



Re-use of WEEE from Household Waste Recycling Centres (HWRCs)

Summary Report

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Contents

1	Introduction	6
2	Scope of Trials	6
2.1	Collection Methods	7
2.1.1	Trial I – Access to Designated Bays (items exposed)	7
2.1.2	Trial II – Access to Sites (items collected in containers)	8
2.1.3	Trial III – Re-use Organisation Set-up as a DCF	8
2.1.4	Trial IV – Bulky Uplifts Intervention	8
2.2	Promotion of Trials	9
3	Trials Key Findings	11
3.1	Trial I – Items at designated bays	11
3.1.1	Key Issues	11
3.2	Trial II – Items collected in containers	12
3.2.1	Key Issues	12
3.2.2	Comparison between Trial I & II	13
3.3	Trial III – Re-use Organisation Set-up as a DCF	14
3.3.1	Key Issues	14
3.4	Trial IV – Bulky Uplift Intervention	14
3.4.1	Key Issues	15
4	Cost Benefit Analysis	16
4.1	Scenarios	16
4.1.1	Trials I, II and IV Running for a Longer Period	16
4.1.2	Trial II Extension	17
4.1.3	Reduced Visual Inspection Rejection Levels	17
4.2	Cost Benefit Analysis Conclusion	17
5	Re-use Trial Benefits	17
6	Conclusions	19
7	Opportunities	20

Figures

Figure 1: Scope of Trials.....	7
Figure 2: Trial I – Access to Designated Bays (Items Exposed).....	7
Figure 3: Trial II – Access to Sites (Items Collected in Containers)	8
Figure 4: Trial III – Re-use Organisation Set-up as a DCF.....	8
Figure 5: Trial IV – Bulky Uplifts Intervention	9
Figure 6: Examples of Signage	10
Figure 7: Trial I Results	11
Figure 8: Trial II Results.....	12
Figure 9: Number of Items Uplifted and Re-used (Trials I and II)	13
Figure 10: Re-use Flow - Items Passing Each Stage	14
Figure 11: Fridge Collected Through Bulky Uplift.....	15
Figure 12: Cost Benefit Analysis (Re-use Trials v 'No Trial/All Recycled')	16
Figure 13: Trial Specific Conclusions	19

Glossary

AATF	Approved Authorised Treatment Facility
DCF	Designated Collection Facility: a registered and approved site which is dedicated to the collection of WEEE from private households for onward clearance by, or on behalf of, producers or compliance schemes. DCFs may be established at local authority civic amenity sites or waste transfer stations, or by distributors, producers, third parties or charitable and social enterprise organisations engaged in the re-use of EEE.
EEE	Electrical and Electronic Equipment
HWRC	Household Waste Recycling Centre
KPI	Key Performance Indicator
LA	Local Authority
LDAs	Large Domestic Appliances
NPV	Net Present Value
PAT	Portable Appliance Testing
PCS	Producer Compliance Scheme
WEEE	Waste Electrical and Electronic Equipment

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
www.zerowastescotland.org.uk

Executive Summary

This report provides a summary of the opportunities to maximise the re-use of waste electrical and electronic equipment (WEEE) products disposed at HWRC sites. The project used four trials to identify the key issues, potential solutions to barriers and provide an economic analysis to identify the most cost effective options. The trials have resulted in commitments by the participating councils to continue the trials and expand them into permanent activity. In real terms, this means that 770,000 people, almost 15 % of Scotland's population, now have the option to re-use their unwanted electrical items.

Background

Research indicates that only 7% of Waste Electrical and Electronic Equipment (WEEE) collected at Household Waste Recycling Centres (HWRCs) is currently re-used. However, it is estimated that approximately 23% could be re-used with only a small degree of refurbishment and repair. This presents a significant opportunity to increase the benefits of re-use to local communities at a time when the re-use sector is seeing a significant increase in demand for such items; particularly large domestic appliances.

Scope of Trials

The project involved four trials:

- Trial I – Items collected from designated bays at HWRCs;
- Trial II – Items collected from lockable containers at HWRCs;
- Trial III – Re-use organisation set-up as a Designated Collection Facility (DCF); and
- Trial IV – Bulky uplifts intervention.

Key Findings

- Raising and maintaining public awareness is important to optimise re-use opportunities;
- Co-ordination and co-operation between stakeholders is important to optimise re-use;
- Optimising repair knowledge and expertise is required to maximise re-use;
- Use of containers at HWRCs increases the amount of products that can successfully be re-used. During Trial I, 22% of LDAs and cooling equipment that were uplifted from the HWRCs were successfully re-used; however, during Trial II, 68% of items uplifted were re-used; and
- Trial IV had the highest net benefit (per item) of all trials (see figure below).

Cost Benefit Analysis

	Trial I	Trial I (All recycled)	Trial II	Trial II (All Recycled)	Trial IV	Trial IV (All Recycled)
Total Revenue	£9,935	£6,458	£21,320	£7,872	£3,830	£440
Total Cost	£3,826	£0	£14,865	£0	£561	£0
Total Benefit	£6,110	£6,458	£6,456	£7,872	£3,269	£440
Revenue / Unit	£0.60	£0.39	£1.65	£0.61	£10.13	£1.16
Cost / Unit	£0.23	£0.00	£1.15	£0.00	£1.48	£0.00
Benefit / Unit	£0.37	£0.39	£0.50	£0.61	£8.65	£1.16

This indicates that Trial II is preferable to Trial I; this is despite a lower cost related to Trial I due to no containers being required. This is due to the higher proportion of items being re-used.

Trial IV had a significantly high net benefit (per item), although with a lower overall benefit, which is due to the lower volume of items. The larger benefit per item was due to having a higher proportion of items being re-used; however, this consequently resulted in a lower volume of items, impacting on the total revenue.

Opportunities

Participating organisations highlighted several areas which could help increase re-use:

- Raising public awareness will increase items available for re-use;
 - Re-use should be prioritised at HWRCs;
 - Improving training and support for HWRC operatives will maximise the items that can potentially be re-used from HWRCs;
 - Containers should be used to protect items for re-use at HWRCs;
 - In order to maximise the quantity of items re-used from HWRCs, training should be provided to repair staff to optimise their knowledge and skills to enable them to repair the most challenging items;
 - Efforts should be made to prevent leakage of potentially viable units from HWRCs to increase re-use opportunities;
 - EEE should be designed for easy repair using standard parts; and
 - Scottish Welfare Fund should include repaired items to help create greater demand for re-use products.
-

1 Introduction

Currently only 7% of WEEE separately collected at HWRCs is re-used¹. However, it is estimated that approximately 23% could be re-used with only a small amount of repair. This represents a significant opportunity to increase the re-use of WEEE and the benefits it brings.

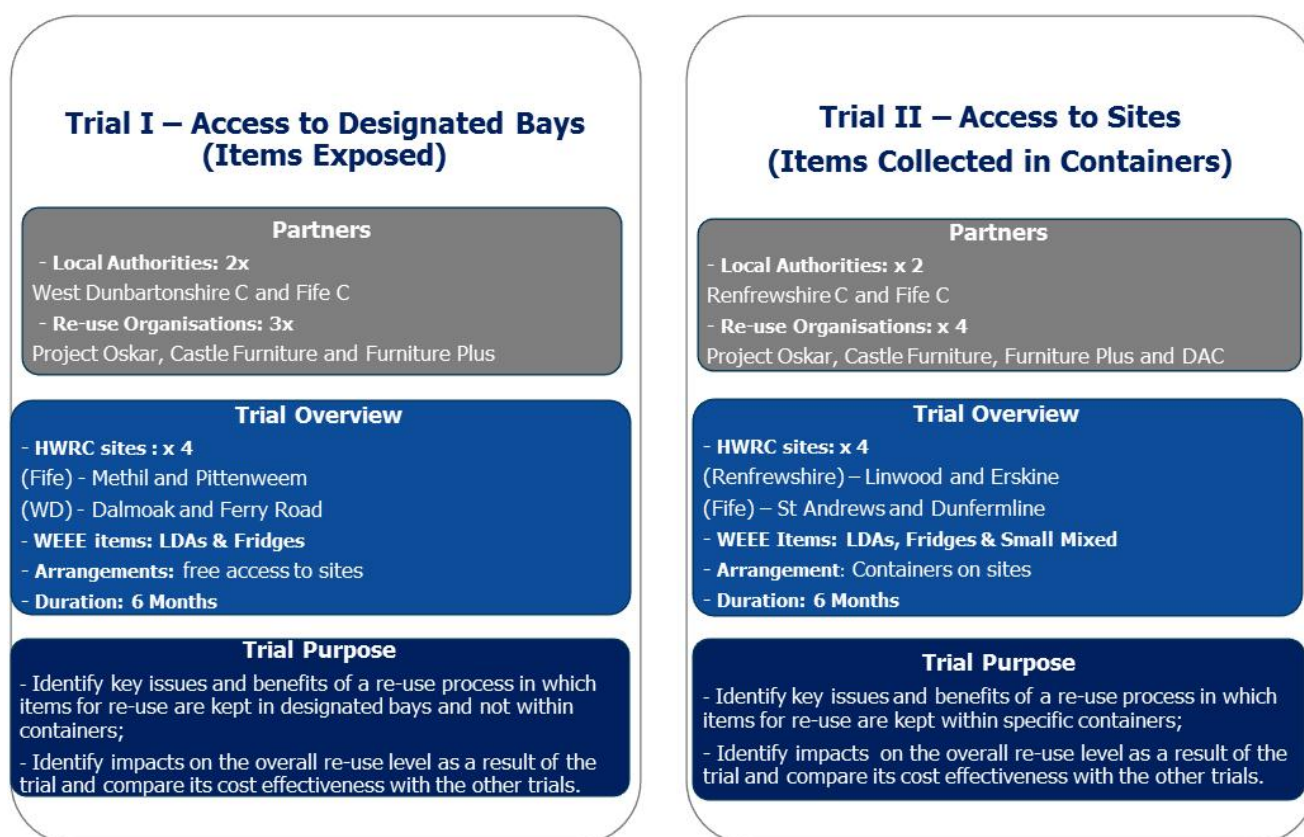
It is generally accepted that re-use contributes to resource efficiency by extending the life of a product. This results in a reduced demand for the manufacture of new products, and as such, reduces the burden on raw material extraction for all the constituent materials (such as metal, glass and plastic) that make up electrical and electronic equipment (EEE)². There are also social and financial benefits to increasing WEEE re-use, such as job creation and training opportunities.

This project trialled different methods of collecting WEEE for re-use from HWRCs in order to identify the best system for optimising re-use.

Although the focus of the study was on collections from HWRCs, a trial was included that involved the collection of WEEE for re-use from bulky uplift collections. It was identified that bulky uplift collections can affect the items received at HWRCs, and, as such, this trial was included for completeness.

2 Scope of Trials

The trials looked at four methods of obtaining WEEE suitable for re-use, as shown in the figure below.



¹ Or approximately 40,650 tonnes. Data accessed from the Environment Agency website on October 2013.

² Re-using WEEE products provides a greater benefit than recycling WEEE because most of the upstream activities required to manufacture a WEEE product are avoided. The only upstream activities that might be required are those associated with repair and parts that may be needed to refurbish a re-usable WEEE product.

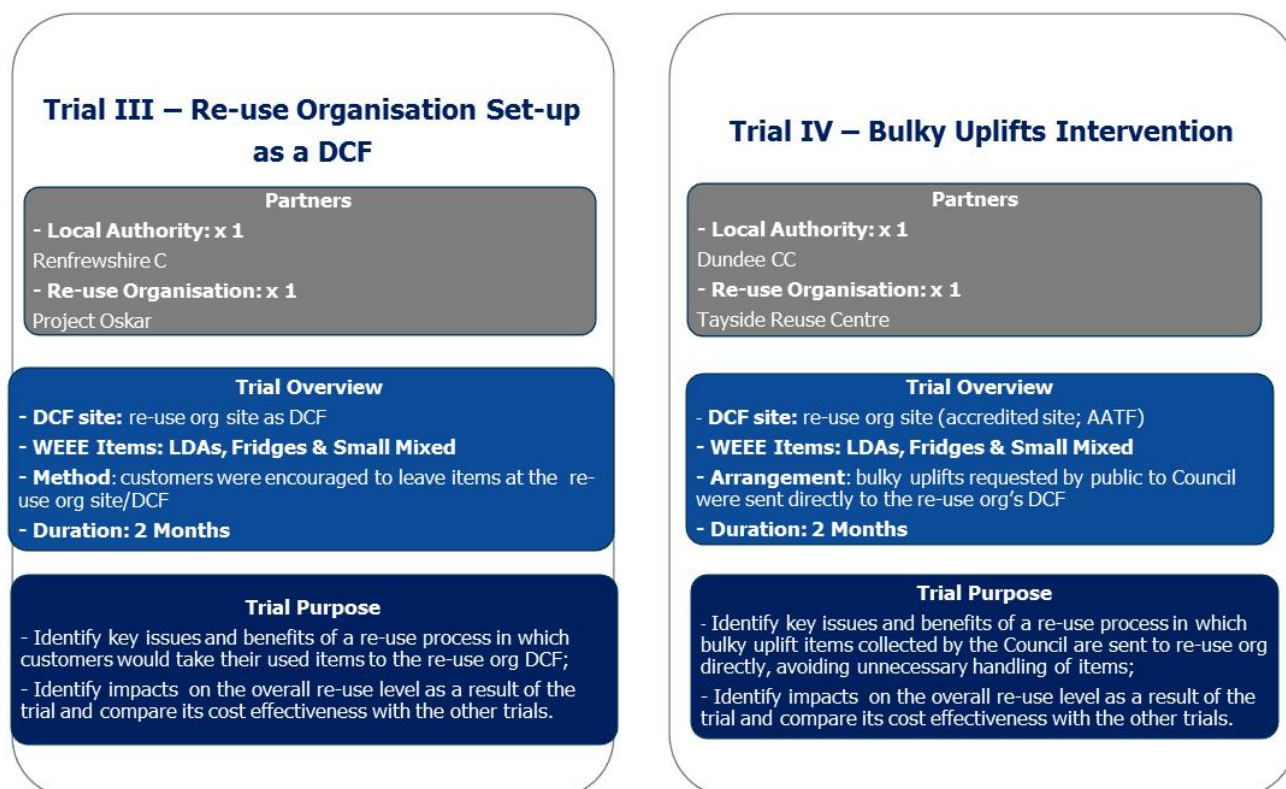


Figure 1: Scope of Trials

The trials were conducted within the boundaries of four Scottish local authority areas: Dundee, Fife, Renfrewshire, and West Dunbartonshire. The selection of these local authorities provided a mix of urban and rural catchment areas, allowing the trials to assess as many varying elements as possible.

2.1 Collection Methods

2.1.1 Trial I – Access to Designated Bays (items exposed)

Trial I was designed to establish the percentage of items that could be re-used where the WEEE was stored in existing designated areas at HWRCs, and consequently exposed to the elements. This would assess the impact of this storage method and exposure to weather on re-use performance. The figure below shows the process, from items deposited by the public at the sites, to final destination.

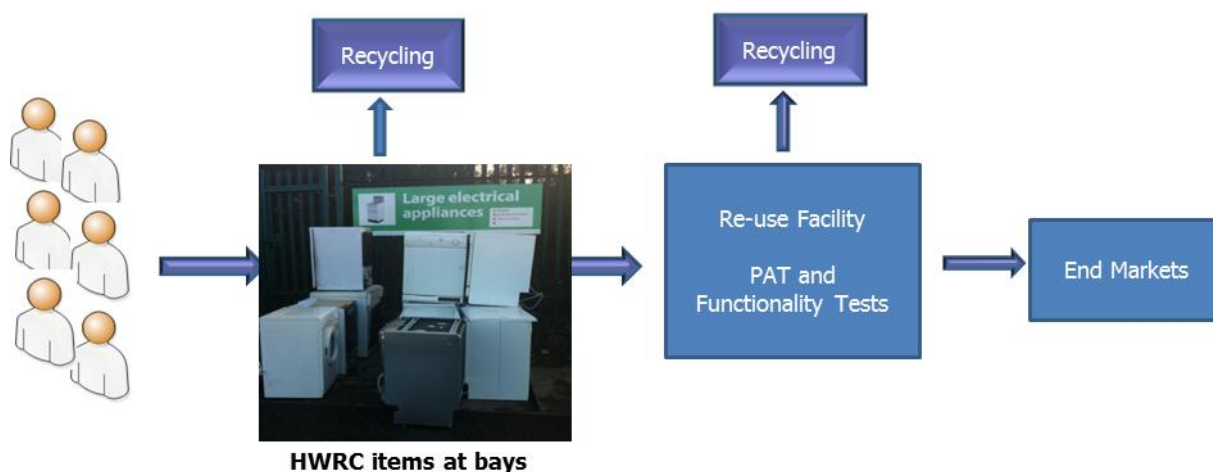


Figure 2: Trial I – Access to Designated Bays (Items Exposed)

2.1.2 Trial II – Access to Sites (items collected in containers)

Trial II was set up to identify the number of WEEE items that could be recovered for re-use from an HWRC where the items were stored undercover in containers. The aim of this trial was to identify how the potential for re-use could be increased by protecting the WEEE from the weather at an HWRC.

Figure 3 describes the process, from items been left by the public, to final destination.



Figure 3: Trial II – Access to Sites (Items Collected in Containers)

2.1.3 Trial III – Re-use Organisation Set-up as a DCF

Trial III was set up to identify the number of WEEE items that could be recovered by the public taking items directly to a re-use organisation instead of to a HWRC. Project Oskar was registered as a designated collection facility (DCF) and acted like a 'dedicated HWRC'. Figure 4 describes the process.

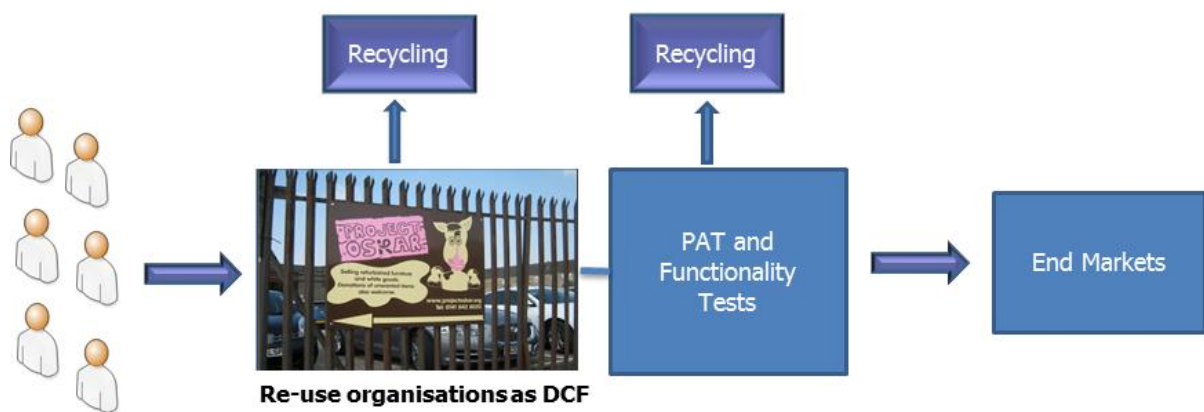


Figure 4: Trial III – Re-use Organisation Set-up as a DCF

2.1.4 Trial IV – Bulky Uplifts Intervention

Trial IV was set up to identify the number of WEEE items that could be recovered directly from bulky uplift collections. The aim of this trial was to show if there was a benefit from intercepting the WEEE item (in terms of re-use potential) prior to it arriving at an HWRC/depot.

The trial involved Dundee City Council collecting bulky uplift items from households on demand, as per their normal collection service. However, rather than take the items back to their depot, the Council diverted the WEEE items directly to the Tayside Re-use Centre. Figure 5 shows the process from the point of the public requesting a bulky uplift service to items been delivered at the re-use organisation site.

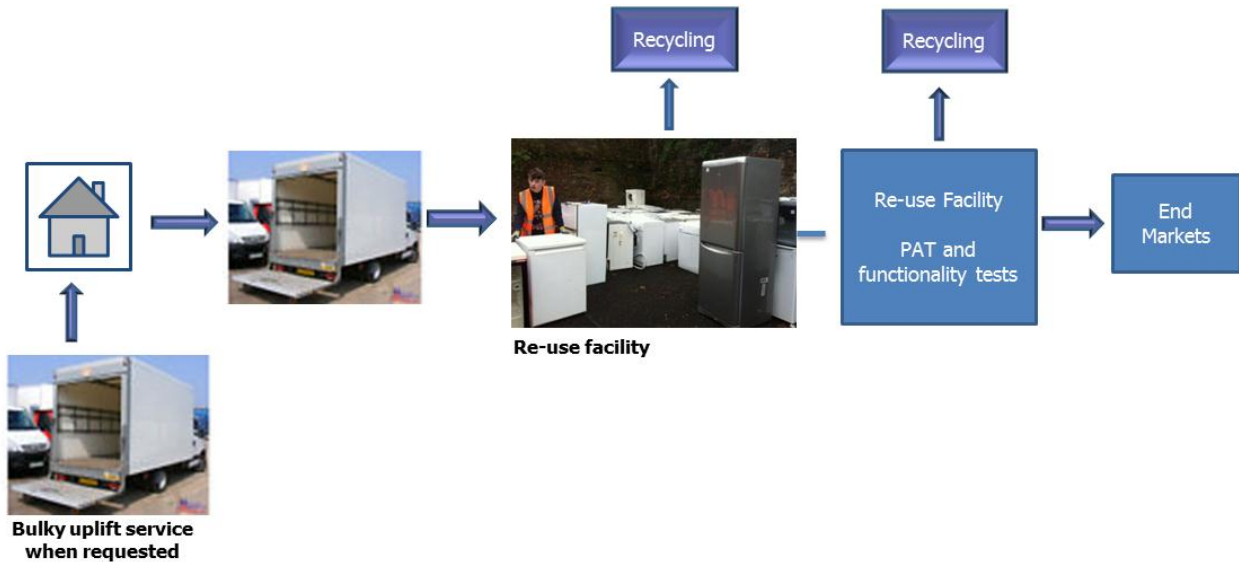


Figure 5: Trial IV – Bulky Uplifts Intervention

2.2 Promotion of Trials

The trials were supported by a communication strategy to help:

- Engage and educate site staff in the benefits of re-use;
- Inform staff of how the re-use system used in the trial should operate and what their role would be; and
- Encourage the public to increase the number and frequency of items they bring to the site for re-use.

In conjunction with the WRAP and ZWS communications teams, Valpak used the following communications tools for Trials I, II and III, using the WRAP Re-use National Campaign template:

- **A5 Leaflets**³ – These were printed and distributed door-to-door in the HWRC catchment area. The leaflets informed the public of the service and its benefits. The leaflets encouraged the public to bring working or potentially repairable items to the HWRC for re-use;
- **Advertisements on Council Websites**⁴ – Details of the trials were posted on each of the Council websites. The message was consistent for Trials I & II; however, for Trial III, the text encouraged the public to take their used items directly to the DCF (Project Oskar); and
- **Signage (banners and stickers)**⁵ – This was used to reinforce the re-use message once the public arrived at the site (Figure 6), and also to help HWRC staff divert items for re-use. Larger

³ A total of 8,000 A5 leaflets were printed and distributed for all trials.

⁴ As an example, within its bulky uplift webpage, Renfrewshire Council reminds the public of the possibility of those items being re-used, and provides the contact details for Project Oskar. It can be accessed here: <http://www.renfrewshire.gov.uk/webcontent/home/services/environment/recycling+and+waste/special+uplifts/es-ss-special-uplift-household>

10 | Re-use of WEEE from Household Waste Recycling Centres (HWRCs)

signage in the form of decals was also added later in the trial as a direct result of feedback from the HWRC staff relating to public perceptions.

The figure below shows examples of communication materials used on site to promote the re-use service.



Figure 6: Examples of Signage

⁵ Each of the nine sites (including trial III with Project Oskar as a DCF) was given a banner and stickers for the containers (trial II only).

3 Trials Key Findings

3.1 Trial I – Items at designated bays

Figure 7 shows the number of items (by WEEE stream) that passed through the HWRCs during the trial period, the number that passed the visual inspection stage (deemed to have the potential for repair) and the number ultimately re-used⁶.

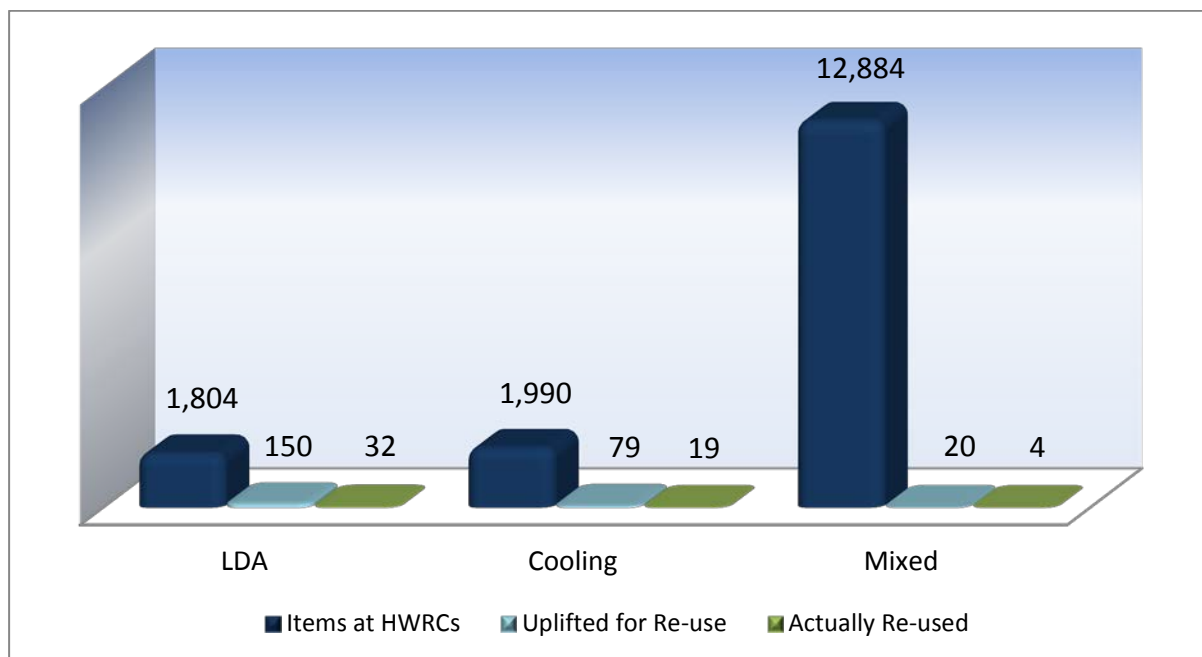


Figure 7: Trial I Results

The total number of items received on all four sites operating this trial was 16,678, with 3,794 of them being white goods (LDAs and Cooling Equipment). Of these white goods, 229 items that passed the initial visual inspection at the HWRCs were collected for re-use (6% of the white goods) by the re-use organisation.

3.1.1 Key Issues

The key issues identified in relation to Trial I during the six month trial period were:

- Items were subject to damage from weather at the HWRC. This included water damage to electrical circuits and cosmetic damage to cases;
- Extra traffic on sites due to the addition of the re-use collections. This added extra management time for site supervisors to manage extra vehicles in and out of sites, meaning the re-configuring of plans for the co-ordination of vehicle movements. A minority of supervisors were sceptical regarding the trials and so gaining staff “buy-in” should be a feature of pre-service training;
- Many items that could have been considered for re-use were incomplete when inspected by the re-use organisation. The most common example of this was missing copper wire, especially mains leads; however, compressors and filters were also regularly missing from otherwise salvageable fridge units; and
- The re-use organisations involved in Trial I all had established retail showrooms and had constant demand for white goods. The end market in this trial was 100% retail; however, alternatives such

⁶ Total re-used includes items already sold plus proportion of items nearing the end of the test process, of which 40% are expected to be repaired.

as Social Services and landlords would readily fit into the template should the retail model reach a surplus of supply.

3.2 Trial II – Items collected in containers

Figure 8 shows the number of items (by WEEE Stream) that passed through the HWRCs during the trial period, the number that passed the visual inspection stage (deemed to have the potential for repair) and the number ultimately re-used⁷.

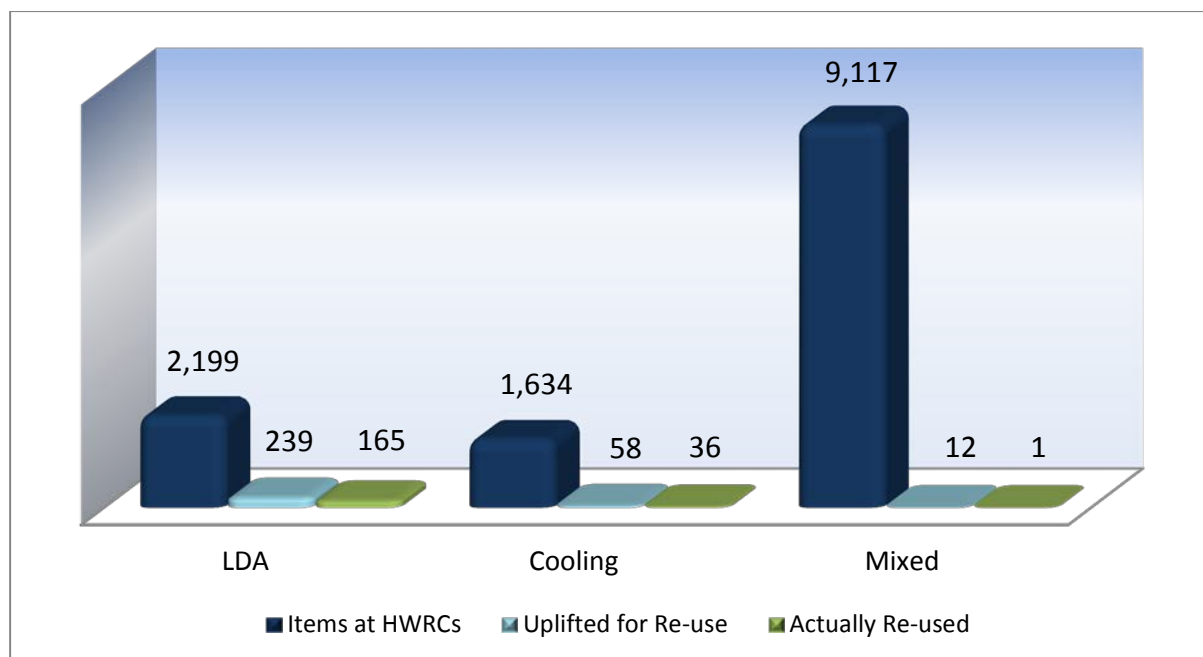


Figure 8: Trial II Results

The total number of items received on all four sites was 12,950, with 3,833 (or 30%) of them being white goods (cooling and LDAs). Of these, 297 items (8%) passed the visual inspection and were collected for re-use.

3.2.1 Key Issues

The key issues identified in relation to the operational aspects of Trial II (collected in containers) during the trial period were:

- Restricted space availability proved to be an issue on some sites for siting containers;
- The introduction of the re-use collections meant more site traffic, which (as per Trial I) had to be accommodated into site operational plans;
- Risk assessments relating to the ingress and egress of materials from the re-use container needed to be completed prior to the commencement of the service. Also, the removal of non-reusable items from the container to the recycling area had to be managed by the re-use staff;
- It was found that there was a high degree of difficulty in re-using mixed WEEE collected from HWRCs, which is an issue experienced at many sites (and is not specific to these trials). The key reasons are:

⁷ Total re-used includes items already sold plus proportion of items nearing the end of the test process, of which 40% are expected to be repaired.

- o The vast majority of HWRCs use open skips to store mixed WEEE; these containers cannot be safely accessed to remove individual items potentially suitable for re-use;
- o The mixed WEEE contained in these open skips is often compacted or rolled to increase the density of the material for more cost-effective transportation;
- o Secondary segregation areas for re-usable mixed WEEE could increase the number of items taken for repair, but few sites have the necessary space to provide bays or containers for this purpose;
- o Most re-use organisations consider mixed WEEE uneconomical to refurbish and repair; and
- o The physical characteristics of mixed WEEE, such as cables readily intertwining with the other items, makes the process of selecting objects for re-use time-consuming and labour intensive.

As in trial I, it is important to note that during the first weeks there was a period of 'maturation', which included the co-ordination of collections between re-use organisations, recycling companies and site staff. This maturation period may have negatively affected the number of items separated into containers for collection and therefore the amount of WEEE suitable for re-use during the trial.

3.2.2 Comparison between Trial I & II

Trial I and Trial II were operationally very similar, with the differences relating to the way items were stored on site rather than changes to collection procedures. Even allowing for local variations in service provision and repair skills, Figure 9 demonstrates that re-use containers facilitated a significant increase in the ratio of items (LDAs and cooling items) from visual inspection at the sites to full repair at the re-use organisations' sites. This shows that Trial II proved the most successful in terms of the number of items entering the re-use system and the number ultimately being re-used.

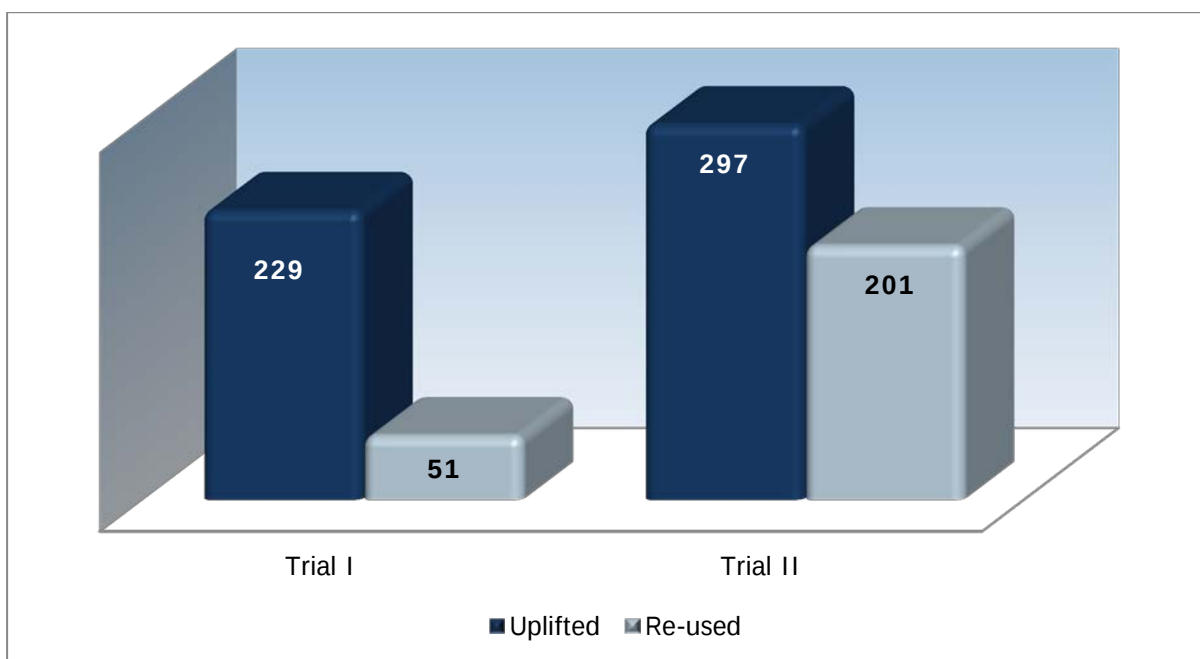


Figure 9: Number of Items Uplifted and Re-used (Trials I and II)

3.3 Trial III – Re-use Organisation Set-up as a DCF

Trial III involved the engagement of Project Oskar as a Designated Collection Facility (DCF) where householders could bring their unwanted WEEE for direct donation for re-use. However, monitoring of site activity over a two month period established that no WEEE items were taken directly to Project Oskar.

3.3.1 Key Issues

Discussions with Project Oskar's manager and the Council established that the main reasons for this lack of interest were:

- The number of alternatives currently available to the public when disposing of WEEE in working condition, such as eBay, Gumtree, and Freecycle websites. All were offering alternative routes, either as donations or as a means of raising money. These could be seen as more convenient options than transporting items to a local DCF;
- Project Oskar's own free collection service offers the public the option to have items uplifted directly from their own door rather than having to take them to the Project Oskar site. This meant that although the items were still being taken back to the DCF site by Project Oskar staff, the bulky uplift service prevented the public having to use the site as they would any other HWRC/DCF and have to take their items to the site.

As the take-up at the DCF was so poor, Trial IV was established as an alternative.

3.4 Trial IV – Bulky Uplift Intervention

Figure 10 shows the number of items collected by the Council, the number of items that passed the visual inspection stage at the re-use organisation site, the number that passed the PAT and functionality tests and the quantity ultimately re-used.

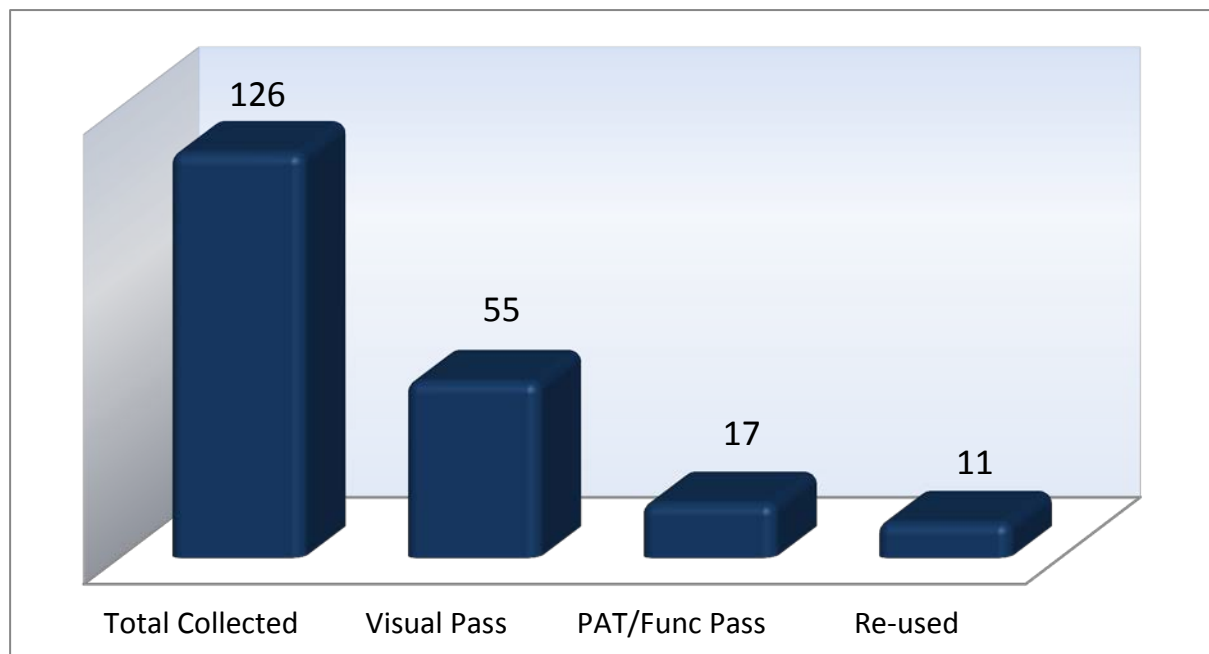


Figure 10: Re-use Flow - Items Passing Each Stage

The difference in the number of units collected and the number passing visual inspection was significant. As bulky uplift items are collected from kerbside, some showed signs of prolonged exposure to the elements. This rendered them damaged beyond what was considered as acceptable

for normal household use. As an example, Figure 11 shows an item collected from a bulky uplift, which has a missing door and broken shelves.



Figure 11: Fridge Collected Through Bulky Uplift

Approximately 44% of items delivered to the re-use centre passed the initial visual inspection, which was a similar proportion to that seen during the HWRC trials. This suggests that if items can be collected in the bulky uplift service before being damaged by weather, vandalism, or theft then the number of items that are suitable for re-use could increase significantly.

3.4.1 Key Issues

- The delay between WEEE items being put out for collection and being uplifted may be a significant factor in determining whether the items will be suitable, or even available for re-use. Traditionally, bulky uplifts are carried out from kerbside, with a potentially long period of time between an item being deposited and its collection. The only responsibility on the householder is to place the item at the collection point. They have no responsibility and usually no control over who collects the item and when; and
- The number of items being delivered to the re-use organisation was fairly consistent, but the condition varied greatly. The reasons for this were that items left at the kerbside were frequently found to be vandalised or had parts and valuable metal components removed. Audits showed that the majority of items put out for collection reached the re-use organisation; however, it should be noted that leaving items on the kerbside presents an opportunity for theft⁸. The scale of the problem is difficult to fully assess, and would require careful cross-checking of client orders against uplifted totals to ascertain the full extent of the loss.

⁸ This scenario is not limited to a single local authority; discussions relating to Bulky Uplift services with other authorities are similar, with crews arriving at the collection address and finding items had already been removed.

4 Cost Benefit Analysis

The total results are shown in the figure below, which provides the marginal revenue, cost per item for Trials I, II and IV (in comparison to no trial taking place, i.e. all recycled) and the net benefit per unit of each trial over the initial six month trial period⁹.

	Trial I	Trial I (All recycled)	Trial II	Trial II (All Recycled)	Trial IV	Trial IV (All Recycled)
Total Revenue	£9,935	£6,458	£21,320	£7,872	£3,830	£440
Total Cost	£3,826	£0	£14,865	£0	£561	£0
Total Benefit	£6,110	£6,458	£6,456	£7,872	£3,269	£440
Revenue / Unit	£0.60	£0.39	£1.65	£0.61	£10.13	£1.16
Cost / Unit	£0.23	£0.00	£1.15	£0.00	£1.48	£0.00
Benefit / Unit	£0.37	£0.39	£0.50	£0.61	£8.65	£1.16

Figure 12: Cost Benefit Analysis (Re-use Trials v 'No Trial / All Recycled')

The results show that trials I and II yield a lower benefit (total and per item) than simply recycling all the items. However, it should be noted that the containers and marketing costs are 'sunk' costs so only needed to be accounted for at the start of the trial. This means that in the following months Trials I and II are preferable options to 100% recycling in terms of cost benefits.

In addition, the results would suggest that Trial II is preferable to Trial I, despite a lower cost related to Trial I due to no containers being required. This is due to the higher proportion of items being re-used in Trial II in comparison to Trial I.

Trial IV had the highest net benefit (per item), although with a lower overall benefit due to the lower number of items. The higher benefit per item was due to having a higher proportion of items being re-used (and low cost as the local authority charges for the bulky uplift service, and as such, is cost neutral), although the lower number of items impacted on the total revenue.

The trials showed that re-use was more beneficial than recycling; however, the service needs to be operational for several months before this is the case due to the initial costs of marketing and containers.

4.1 Scenarios

The following scenarios were developed for a more detailed analysis:

- Trial I, II and IV running for a longer period;
- Trial II extension; and
- Trials assuming reduced visual inspection rejection levels.

4.1.1 Trials I, II and IV Running for a Longer Period

This analysis considered a four year period and gives a cumulative net present value (NPV) for each trial option at the end of each year¹⁰. Results indicated that Trial I would need to run for at least two

⁹ It should be noted that the results for Trial IV have been scaled up to represent six months worth of results as this trial only ran for two months.

¹⁰ These costs are discounted in line with the discount factors as provided in the Defra Green Book on economic evaluation, which can be found here: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

years before it is preferable to 100% recycling. However, Trial II and Trial IV equivalent would be preferable to 100% recycling after just one year in operation¹¹.

4.1.2 Trial II Extension

This scenario looked at the impact of an extension of Trial II, due to its higher re-use level, assuming that five times Trial II services were in operation¹². The results showed that with only five Trial IIs in operation (based on a 12 month period), approximately 2,000 items could be re-used per year: equivalent to 104 tonnes. There would also be a positive NPV of over £107,000 over the first year.

4.1.3 Reduced Visual Inspection Rejection Levels

The final analysis carried out was on the visual inspection rejection levels that occur at this stage at the HWRCs¹³. This scenario was designed in order to identify the impact on the re-use levels just by improving the conditions of items on site; i.e., by reducing the current levels of rejection at visual inspection stage. Results showed that by reducing the visual inspection rejection rates (at HWRCs sites) by only 3% (from 98% to 95%), the total quantity of items re-used would more than double from 202 to 423 items: a rise of 109%.

4.2 Cost Benefit Analysis Conclusion

A combination of a high number of items and a high re-use rate resulted in Trial II being the most cost effective system for re-use. This Trial also demonstrated that that re-use is not only a more environmentally preferable option, but also more economically advantageous (once the initial set up costs are paid back).

The results from the cost benefit analysis showed that over a period of at least two years, all the re-use trials were more cost effective than a recycling only option. This highlights that re-use is not only a more environmentally preferable option, but it is also more economically advantageous once the initial set up costs are paid back.

When comparing each trial, the results showed that Trial II delivered the best economic results because it combined the most advantageous features of Trial I and IV. It had a high throughput of items in comparison to Trial IV, meaning the overall benefit was greater due to a higher number of items being re-used and returned to market. Trial II also indicated a higher re-use rate in comparison to Trial I due to the use of containers, which protected the equipment from the elements.

Trial IV had the highest net benefit (per item), although with a lower overall benefit due to the lower number of items.

5 Re-use Trial Benefits

The benefits of the project were identified throughout the duration of the trials and also through interviews with the trial partners. These are:

- **Supports the local community** - Re-use organisations are often involved in providing jobs and training opportunities for the local community. Being able to secure a consistent feedstock of items from HWRCs and bulky uplift collections allows them to continue and even expand these

¹¹ It should be noted that the components of the revenues and costs in this table are detailed in Appendix V, i.e. this is a direct financial comparison and does not include a wider external analysis such as impact upon incumbent compliance scheme.

¹² The analysis is based on one year and includes the total quantity of material successfully re-used and the total NPV (net present value).

¹³ Of the total items received on site, 99% and 98% were rejected from collection for re-use for Trial I and Trial II respectively.

opportunities. Castle Furniture, for example, now employs a full time domestic appliance engineer, who provides training to their third sector partners;

- **Supports the growth of re-use organisations** - Castle Furniture has indicated that participation in the trials and the resultant engagement with Fife Council and its WEEE Producer Compliance Scheme has enabled it to invest in its business, safe in the knowledge that it has regular access to a secured supply of items;
 - **Supports the development of skills within re-use organisations** - Knowing that a steady supply of WEEE is available allows organisations to commit to training programmes, which help to increase the number of items being repaired;
 - **Potential to extend support to other Councils and charities** - Castle Furniture now has access to approximately three times more WEEE items than prior to the trials and can therefore currently support its charity partners who do not have repair facilities of their own;
 - **Management of WEEE occurs further up the waste hierarchy** - By diverting more WEEE to re-use rather than to recycling or disposal, the local authorities are able to demonstrate improved management of WEEE further up the waste hierarchy than at the point of recycling;
 - **Positive public relations (PR)** - As a result of local authorities' participation in the trials they are able to demonstrate their willingness to support the local community as well as achieving environmental benefits; and
 - **In line with the circular economy approach** - Increasing the rate of WEEE re-use demonstrates improved resource efficiency through product life extension.
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6 Conclusions

General Conclusion

The success of introducing a re-use system at HWRCs is largely dependent on the active support of all parties involved. The majority of obstacles in the trials were overcome through consistent communication and support amongst all parties:

- **Public** – Public participation and support of any re-use service is important to ensure they make items available for re-use. It also helps ensure items are stored, transported and handled in a way that optimises their potential for re-use;
- **Councils** – It is important that on-site staff actively seek out goods for re-use, and embrace the concept of using set-aside areas and containers to overcome the first hurdle of making material available for the re-use organisations;
- **Re-use organisations** – They must work closely with the councils to build relationships at site level, and to work around established collection patterns in order to maximise the yields from HWRCs; and
- **The Compliance Scheme** – It is important for an organisation such as a Compliance Scheme to take on the role of a service manager. This involves co-ordinating re-use organisations, councils, and recycling companies to ensure services are provided seamlessly. The compliance scheme effectively became the facilities manager for each trial/service, taking an overview of where changes were required and amending them when required.

Trial Specific Conclusions

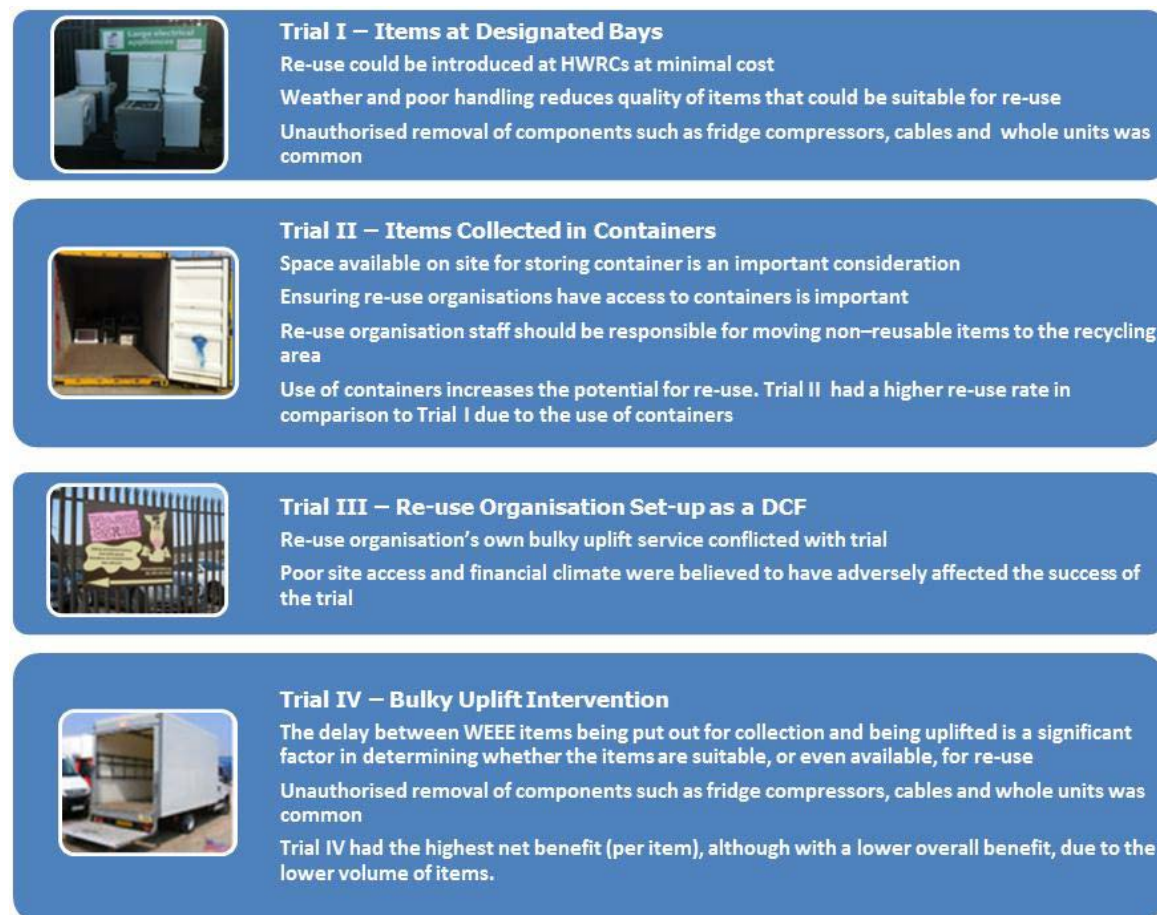


Figure 13: Trial Specific Conclusions

As a result of these trials, WEEE re-use was made available to 15% of Scotland. This demonstrates that partnership, co-ordination and communication amongst relevant parties are essential features in optimising the potential for WEEE re-use in the UK.

7 Opportunities

Opportunities to increase re-use identified by the project partners.

- **Increase public awareness of re-use services and benefits** - Re-use should be widely promoted on-site at HWRCs to ensure that the public is aware of the re-use opportunity being offered. The social benefits of re-use should also be promoted. Consideration should be given to informing the public about re-use before they get to site to ensure they handle and transport the items appropriately;
 - **Improve training and support for HWRC operatives** - The trials showed that there is little or no formal training in place regarding methods of engagement with the general public in terms of re-use. HWRC staff are a key factor in any successful re-use operation, but there is limited research into their attitudes and views on improving re-use processes. They can make a significant contribution in areas such as their approach to the general public, properly assessing incoming items goods and avoiding the double handling of items on-site. Training can be delivered by a service provider rather than in a formal training module, and can be undertaken as both a continuous and periodic process, reinforcing key messages;
 - **Re-use should be prioritised at HWRCs** - Re-use is often absent from the site design or its operational procedures. The use of bays containing hook lift compactors is a good example of how repairable items, simply by being thrown over the bay wall into the container, are put instantly beyond re-use. Set-aside re-use areas should be included at all HWRCs to capture re-usable WEEE before it enters the recycling stream;
 - **Where space permits, containers for re-use should be used at HWRCs** - The main advantage of using dedicated containers is to keep the items undercover to prevent weather damage. The container may also reinforce a 're-use first' message on site, giving a physical presence to the re-use commitment of the site. With appropriate signage, the container can be used as a public awareness portal, helping to direct people to the re-use service offered;
 - **Increase refurbishments and repair skills of re-use organisation staff** - Improving the knowledge and skills of repair staff could increase the number of items being refurbished, repaired and ultimately re-used. Consideration should be given for supporting re-use organisations in improving their knowledge and repair capabilities. This would include the recruitment of staff with the specialist skills required to refurbish and repair WEEE, and the ability to transfer that knowledge to other members of the organisation. This training would ideally be delivered via a structured training programme, leading to externally recognised qualifications;
 - **Leakage from collection points must be minimised to increase re-use** - Initiatives that could help reduce or prevent leakage and increase the number of items available for re-use include use of onsite CCTV, spot site visits, item tracking and comparing bulky item requests against items collected;
 - **EEE should be designed for easy repair** - The lack of standardisation of parts and accessories used in EEE items, even within the same brand, can make their repair and refurbishment for re-use more expensive. This often results in the re-use organisation having to purchase specific parts directly from manufacturers, which can mean that the item becomes uneconomic to repair and is therefore sent for recycling instead. Manufacturers should be encouraged to design items for easy disassembly and repair, using standardised parts that would enable items to be easily and cost effectively repaired;
 - **Scottish Welfare Fund should include repaired items** - Although the fund provides a valuable lifeline to people in severe hardship, the fund only applies to new items. This means that people who may have had their needs met by re-used EEE must now apply through the fund to purchase new items, thereby reducing a potential end-market demand for repaired items. In addition, the
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cost of the grant system is increased as there is a clear cost differential between new and repaired items. Consideration should be given to determine if the scope of the fund can be broadened to include re-used EEE; and

- **Benefits of re-use organisations providing bulky uplifts services should be investigated further** – This would determine if the leakage of items could be reduced or prevented, as well as whether the quality of items collected directly from the householder could be improved.