying and clearing any blockages; and the promotion of the scheme to customers, including helping customers to use the machines.

Volunteers (organised by Zero Waste Scotland) supported IKEA staff at the launch of the machines at the public events on 21 February 2013 at the Edinburgh store and 24 February at the Glasgow store. IKEA staff were involved to a limited degree in ongoing promotions throughout the pilot.

Fujitsu UK, the installation and maintenance partner for Reverse Vending Corporation, provided initial training for staff with only managers and supervisors attending this initial session. This gave background information about the scheme and generic cleaning and maintenance guidance. The supervisors were then responsible for interpreting the training and cascading it down through their teams. The sustainability and environment specialist also ran further short training sessions for staff to ensure they were competent to use the machines and were able to demonstrate to IKEA customers how to use them correctly. All IKEA Edinburgh staff interviewed were aware of the Recycle and Reward scheme, and understood how the scheme operated and what items were accepted by the machines.

Overall, the majority of the additional work, beyond initial training and promotion, was related to collating and providing pilot data to SKM rather than the day-to-day operation of the machines. Emptying, cleaning and liaison with the machine supplier were, however, additional tasks that did take up a considerable amount of staff time.

It should be noted, however, that had the machines replaced rather than supplemented the existing recycling facilities at Edinburgh the machines could have actually reduced the level of effort required by staff, in particular by reducing the need for segregation in the kitchen dish area. In the in-depth interviews the staff at Edinburgh noted that the scheme required little staff involvement, was easy to administer and manage and also saved staff time by reducing the amount of time to sort recyclates in store. At Glasgow it could be argued that the machines provided some degree of recycling with less effort than would otherwise be required in terms of staff material segregation.

5 Public reactions to the pilots

It should be noted that, in assessing public reactions, this section considers the views of only a very small number of members of the public at the two sites. This section first considers user and non-user views in isolation, before discussing the extent to which the rewards themselves were seen as appropriate more generally. A further section summarises the perceived benefits of the scheme and also highlights any questions raised about the scheme. A final section discusses the legacy of the system, i.e. the extent to which users and the site staff wish to see it continue, and user suggestions for changes.

5.1 User views and motivation

Only one person surveyed had used the machine in IKEA Glasgow and there were no users observed or interviewed at IKEA Edinburgh. The one customer who used the Recycle and Reward machine at the Glasgow store had been motivated to do this by the ability to redeem a reward, by seeing other customers using the machines and because it had the environmental benefit of reducing the amount of waste being sent to landfill.

Initially a 'sustainability area' had been created around the machines in IKEA Edinburgh to promote the Recycle and Reward scheme. This comprised a selection of sustainable products sold in the IKEA store and recycling messages, e.g. explaining how certain products had been made using recycled materials. Staff felt that this could be confusing and did not encourage people to use the machines. Staff noted that use increased when this feature was removed, though other changes were also introduced.

Staff believed that use also increased with the introduction of the sustainable product rewards, launched on 23 July and on offer in store during July and August. Users were able to collect vouchers and exchange them for sustainable products sold in store; two vouchers could be exchanged for a wind-up torch, four for a recycling bin and six for an LED light bulb. The products were displayed and available to pick up from baskets next to the machines, and then purchased using the vouchers at the till points. As noted earlier in the report, it does appear that use rates peaked in August, although the increase in use seems to have started before 23 July. This may have in part been thanks to improved communications from 24 May and the covering of the existing recycling points around this time.

5.2 Non-user views

As noted above, the primary reason given by survey respondents for not using the schemes were that customers were not aware of the machines in the stores; 82% unaware in Edinburgh and 96% unaware in Glasgow. However, 91% of the non users surveyed in Edinburgh and 82% in Glasgow suggested that as a result of becoming aware of the machines they would now consider using them. It

should be noted that not even all of the café/restaurant users are in fact potential Recycle and Reward machine users because of their product choices (i.e. not buying drinks in bottles and cans).

5.3 Appropriateness of the rewards

The majority of customers thought that the reward offered was appropriate; 94% of customers in IKEA Edinburgh and 96% in IKEA Glasgow. The customers in both stores also believed the size of reward (10p to be redeemed against any future purchase in store) was appropriate; 100% in Edinburgh and 93% in Glasgow. No further suggestions were offered for alternative rewards.

The reward at IKEA Edinburgh changed during the pilot; as well as the 10p voucher or charity donation, it began to include the option to exchange multiple vouchers for sustainable IKEA products (such as light bulbs with a significant value of several pounds). During the interviews some members of staff felt that the 10p voucher was good and they liked the option to donate to charity and that, overall, the voucher system had been easy to administer. However, all staff interviewed felt the sustainable products were better rewards as they:

- had more value for customers;
- tied into the sustainability theme that was an important part of the IKEA corporate identity; and
- promoted IKEA products.

One staff member mentioned that the change in reward had resulted in more of the vouchers being redeemed in store, and another explained that the machines were emptied more frequently when the product rewards were being exchanged for vouchers. The data show an increase in the number of vouchers issued versus donations made (Figure 10).

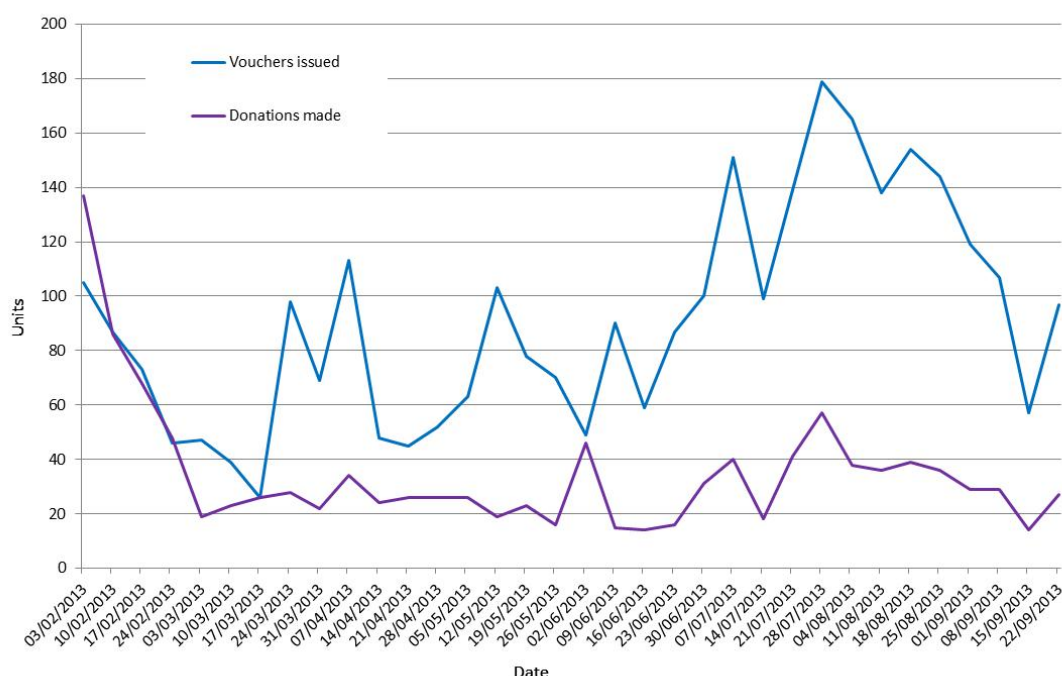


Figure 10 Machine vouchers issued vs donations made, Edinburgh

Looking at this in more detail, the data in Table 11 show that the rate of donation versus voucher issues at Edinburgh dropped from ~46% before the new incentives were introduced to ~27% afterwards, indicating that the better reward had a clear impact on user choices. With hindsight, staff

at Edinburgh stated that they would have preferred to have offered the products as a reward from the beginning of the pilot and would have liked to further explore the range of products that could have been offered as rewards. Staff suggested that the products offered as rewards could be changed on a regular basis to keep the scheme dynamic and engaging for customers and staff and that a specific reward for staff would encourage greater use amongst staff.

Period	Vouchers issued	Donations made	Donations/vouchers (%)
Before 23 July	1,797	831	46.2
After 23 July	1,299	346	26.6

Table 11 Voucher issues vs donations at Edinburgh before and after the enhanced incentive

At Glasgow, beyond the point where staff bulk loading ceased, donations were extremely low, as can be seen in Figure 11.

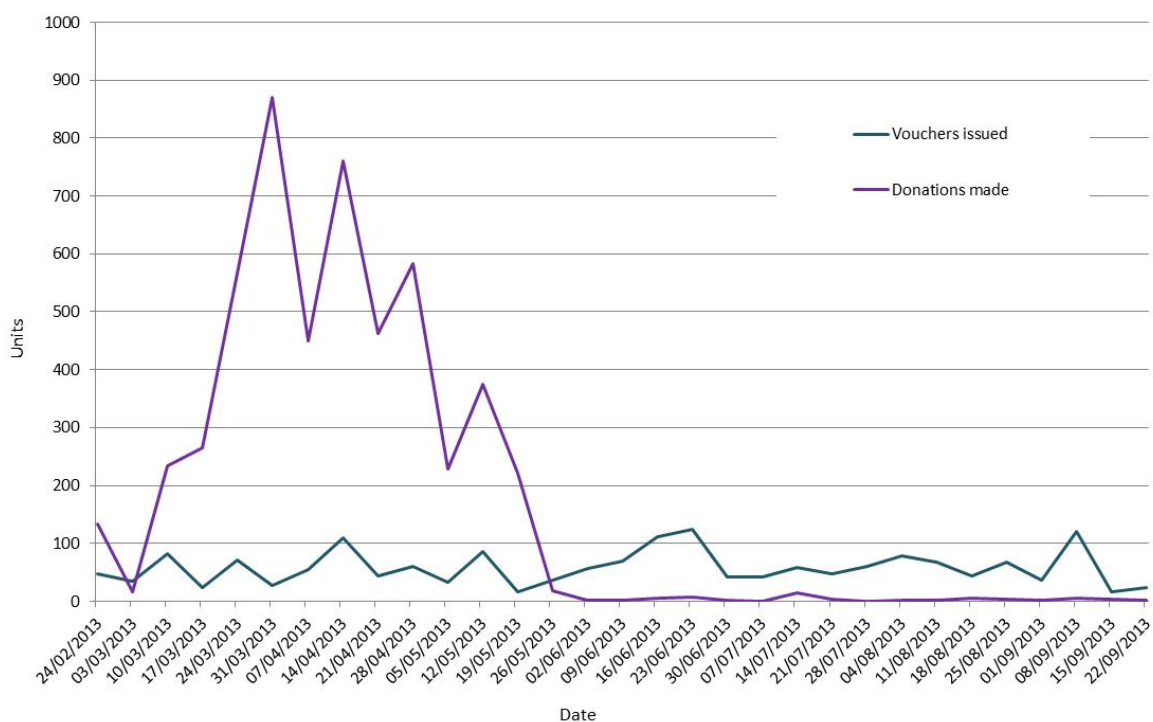


Figure 11 Machine vouchers issued vs donations made, Glasgow

5.4 Other benefits

The main benefits identified by survey respondents (unprompted), as displayed in Figure 12, were the Recycle and Reward scheme's environmental advantages, the reward offered to customers and a reduction in litter. There was a difference in the perceived benefits identified by customers of the two stores, with a higher proportion of customers in Edinburgh identifying environmental improvement as the main benefit.

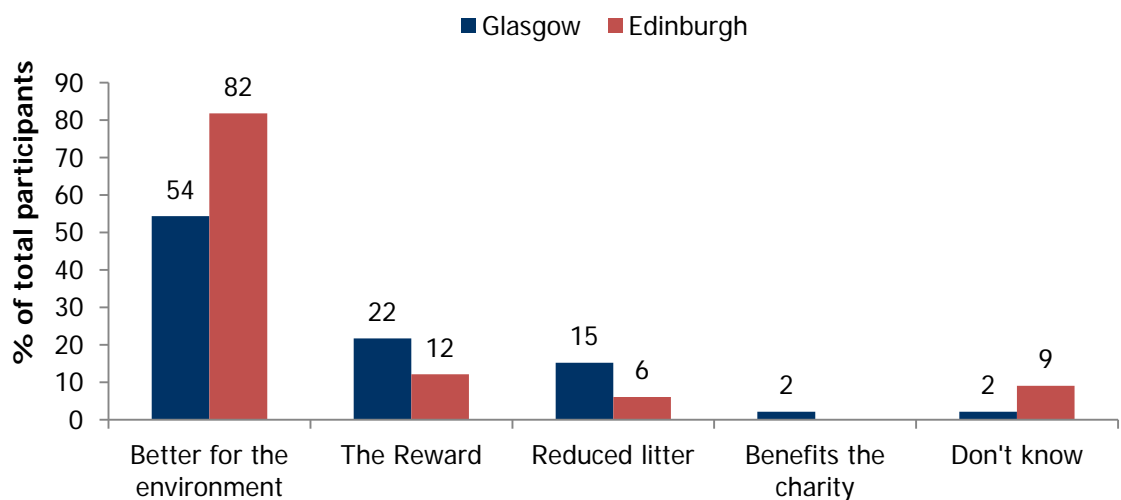


Figure 12: Suggested benefits of the Recycle and Reward Scheme

Staff identified a number of benefits associated with implementing the scheme in the IKEA Edinburgh store:

- It demonstrated IKEA's commitment to sustainability and was good for IKEA's corporate image, helping to raise awareness and inform the IKEA customers (although, as noted above, customer awareness of the scheme was generally low).
- The interactive element of the scheme was complementary to the IKEA approach to display, promoting and enhance the IKEA customer's overall shopping experience.
- It helped to improve recycling performance in the store (although Edinburgh had high levels of recycling prior to the pilot, and it seems likely any impact on recycling would be more likely in Glasgow).
- IKEA customers were rewarded for recycling.
- The scheme required little staff involvement, was easy to administer and manage and also saved staff time by reducing the amount of time sorting recyclates in store.

Challenges associated with the scheme identified by staff at IKEA Edinburgh were:

- recycling – all the materials accepted by the machines were already recycled in the store (in Edinburgh) and therefore some staff perceived that the scheme added unnecessary complexity; and
- the machines were quite big and took up space.

5.5 Legacy

The majority of customers in both stores, 94% in IKEA Edinburgh and 91% in IKEA Glasgow, were clear they would like the Recycle and Reward scheme to continue, despite the fact that few had used them. Some 52% of customers in IKEA Edinburgh and 57% of customers in IKEA Glasgow were also keen to see similar schemes become more widespread across Scotland.

During the in-depth interviews, the majority of staff thought that the scheme had been worthwhile and should continue. Only one member of staff at Edinburgh thought IKEA should not continue with the scheme (in this case because they felt it did not add anything as the materials were already recycled in store). The same member of staff noted that a deposit return scheme would be better, as people were already aware of these and have experience of them, for example with the Barrs' glass bottles deposit return scheme.

The following areas were identified by staff for consideration if implementing or testing any further schemes:

- material value – the highest-value material was aluminium, very little of which was believed to be sold in the IKEA store, so staff believed that, for the scheme to become financially sustainable, it would have to be widened to allow items purchased elsewhere to be recycled using in-store machines;
- financial considerations – a cost–benefit analysis should be carried out to investigate both the direct and indirect costs, including the cost of recycling against the social benefits of behavioural change over the long term; and
- data capture and collation – staff believed that there should have been clearer guidance from the outset (i.e. at the application stage) about what data they would have to collect, including addressing any data sensitivity/confidentiality issues, what the data would be used for and any additional staff resources required to collate and report the data.

Both sites continued their schemes immediately after the completion of the pilot period and funding. Edinburgh subsequently discontinued theirs, feeling that overall it replicated existing facilities and practice on site. At the time of writing we await a scheme update from Glasgow. It is interesting to note that IKEA now have a national scheme for mechanised take back of light bulbs and batteries, which uses charity donations as an incentive for customers.

6 Conclusions

Of the relevant container sales during the pilot (from the restaurant, Swedish Food Market and vending machines), the capture rate in the Recycle and Reward machines (the proportion collected as a percentage of relevant container sales) was 3.7% in Edinburgh (up to 26 May) and 6.6% in Glasgow (across the whole pilot), although this latter figure includes what was thought to be improper staff bulk returns up to May which should have been excluded. During July and August the capture rate at Edinburgh was probably in excess of 6% although no reliable sales data were available.

The number of transactions was often fewer than 10 per site, with fewer than 100 items per week being collected. This is a small percentage of total sales, and sales of the targeted products represent a small proportion of all customers visiting the sites.

The waste data from the restaurant area in Edinburgh (an estimated snapshot only) indicate that there has been a diversion of recycling from the recycling stations and the customer trays (recycled from the kitchen dish area). The data indicate, however, that the non-machine recycling from the customer trays (~25% of the site total for glass and ~16% for plastic) still exceeds the machine recycling (17% of the total recycled for glass, 16% for plastic). This implies that there are more people who do not recycle at all than use the machines, even though they do have the relevant containers. It should be noted that the recycling weights from the dish area will be an underestimate of the daily average, as this was based on only one visit and did not include busy weekend days which are included in the overall machine data.

It is interesting to note that the total of the Recycle and Reward machine and dish area recyclables account for only around 42% of the glass and 32% of the plastic in total. This implies that either the dish area recycling figure is a very low estimate or glass and plastic recycling is occurring via other routes, including an amount from the Recycling Stations and site bins (which is thought to be quite small because of contamination and the need for sorting) and presumably a considerable amount from the staff canteen.

There are thought to be a number of reasons why this scheme has failed to attract high volumes of containers:

- The number of containers available for the machines is actually quite low, as sales of the targeted containers are relatively small in relation total site visitor numbers, and even the total number of restaurant users (with many purchasing hot drinks or fizzy drinks on draft).
- Non restaurant sales were potentially consumed offsite (almost certainly for sales from the Swedish market, and possibly for vending machine sales). It seems likely that once containers left the site, they were relatively unlikely to come back, given the site specific nature of the scheme, and the relative infrequency of customer visits. The location of machines in Glasgow (at the exit, and thus most convenient for returns, or vending machine users) may therefore have been less convenient than Edinburgh (in the restaurant, and thus most convenient for restaurant customers), also affecting use. These factors may also have reduced redemptions of rewards.
- Unlike some other pilot sites, there was no scope for import of material into this scheme. This was a deliberate decision to both manage costs, and avoid the potential diversion of material from other recycling schemes.
- Customer awareness of the Recycle and Reward machines and the communication materials to promote these was low during surveying in both IKEA stores; fewer than one fifth of customers in IKEA Edinburgh and fewer than one tenth of customers in IKEA Glasgow were aware of the Recycle and Reward machines despite the prominent position of the branded machines and extensive promotion (though it may be that some customers 'screened out' information about a scheme that related to containers they do not purchase). At Edinburgh the sustainability display originally placed around the machine was thought to be confusing for customers, and use of the machine increased once the display was removed. It is worth noting that higher awareness did correlate with higher levels of use, but this may be a context where a continual "push" is required, given irregular visits by most customers.
- Edinburgh had good customer recycling facilities in place prior to the pilot, and some customers may have also been aware that staff also recycled materials left on the trays, hence reducing the need to recycle. Having other recycling facilities that people are familiar with using can obviously create a potential barrier to the use of the machines, although the limited data suggest that the use of the Recycling Stations reduced significantly once the machines were in place. This suggests that the 'green' customers who already recycle are willing to switch, while the non-recyclers are (relatively) less willing to use the machines. The latter observation links in to the awareness of the machines and of the type and size of the incentive as discussed below.
- Anecdotally, staff use of the machines (as customers) was lower than expected. Given high levels of staff awareness, the main reason for this may have been that few staff bought cans or bottles of juice, as they were given free juice and hot drinks in the staff canteen. At Edinburgh, staff were still able to collect recyclables in the canteen and take these materials directly to the skips in the yard. Similarly, staff at Glasgow were still able to use the canteen recycling point without having to walk to the machine. The machines may also not have been ideally located for staff convenience, as they targeted customers.
- While the machines were generally reliable, and quickly fixed if not working, the rejection of containers did occur and led to customer frustration and people 'giving up'. This could be due to a number of things including delays in barcode information being added to the machine databases for new beverage products, deformation of containers (e.g. squashed cans and plastic bottles) and items being brought from home and not originally sold at IKEA. The limitation of this pilot to containers purchased at IKEA made this pilot the most sensitive to delays in providing up to date product information to the machines.

Other points of note:

- The majority of customers thought that the type of reward and the size of the reward offered (10p to be redeemed against any future purchase in-store) was appropriate, although voucher redemption rates were low at Edinburgh and very low at Glasgow, which may contradict this – or alternatively imply something about convenience. Vouchers can be fiddly and easily lost between visits to IKEA and, when considered against the typical cost of most of the items on sale at IKEA, 10p is very little. Higher levels of incentive (vouchers being redeemable against sustainable IKEA products such as an LED light bulb), once introduced at Edinburgh, may have been part of the reason for increased
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machine use (alongside improvements to the communications). There was certainly a clear decrease in the proportion of people making a donation rather than selecting a voucher, from around 46% before the enhanced incentive to around 27% afterwards.

- Staff in Edinburgh noted that the machines tended to be more commonly used by younger people and that they were very popular with young children, who were often fascinated by the machines. It is not the children in a family, however, who generally make the decision about a trip to IKEA to return containers or to redeem vouchers, so this may not be a driver for sustained scheme use.
- The main benefits identified by survey respondents were the Recycle and Reward scheme's environmental advantages, the reward offered to customers and a reduction in litter. There was a difference in the perceived benefits identified by customers of the two stores, with a higher proportion of customers in Edinburgh identifying environmental improvement as the main benefit.
- No changes to the litter levels in the IKEA Edinburgh store were reported during the staff interviews. However, when asked what the benefits of this type of scheme might be, 15% of customers from IKEA Glasgow and 6% of customers from IKEA Edinburgh perceived (unprompted) that there would be a reduction in litter.
- The vast majority of customers in both stores, 94% in IKEA Edinburgh and 91% in IKEA Glasgow, were clear that they would like the Recycle and Reward scheme to continue, despite the fact that so few had used it. Some 52% of customers in IKEA Edinburgh and 57% of customers in IKEA Glasgow were also keen to see similar schemes become more widespread across Scotland.

While acknowledging that machine use had been lower than expected, the majority of staff also felt that the scheme had been worthwhile and that IKEA should continue with it. Staff in Edinburgh noted that the scheme was helpful in promoting and demonstrating IKEA's corporate commitment to sustainability. The scheme was considered easy to administer, with most burdens from it being linked to pilot data requirements. However, it was suggested that at Edinburgh (which already had good customer recycling facilities) that the machine added relatively little, while taking up space.

Generally, despite the fact IKEA superstores may look like large retail environments, the volume of material available at IKEA was less than at some other sites, and this, combined with quite different patterns of use, may account for the relatively low capture rate seen. Nonetheless, both staff and customers were enthusiastic about the concept. Although Edinburgh subsequently discontinued their scheme, feeling it ultimately replicated existing facilities, it is interesting to note they now support a national IKEA initiative for mechanised take back of light bulbs and batteries, which uses charitable donations as an incentive. From a pilot point of view, the learning from the IKEA site and context is extremely useful.

7 Glossary of terms

- Capture rate: the proportion of targeted containers that are recycled through the system.
 - Collection: the return of containers to the reverse vending machine.
 - Deposit: the 10p charge placed on an in-scheme container.
 - In-scheme: a container that was sold within the university with a deposit charged.
 - Non-user: person who has not used the Recycle and Reward scheme, or has used it but does not intend to again.
 - PET: polyethylene terephthalate.
 - Reverse vending: accepting an item for recycling in a machine that issues a reward or other incentive.
 - Shelf talker: card or sign attached to a shelf to highlight a product or promotion.
 - Transaction: a visit to the reverse vending machine by a user placing one or more collected containers in the machine.
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- Units/containers: the aluminium cans, PET plastic bottles or cups.
- User: person who has used the Recycle and Reward scheme more than once.

Appendix: monitoring methodology

The monitoring and evaluation work for the pilots was led by SKM Enviros (SKM), working in partnership with Nicki Souter Associates (NSA). At the educational sites, Zero Waste Scotland undertook additional data collection outside the trial period, so a complete dataset could be obtained for the autumn term.

The range and number of data collected varied somewhat by site, reflecting constraints on what sites knew, and the cost-effectiveness of obtaining certain types of data in some contexts. As the pilots progressed, the balance of monitoring was adapted to concentrate on those sites which would be most likely to provide useful learning. This particularly affected strand B, where it was felt that, firstly, concentrating some resources on key sites could help offset some of the limitations on the strand A data and, secondly, some sites were experiencing relatively low footfall and would be far less cost-effective to target in data collection terms.

Data collected and methods employed included the following. Some differences between sites are highlighted here, whilst the approach for specific sites is in tabular form below.

Strand A

Baseline retail sales data for the site – some sites had only annual data, others monthly and some only partial data. In one case (HebCelt) there were no historic data, and in another (Troon HWRC) no sales data were collected either before or during the trial, as the target area was too broad.

Pilot period retail data – all sites but Troon HWRC provided these data. Typically data were either weekly or monthly depending on the sales systems and number of outlets that were relevant to the site.

Baseline waste management data for the site – some sites had monthly data and one site (Dundee) sought to estimate weekly information. However, several sites had no baseline data. All sites struggled to provide detailed waste information (e.g. the composition of drinks containers by stream, or weights rather than volume-based estimates).

These are common challenges in trials of this type, and could be comprehensively tackled only by a year-long resource intensive pre-pilot monitoring period. In an attempt to improve understanding, in two cases (Heriot-Watt and the North Ayrshire schools) waste compositional analysis was undertaken before and during the trial. Site visits in all cases where it was appropriate also included visual estimates of container fill rates and contamination, and discussion with site staff to understand collection frequency, but, while this improved our understanding of material flows, it was insufficiently sensitive in itself to highlight change over the trial period.

Waste management data during the pilot period was available for all sites, but granularity and quality varied. Most sites knew their overall waste arisings and some knew recyclates within that. In two cases (as noted above) compositional analysis was undertaken to try to understand residual composition. Sites provided data from a mix of volume-based measures, weight information, and site and waste contractor information.

Returns data from the recycle and reward machine(s) and/or manual data during the trial period were collected. Where both were available they were sense-checked against each other. Typically the

manual data were preferred in those cases where there was a contradiction (for example, switching the power on and off was found to have led to the machine resetting the count at one site).

Machines recorded transaction data in different levels of detail (daily, weekly or by individual transaction). Most machines recorded data by container type; in one case the machine collected mixed plastics and cans in a single receptacle and in this case the split of material was estimated during site visits.

The level of analysis that these data could be subjected to varied according to the format obtained.

Downtime data during the pilot period – some machines also provided telemetry data when they were offline (either for servicing or emptying, or because of a problem), and some sites provided these data. However, it was not always clear at all sites how long machines were down for.

Redemption rates during the trial period – the machines identified how many vouchers were issued (where this differed from the number of containers returned, e.g. where some containers did not attract a reward, or rewards were given to charity). Voucher redemption data were collected from the retail outlets either monthly or weekly. The level of analysis that these data could be subjected to varied according to the format obtained, and how closely they matched the machine data in time periods covered.

Site visits were conducted to understand waste management practice, to help gather baseline data and to build a relationship with the sites to facilitate the overall monitoring. SKM staff originally proposed to visit each site (with the exception of HebCelt, which it was sensible to visit only during the pilot) at least twice (once before the pilot and once during it). However, for some sites the number of visits was increased, where it was felt this would enable the collection of better baseline data, addressing some of the gaps in pre-existing records.

Although not formally part of the monitoring process recorded here, all sites (except HebCelt, though other Zero Waste Scotland staff were present) received multiple visits from the Zero Waste Scotland project manager. Especially during the early trial period, these were often weekly for some of the bigger sites. Zero Waste Scotland staff were also available to troubleshoot problems remotely (by phone and email) and this also means we obtained data on much of the learning around set-up and installation. These visits were therefore invaluable both in delivering the pilots and also in providing insight into how they were functioning on the ground, and what was and was not working well. Visits included an assessment of reliability, and material quality, on several occasions. Zero Waste Scotland also made several other visits to sites to assess communications and scheme performance; these included informal 'mystery shopper'-style use of the machines. NSA also visited all sites where they conducted fieldwork at least once, and provided feedback on how well the scheme was functioning at the time of their visits.

Throughout the pilot period SKM, NSA and Zero Waste Scotland liaised closely on issues encountered.

In some cases, site visits included visual (including photographic) inspection of residual bins, recycling bins or the recyclate collected from the machines. In a few cases, site waste management staff were able to supplement data gathered this way independently of a visit from the monitoring team.

Strand B

Focus groups were concentrated on the university sites, which saw relatively high levels of use, and an audience that was accessible for this form of research. Despite the variation in scheme design,

these three institutions are of course broadly similar in function, so it was also felt cross-site comparison would add most value to focus groups conducted in these contexts.

Face-to-face (and online) surveying was concentrated on the university sites and HebCelt, as these saw the highest footfall and were thus most appropriate for an in-situ survey technique. Thanks to patterns of use at these sites, an in-situ technique also has a good chance of reaching a representative set of users, and (albeit to a somewhat lesser extent) relevant non-users (i.e. those who use the public areas targeted, but not the scheme). The samples obtained in these cases do allow for quantitative analysis.

At Dundee, an online survey to students managed by the university also asked about reactions to the Recycle and Reward scheme, and the results were kindly shared with Zero Waste Scotland. These provide an interesting perspective, as the respondent base and time period differ somewhat from the external monitoring undertaken.

At the Ikea stores and Troon Household Waste Recycling Centre an interviewer was placed on site for a day in each case, but, as expected, relatively few interviews were obtained because of the lower footfall. The responses obtained here provide customer insight, but are too small to be analysed quantitatively.

In the school context it was felt that an online survey was a cost-effective alternative to face-to-face surveying (all students can be contacted in this way, and can be encouraged to participate by staff). Numbers were relatively small, but can be considered quantitatively (with caution).

An online survey was made available at Whitmuir (using its customer database), as it was felt that on site surveying would yield too few users to be worthwhile. Very little feedback was obtained via this route (which is also a somewhat selective sampling method, as not all customers are on the database – though regular customers, which the scheme expected to target primarily, were).

Observations were also concentrated on sites where footfall was highest, but were employed to some extent at all sites except Marr (as Zero Waste Scotland considered the schools in North Ayrshire to provide sufficient insight) and Whitmuir (where machine use was very low). The extent to which the observations can be analysed quantitatively is dependent on the number of transactions actually observed in each case.

Insight from formal observations is supplemented by the insight gained during site visits by SKM, NSA and Zero Waste Scotland throughout the trial period, and feedback from site staff (about both what they have observed, and what customers have told them). This provides a useful perspective, in conjunction with other sources, both on changing behaviour over time (in particular the extent to which the observed periods at the universities may have been atypical, as they were near the start of term) and on behaviour outwith the monitoring period (for example, use by cleaning staff at some sites particularly in the early morning).

In-depth interviews were carried out by NSA at a smaller number of sites. These sites were selected by Zero Waste Scotland on the basis that they would provide most additional insight. The interviews targeted a range of site staff including management, cleaning and retail staff. The excluded sites were those where Zero Waste Scotland had had particularly extensive contact throughout the trial period, and it was felt staff insight and reactions were already well understood. Zero Waste Scotland has fed into the reporting process in all cases.

General

Although presented as strands A and B in research design, with SKM undertaking the fieldwork and analysis for strand A and NSA doing so for strand B, the final reporting and analysis for all cases, and the overview report, have been led by SKM, working closely with both NSA and Zero Waste Scotland. Throughout the process, the project team across the three organisations met regularly to exchange information and insight, and, particularly in terms of insight into site management and scheme performance, all three organisations gained insight from their respective site visits. The reporting should thus be seen as an integrated report, drawing on both technical data and analysis, and quantitative and qualitative social research.

Key challenges in interpretation and analysis are highlighted in the main report at section 2.4, and where appropriate when presenting specific findings. Table A1 shows the detail of monitoring across sites, including variation.

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	Pilot Project	Hard' Performance Data - baseline (pre-pilot)			Hard' Performance Data - during pilot							Strand B				Other information	
		Baseline retail data	Baseline waste management data	RVM data manual record	RVM data telemetry	Retail data	Voucher data	Waste Management data	Machine downtime	Site visits	Other in depth analysis	Focus Groups	Depth interview (days)	Observational analysis (days)	Face-to-face surveys (total number)	Site Specific data limitations	Other supporting information
Universities	GCU	Supplied approximately weekly by the General Manager of Catering Services	Supplied as monthly data by the Sustainability Coordinator	Supplied approximately weekly by the General Manager of Catering Services	Machine supplier provided data approximately weekly.	Supplied approximately weekly by the General Manager of Catering Services	Supplied approximately weekly by the General Manager of Catering Services	Supplied monthly by the Sustainability Coordinator	Limited data from machine supplier (machine ID but not date/duration)	5	Photographic/ observational bin audits (6: 5 by SKM staff; 1 by GCU staff)	2	0	3	250	Early weeks recorded as a total value. No machine downtime data provided by GCU. Procurement of drinks containers based on existing process rather than sensitive to current patterns.	
	HWU	Comparable data not available	Annual data available	N/A	Machine supplier provided weekly; data available at an hourly level	Supplied weekly by the Hospitality Services Manager and Student Union Manager; machine supplier provided weekly data on vouchers issued	Unavailable so waste compositional analyses undertaken	Machine supplier provided weekly	3	2 waste compositional analyses (prior and during trial)	3	1	2.5	500	The data provided by Hospitality Services of units sold in retail outlets was initially understood to be PET bottles; only as no cans were sold in retail outlets. However it became apparent in the latter stages of the trial that a small quantity of cans is indeed sold in retail outlets. This has led to an unidentifiable but small number of cans sales being reported as PET bottle sales		
	UoD	Provided by DUSA based on actual sales in the two campus shops during one term-time week, an estimated figure for weekly term-time vending machine sales and an estimate for expected sales (from shops and vending machines) during holiday periods.	Estimated weekly data on segregated recyclables provided by University based on container fullness rather than weight; estimated annual tonnages of segregated recyclables from teaching and admin buildings supplied by University waste manager; also monthly residual data excluding May to July 012	Supplied approximately weekly by the Environment and Sustainability Officer	Machine supplier provided data approximately weekly.	Supplied monthly by the Environment and Sustainability Officer/DUSA Shop and Vending Manager	Environment and Sustainability Officer provided data on the total amount invoiced by DUSA (variable frequency)	Data on for recycling from RotG banks, Halls of Residence supplied monthly by Dundee City Council; University Waste Manager supplied weekly data on University residual waste	Supplied approximately weekly by the Environment and Sustainability Officer; limited data from machine supplier (machine ID but not date/duration)	1	N/A	2	0	3	250		
HWRC	Troon	N/A	No data available	Total units data provided weekly by Council staff; data on bottle/can split only provided as overall ratio provided at end of trial	N/A	N/A	Monthly data provided by HWRC staff at end of trial	Material collected in combination with other recyclates so no data available	No data	2	N/A	0	1	1	1 day		
Schools	Marr College	Baseline vending sales data was available from DC7 Ltd but not from the school canteen	No data available	Weekly data provided by the community policeman	N/A	Weekly data supplied by canteen staff and monthly data for the vending machine was provided by DC7 Ltd	Data provided by the community policeman and the eco-committee	Only estimated data available	No data	2	N/A	0	1	0	50		
	NAC Schools	Monthly data supplied by each school's canteen staff	No data available	Janitor from each school provided a weekly record excluding summer holiday period	N/A	Monthly data supplied by each school's canteen staff	Monthly data supplied by each school's canteen staff	Only estimated data available so waste compositional analyses undertaken	Janitor from each school provided a weekly record excluding summer holiday period	3	2 waste compositional analyses (prior and during trial)	0	0	1	50 per school		
Retail	IKEA Edinburgh	Monthly data for Britvic vending machine sales only	Very little data available; initial visual inspection/weighting of recyclables to provide indicative daily data undertaken by SKM staff but access limited latterly	N/A	Daily data provided by machine supplier	Approximately four weekly provision of weekly data for relevant items sold in the restaurant and the Swedish Food Market by sustainability staff; data for store sales have been provided for PET and glass bottles	Approximately four weekly provision of weekly data for voucher redemption figures provided by sustainability staff	Some data on recyclables for a proportion of the trial period only	No data provided	4	Granular level telemetry data analysis	0	1	2	1 day per store		
	IKEA Glasgow	Monthly data for Britvic vending machine sales only	Monthly average residual waste data estimated based on volumes provided by store	N/A	Daily data provided by machine supplier	Approximately four weekly provision of weekly data for relevant items sold in the restaurant and the Swedish Food Market by sustainability staff; data for store sales have been provided for PET and glass bottles	Approximately four weekly provision of weekly data for voucher redemption figures provided by sustainability staff	Weekly residual data provided	No data provided	1	Granular level telemetry data analysis	0	1	2	1 day per store		
	Whitmuir	2012 unit sales provided for same period as pilot	Very little data available; initial visual inspection/estimation by volume of recycle and residual bins to provide indicative daily data undertaken by SKM staff; not possible to estimate fullness of glass banks (opaque)	N/A	Machine supplier provided at a weekly level	Weekly data provided by WO staff every few weeks	Machine supplier provided data on issued at a weekly level; weekly data on total redemptions provided by WO staff every few weeks	Weekly observations by WO staff of bags in the dry recyclables storage shed and residual bins where practicable	Machine supplier provided at a weekly level	1	N/A	0	1	0	Online - no target	Machine downtime data conflicting with staff experience due to issues with the quality of barcode stickers applied causing difficulty in machine reading	
Festival	HebCelt	None available	General waste and organics only for the 2012 festival	N/A	Machine supplier provided at a daily level	Hebcelt (beer cups; via Caroline) and 4 other vendors (bottles and cans); Based on stock purchased and left at end	Festival and machine supplier provided data on vouchers issued for prize winners	Council provided weighbridge data; supporting waste data gathered by SKM/Hebcelt team during festival via waste analyses	Manual observations only	Staff on-site the duration of entire festival	General waste analysis from litter pick / general waste	0	0	2	100		

Table A1 Breakdown of monitoring activity undertaken at each site



Zero Waste Scotland works with businesses, communities, individuals and local authorities to help them reduce waste, recycle more and use resources sustainably.

Find out more at zerowastescotland.org.uk
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