Report

Worked Example Report for the Collection of Absorbent Hygiene Products from Scottish Households

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communities and local authorities to help them reduce waste,

recycle more and use resources sustainably.

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Front cover image: Perth & Kinross Council AHP introductory leaflet front cover

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1 Introduction

This Worked Example Report has been developed to provide guidance and support for local authorities who are considering implementing an Absorbent Hygiene Products (AHP) collection service as part of their overall waste management strategy. This report details worked examples for four different weekly kerbside collection services for AHP, detailed in Table 1, for a single exemplar Local Authority of 42,262 households.

Table 1: Summary of Kerbside Collection Service Types Used in the Worked Examples

Kerbside Collection Service Type
1. 120 Litre External Wheeled Bin and 30 Litre Tiger Sacks (Annual Supply of 156 Sacks); bin presented weekly at kerbside.
2. 120 Litre External Wheeled Bin; bin presented weekly at kerbside.
3. 87 Litre Container and 80 Litre Blue Recycling Sacks (Annual Supply of 104 Sacks); blue recycling sacks presented weekly at kerbside.
4. 80 Litre Blue Recycling Sacks (Annual Supply of 104 Sacks) and 30 Litre Tiger Sacks (Annual Supply of 156 Sacks); blue recycling sacks presented weekly at kerbside.

These worked examples are based on the results of the Scottish local authority AHP trials funded by Zero Waste Scotland (ZWS) in 2012-13. The results of these trials, presented in the ZWS Evaluation of the AHP Collection Trials in Scotland (2013) report[1], indicate that kerbside services are the recommended collection method for these types of materials. Kerbside collections, irrespective of service type, achieved higher public acceptability, opt-in rates and diversion rates than collections from Household Waste Recycling Centres (HWRCs).

For each of the four worked examples, the following is provided:

- Capital and revenue costs of implementing and running the collection service for Years 1 and 2;
- Costs per tonne, per opting-in household and for the total number of households in the Local Authority area;
- The impact on the recycling rate; and
- Public opt-in and use of the collection service.

[1] www.zerowastescotland.org.uk/content/evaluation-absorbent-hygiene-products-collection-trials-scotland

The service and operational assumptions used in the model are detailed in Section 2. The costs assumptions are stated in Appendix 1[2].

[2] The exemplar figures used for the calculations within this report are for guidance only and should not be taken as the actual costs of implementing a specific AHP collection service.

2 Worked Examples Calculation Methodology

Information from the Scottish AHP trials was used to produce four worked examples based on the same common set of parameters, shown below:

2.1 Local Authority Area

- The example Local Authority consists of 56,685 households of which 42,262 are own door properties used to model the four kerbside scenarios.

2.2 Household Performance

- The average number of households which use AHP in any given area is 12%[3];
- Households are given the opportunity to opt-in to the service. The average opt-in rates for different kerbside collection services were[4]:
    - Kerbside 120 litre bin collection, no sacks: 36% opted-in;
    - Kerbside 120 litre bin collection, with 30 litre tiger sacks: 36% opted-in;
    - Kerbside 80 litre blue sack collection, with 87 litre bin provided: 47% opted-in; and
    - Kerbside 80 litre blue sack collection, with 30 litre tiger sacks: 35% opted-in.
- All households who opted-in received the collection service;
- 3% of households who opted-in never used the service[5] but were still provided with the containers and associated communications materials;
- 10% of households who opted-in stopped using the service at some point. The main reason for this being that it was no longer required. However, we have assumed for the purposes of the model that an equal number of people will opt-in during a similar time period as the need for the service arises. Our assumption is therefore that there is a steady state;
- Average yield was 3.13kg/household/week per participating household, as the worked examples apply to the same geographical area, the average yield and participation were set to a standard rate[6].

[3] The figure for the average number of households using AHP of 12% has been compiled from the pre-trials AHP survey, based on 1,250 surveys across four Local Authority areas.
[4] Opt-in rates for the worked examples were based on the actual opt-in for each of the Scottish trials, assuming 12% of households in any given area use AHP.
[5] The 3% and 10% rates were based on AHP consumer post-trial survey results.
[6] Although different trial schemes produced slightly differing yields and participation rates, it is impossible to say with any confidence that these differing yields and rates were linked exclusively to the container type and not to any area factors e.g. local AHP arisings (the WCA suggested that some areas may have higher expected arisings than others). Please refer to the Scottish AHP Collection Trials Technical Report 2012-13.

*2.3 **Operational Performance***

- The frequency of collection for all services is weekly;
- The pass rate[7] is defined as the number of opted-in households that the collection vehicle could service in an hour irrespective of whether the opted-in household had presented AHP waste for collection or not[8]. We have assumed collection vehicles were able to service 32 households per hour for kerbside bin collections and 42 households per hour for kerbside sack collections. The pass rate for the sack schemes was assumed to be faster than that of the wheeled bin scheme due to the extra time required to empty the bins via the lifting mechanism and return them to kerbside:
    - Housing density has not been included in this model as a variable which affects the pass rate;
    - Set-out has not been included in this model as a variable which affects the pass rate. Although an increased set-out rate would increase working time, it is unlikely to have an effect on the pass rate for each service type as the collection vehicle must still travel to each opted-in household.
- Due to the geographic spread of the opted-in population across the Local Authority area, the collection process is likely to involve more time travelling and less time uplifting waste than a conventional waste or recycling scheme. It was therefore assumed that a vehicle of sufficient capacity was used in order for a full days' collection to be carried out without the requirement to tip other than at the end of the shift. This allowed for crew time and associated costs to be minimised;
    - The distance between each opted-in household was estimated to be 0.21km;
- 6.5 working hours of standard 8 hour shifts were allocated for uplift for collection crew;
- Transfer of materials to reprocessor:
    - The reprocessor is based in Stirling (chosen as a convenient central location for modelling);
    - The local authority will purchase two 20 cubic yard containers for bulking and will enter into a lease agreement for the transfer of material to the reprocessing plant at a cost of £20 per tonne of material.
- The average number of sacks provided per year for each household participating in the kerbside scheme is:
    - 120 litre bin collection, with 30 litre tiger sacks (156 provided)[9];

[7] Pass rates have been calculated using information provided by Perth & Kinross Council operatives regarding: working day length, the number of tips, the travel time between depot, work area and tipping, and any breaks.

[8] The pass rate is affected by a number of variables including the number of opted-in households, housing density, set-out and participation rate, average yield per household, crew size and vehicle type.

[9] In the original 140 litre bin and two sack services, a total of 260 sacks 30 litre tiger sacks were provided per year, based on each household using 5 per week. This figure has been reduced to a requirement of 3 per week based on actual usage recorded in the post-trial surveys. A 3 sack provision per week would be sufficient for 95% of households using the 140 litre bin service and 97% of households using the two sack service.

- 80 litre blue sack collection (104 provided)[10], with an 87 litre Slim Jim PHS-style container provided;
- 80 litre blue sack collection (104 provided), with 30 litre tiger sacks (156 provided).

- The service is operated with a single driver (no additional collection crew).

*2.4 **Communications***

An opt-in AHP service leaflet was posted to every household in the local authority area for all services. Households who opted-in then received the collection containers and/or recycling sacks, a bin decal (where appropriate) and a reminder postcard which outlined the materials which could and could not be recycled.

*2.5 **Costs***

Service costs are presented as:

- Year 1:
  - Capital costs of purchasing vehicles, bulking containers, household containers and sacks for each kerbside service type.
  - Revenue costs including staffing, running and maintaining collection vehicles, transferring collected material to the reprocessing facility and the incurred gate fees for disposal. These costs also include the first year of cleaning containers from households who no longer wish to participate and re-delivery of containers to new participating households, fuel and on-going communication activities. The anticipated landfill savings have been deducted assuming £80 per tonne of landfilled material.
- Year 2 onwards assumes an annual turnover of 10% of households which must be provided with containers collected from households which no longer require the service, a supply of recycling sacks and communication materials:
  - Capital costs of purchasing additional household recycling sacks for each kerbside service type;
  - Revenue costs including staffing, running and maintaining collection vehicles, transferring collected material to the reprocessing facility and the incurred gate fees for disposal. These costs also take account of providing new households with the necessary communication materials. It has been assumed that all households will continue to receive a leaflet every year to engage existing and new customers and to encourage those who no longer need their containers to return them.

The combined Capital and Revenue Costs are presented for Year 1 and 2 to provide an estimated yearly cost of providing the service, including the potential cost per tonne of AHP waste collected and

[10] In the original 80 litre blue sack and 87 litre bin service, a total of 260 sacks were provided per year, based on each household using 5 per week. This figure has been reduced to a requirement of 2 per week based on actual usage recorded in the post-trial survey. A 2 sack provision per week would be sufficient for 97% of households.

disposed of, the cost per opted-in household and the cost per household within the Local Authority area. The full cost assumptions modelled are in Appendix 1.

A full worked example for a collection from HWRCs is excluded from this report as the opt-in rates achieved for this type of service were considerably lower than the kerbside schemes as detailed in the ZWS Evaluation of the AHP Collection Trials in Scotland (2013). It is not considered a viable option for the effective capture of AHP materials. For indicative costs of such a service see Appendix 2.

3 Worked Examples

3.1 ***Worked Example 1***

The following service is provided:

Table 1: Collection Design for Worked Example 1

Parameter	
Container	120l Wheeled Bin
Recycling Sacks	30 Litre Tiger Sacks, 3 per week (156 Per Household Per Annum)
Vehicle	7.5t RCV

The key parameters for Worked Example 1 are detailed in Table 2.

Table 2: Key Parameters for Worked Example 1

Parameter	Value
Households in Service Area	42,262
% Households Using AHP	12%
AHP Households	5,072
Opt In Rate (of Households Using AHP)	36%[11]
Opt In Households	1,826
Average Yield (kg/hh/week)	3.13

In total, 1,826 households opted-in to the scheme. This AHP collection service required:

- Two RCVs based on a pass rate of 32 households per hour, employing 1 member of staff per vehicle to complete 9 regular 8 hour shifts (6.5 uplift hours) per week. Each vehicle was utilised 73% of the time;
- The provision of 1,826 (120 litre) wheeled bins and 284,856 (30 litre) tiger sacks;
- The provision of 42,262 opt-in leaflets delivered to all households, with a further 1,826 postcards and bin decals to those households who opted-in;
- 183 bins (10%) to be washed on an annual basis as people opt-out and opt-in.

[11] All households who opt-in will require the containers, recycling sacks and communication materials irrespective of whether they use the service. This includes the 3% estimated to opt-in but never use the service.

3.1.1 ***Results***

The costs and performance for this worked example are detailed in Tables 3, 4, and 5.

Table 3: Year 1 Scheme Costs for Worked Example 1

Item	Cost
Capital Costs	
Vehicles	£87,750
Containers	£42,911
Recycling Sacks	£25,637
Bulking Containers	£6,000
Total Capital	**£162,298**
Revenue Costs	
Staff	£29,203
Communication Materials	£25,300
Fuel	£4,293
Vehicle Maintenance	£4,200
Container Cleansing	£641
Transfer Fees	£5,768
Gate Fees	£23,073
Landfill Savings	-£23,073
Total Revenue	**£69,405**
Year 1 Total Scheme Cost	**£231,703**
Year 1 Cost Per Tonne	**£803**
Year 1 Cost Per Opted-In Household	**£126.89**
Year 1 Cost Per Local Authority Household	**£5.48**

Table 4: Year 2 Scheme Costs for Worked Example 1

Item	Cost
Capital Costs	
Recycling Sacks	£25,637
Total Capital	**£25,637**
Revenue Costs	
Staff	£29,203
Communication Materials[12]	£22,642
Fuel	£4,293
Vehicle Maintenance	£4,200
Container Cleansing	£641
Transfer Fees	£5,768
Gate Fees	£23,073
Landfill Savings	-£23,073
Total Revenue	**£66,747**
Year 2 Total Scheme Cost	**£92,384**
Year 2 Cost Per Tonne	**£320**
Year 2 Cost Per Opted-In Household	**£50.59**
Year 2 Cost Per Local Authority Household	**£2.19**

Table 5: Summary of Performance for Worked Example 1

Performance	Value
Tonnes Collected Per Annum	288.41
Impact on Recycling Rate	0.47%
Year 1 Cost Per Tonne	£803
Year 2 Cost Per Tonne	£320
Year 1 Cost Per Opted-In Household	£126.89
Year 2 Cost Per Opted-In Household	£50.59
Year 1 Cost Per Local Authority Household	£5.48
Year 2 Cost Per Local Authority Household	£2.19

3.1.1.1 Customer Experience

- Customer satisfaction with this service is high, it is considered easy to use and householders are unlikely to experience problems when using the service.

[12] Communication material costs include production and postage of a leaflet for every household in the Local Authority area and the provision of new bin decals and postcards to the 10% of households which have opted-in to the service

- Most households presented their bin for collection once per week irrespective of the fill level. While a fortnightly collection service would be acceptable for the majority of households, approximately one fifth of households considered this frequency insufficient for their needs. Therefore, in order to attract the maximum number of households to the service, collections should remain weekly.

- The 120 litre bin and 30 litre tiger sacks are considered to be suitable for AHP collection, but some users experienced difficulty tying sacks. Three tiger sacks per week are considered to provide sufficient capacity for the majority of households. However, for a proportion of incontinence product users there may be a requirement for additional sacks.

- Householders were motivated to use this service with the main reasons cited as the environmental benefits, including the recognition that it was good to recycle these types of products; and the provision of a specific AHP collection container provided additional capacity in the residual bin.

3.1.1.2 Summary of Worked Example 1 Service

A summary of the costs and performance for this worked example are detailed in Table 6.0.

Table 6: Summary of Worked Example 1 Service

Performance	Value	Rank (relative to other Worked Examples, 1=poorest performer, 4=best performer)
Year 1 Total Cost	£231,703	2
Year 2 Total Cost	£92,384	3
Customer Acceptability	Very High	3
Tonnes Collected Per Annum	288.41	2
Impact on Recycling Rate	0.47%	2
	TOTAL SCORE	**12**

3.2 ***Worked Example 2***

The following service was provided:

Table 6: Collection Design for Worked Example 2

Parameter	
Container	120l Wheeled Bin
Recycling Sacks	N/A
Vehicle	7.5t RCV

The key parameters that were modelled for Worked Example 2 are detailed in Table 8.

Table 7: Key Parameters for Worked Example 2

Parameter	Value
Households in Service Area	42,262
% Households Using AHP	12%
AHP Households	5,072
Opt In Rate (of Households Using AHP)	36.0%
Opt In Households	1,826
Average Yield (kg/hh/week)	3.13

In total, 1,826 households opted-in to the scheme. This AHP collection service would therefore require:

- Two RCVs based on a pass rate of 32 households per hour, employing 1 member of staff per vehicle to complete 9 regular 8 hour shifts per week. Each vehicle was utilised 73% of the time;
- The provision of 1,826 (120 litre) wheeled bins;
- The provision of 42,262 opt-in leaflets delivered to all households, 1,826 postcards and bin decals to those households who opted-in.
- 183 bins (10%) to be washed on an annual basis as people opt-out and opt-in.

3.2.1 ***Results***

The costs and performance for this worked example are detailed in Tables 9, 10, and 11.

Table 8: Year 1 Scheme Costs for Worked Example 2

Item	Cost
Capital Costs	
Vehicles	£87,750
Containers	£42,911
Recycling Sacks	£N/A
Bulking Containers	£6,000
Total Capital	**£136,661**
Revenue Costs	
Staff	£29,203
Communication Materials	£25,300
Fuel	£4,293
Vehicle Maintenance	£4,200
Container Cleansing	£641
Transfer Fees	£5,768
Gate Fees	£23,073
Landfill Savings	-£23,073
Total Revenue	**£69,405**
Year 1 Total Scheme Cost	**£206,066**
Year 1 Cost Per Tonne	**£714**
Year 1 Cost Per Opted-In Household	**£112.85**
Year 1 Cost Per Local Authority Household	**£4.88**

Table 9: Year 2 Scheme Costs for Worked Example 2

Item	Cost
Capital Costs	
Recycling Sacks	£N/A
Total Capital	**£0**
Revenue Costs	
Staff	£29,203
Communication Materials	£22,642
Fuel	£4,293
Vehicle Maintenance	£4,200
Container Cleansing	£641
Transfer Fees	£5,768
Gate Fees	£23,073
Landfill Savings	-£23,073
Total Revenue	**£66,747**
Year 2 Total Scheme Cost	**£66,747**
Year 2 Cost Per Tonne	**£231**
Year 2 Cost Per Opted-In Household	**£36.55**
Year 2 Cost Per Local Authority Household	**£1.58**

Table 10: Summary of Performance for Worked Example 2

Performance	Value
Tonnes Collected Per Annum	288.41
Impact on Recycling Rate	0.47%
Year 1 Cost Per Tonne	£714
Year 2 Cost Per Tonne	£231
Year 1 Cost Per Opted-In Household	£112.85
Year 2 Cost Per Opted-In Household	£36.55
Year 1 Cost Per Local Authority Household	£4.88
Year 2 Cost Per Local Authority Household	£1.58

3.2.1.1 Customer Experience

- Customer satisfaction with this service is extremely high and the service is considered easy to use and householders are unlikely to experience problems when using the service.
- Most households presented their bin for collection once per week irrespective of the fill level. While a fortnightly collection service would be acceptable for the majority of households, approximately one third of households considered this frequency insufficient for their needs. Therefore, in order to attract the maximum number of households to the service, collections should remain weekly.
- The 120 litre bin is considered to be suitable for AHP collection as it is of sufficient size and easy to use.
- Householders were motivated to use this service with the main reasons cited as the environmental benefits, including the recognition that it was good to recycle these types of products; and the provision of a specific AHP collection container provided additional capacity in the residual bin.

3.2.1.2 Summary of Worked Example 2 Service

A summary of the costs and performance for this worked example are detailed in Table 12.0.

Table 11: Summary of Service

Performance	Value	Rank (relative to other Worked Examples, 1=poorest performer, 4=best performer)
Year 1 Total Cost	£206,066	3
Year 2 Total Cost	£66,747	4
Customer Acceptability	Very High	3
Tonnes Collected Per Annum	288.41	2
Impact on Recycling Rate	0.47%	2
	TOTAL SCORE	**14**

*3.3 **Worked Example 3***

The following service is provided:

Table 12: Collection Design for Worked Example 3

Parameter	
Container	87 Litre Container
Recycling Sacks	80 Litre Sacks, 2 Per Week (104 Per Household Per Annum)
Vehicle	Tipmaster

The key parameters that were modelled for Worked Example 3 are detailed in Table 14.

Table 13: Key Parameters for Worked Example 3

Parameter	Value
Households in Service Area	42,262
% Households Using AHP	12%
AHP Households	5,072
Opt-In Rate	47.0%
Opt In Households	2,384
Average Yield (kg/hh/week)	3.13

In total, 2,384 households opted-in to the scheme. This AHP collection service required:

- Two Tipmasters based on a pass rate of 42 households per hour, employing 1 member of staff per vehicle to complete 9 regular 8 hour shifts per week. Each vehicle was utilised 73% of the time;
- The provision of 2,384 (87 litre) indoor or outdoor containers and 247,936 (80 litre) blue recycling sacks;
- The provision of 42,262 opt-in leaflets delivered to all households, and a further 2,384 postcards and bin decals to those households who opted-in.
- 238 bins (10%) to be washed on an annual basis as people opt-out and opt-in.

3.3.1 ***Results***

The costs and performance for this worked example are detailed in Tables 15, 16, and 17.

Table 14: Year 1 Scheme Costs for Worked Example 3

Item	Cost
Capital Costs	
Vehicles	£73,125
Containers	£106,756
Recycling Sacks	£42,149
Bulking Containers	£6,000
Total Capital	**£228,030**
Revenue Costs	
Staff	£29,203
Communication Materials	£26,042
Fuel	£5,634
Vehicle Maintenance	£3,500
Container Cleansing	£837
Transfer Fees	£7,529
Gate Fees	£30,117
Landfill Savings	-£30,117
Total Revenue	**£72,745**
Year 1 Total Scheme Cost	**£300,775**
Year 1 Cost Per Tonne	**£799**
Year 1 Cost Per Opted-In Household	**£126.16**
Year 1 Cost Per Local Authority Household	**£7.12**

Table 15: Year 2 Scheme Costs for Example 3

Item	Cost
Capital Costs	
Recycling Sacks	£42,149
Total Capital	**£42,149**
Revenue Costs	
Staff	£29,203
Communication Materials	£22,717
Fuel	£5,634
Vehicle Maintenance	£3,500
Container Cleansing	£837
Transfer Fees	£7,529
Gate Fees	£30,117
Landfill Savings	-£30,117
Total Revenue	**£69,420**
Year 2 Total Scheme Cost	**£111,569**
Year 2 Cost Per Tonne	**£296**
Year 2 Cost Per Opted-In Household	**£46.80**
Year 2 Cost Per Local Authority Household	**£2.64**

Table 16: Summary of Performance for Worked Example 3

Performance	Value
Tonnes Collected Per Annum	376.46
Impact on Recycling Rate	0.62%
Year 1 Cost Per Tonne	£799
Year 2 Cost Per Tonne	£296
Year 1 Cost Per Opted-In Household	£126.16
Year 2 Cost Per Opted-In Household	£46.80
Year 1 Cost Per Local Authority Household	£7.12
Year 2 Cost Per Local Authority Household	£2.64

3.3.1.1 Customer Experience

- Customer satisfaction with this service is high, it is considered easy to use and householders are unlikely to experience problems when using the service;

- Most households present one 80 litre blue recycling sack for collection per week irrespective of the fill level. A weekly collection service should be maintained as a fortnightly collection service is acceptable to only half of households.

- Overall customer satisfaction with the 87 litre container is high although slightly lower than that for the 120 litre wheeled bins. This is primarily due to the lid type on the container. A container with an alternative, more robust, lid should be considered. Most households store the 87 litre container outside or in a shed or garage.

- Customer satisfaction with the recycling sacks is high, though some households would prefer sacks to be provided with ties. The majority of households use one AHP sack or less per week indicating the provision of two recycling sacks per household per week is sufficient.

- Householders are motivated to use this service with the main reasons cited as the environmental benefits, including the recognition that it was good to recycle these types of products; and the provision of a specific AHP collection container provided additional capacity in the residual bin.

3.3.1.2 Summary of Worked Example 3 Service

A summary of the costs and performance for this worked example are detailed in Table 18.0.

- **Table 17: Summary of Service**

Performance	Value	Rank (relative to other Worked Examples, 1=poorest performer, 4=best performer)
Year 1 Total Cost	£300,775	1
Year 2 Total Cost	£111,569	2
Customer Acceptability	High[13]	2
Tonnes Collected Per Annum	376.46	4
Impact on Recycling Rate	0.62%	4
	TOTAL SCORE	**13**

[13] Customer acceptability would be higher if an alternative lid was provided

*3.4 **Worked Example 4***

The following service is provided:

Table 18: Collection Design for Worked Example 4

Parameter	
Container	N/A
Recycling Sacks	30 Litre Sacks, 3 Per Week (156 Per Household Per Annum) 80 Litre Sacks, 2 Per Week (104 Per Household Per Annum)
Vehicle	Tipmaster

The key parameters that were modelled for Worked Example 4 are detailed in Table 20.

Table 19: Key Parameters for Worked Example 4

Parameter	Value
Households in Service Area	42,262
% Households Using AHP	12%
AHP Households	5,072
Opt In Rate	35.0%
Opt In Households	1,776
Average Yield (kg/hh/week)	3.13

In total, 1,776 households opted-in to the scheme. This AHP collection service would therefore require:

- Two Tipmasters based on a pass rate of 42 households per hour, employing 1 member of staff per vehicle to complete 7 regular 8 hour shifts per week. Each vehicle was utilised 57% of the time;
- The provision of 184,704 (80 litre) blue recycling sacks and 277,056 (30 litre) tiger sacks;
- The provision of 42,262 opt-in leaflets delivered to all households and a further 1,776 postcards to those households who opted-in.

3.4.1 ***Results***

The costs and performance for this worked example are detailed in Tables 21, 22, and 23.

Table 20: Year 1 Scheme Costs for Worked Example 4

Item	Cost
Capital Costs	
Vehicles	£56,875
Containers	£N/A
Recycling Sacks	£56,335
Bulking Containers	£6,000
Total Capital	**£119,210**
Revenue Costs	
Staff	£22,714
Communication Materials	£24,257
Fuel	£4,382
Vehicle Maintenance	£3,500
Container Cleansing	£N/A
Transfer Fees	£5,609
Gate Fees	£22,435
Landfill Savings	-£22,435
Total Revenue	**£60,461**
Year 1 Total Scheme Cost	**£179,671**
Year 1 Cost Per Tonne	**£641**
Year 1 Cost Per Opted-In Household	**£101.17**
Year 1 Cost Per Local Authority Household	**£4.25**

Table 21: Year 1 Scheme Costs for Worked Example 4

Item	Cost
Capital Costs	
Recycling Sacks	£56,335
Total Capital	**£56,335**
Revenue Costs	
Staff	£22,714
Communication Materials	£22,542
Fuel	£4,382
Vehicle Maintenance	£3,500
Container Cleansing	£N/A
Transfer Fees	£5,609
Gate Fees	£22,435
Landfill Savings	-£22,435
Total Revenue	**£58,746**
Year 2 Total Scheme Cost	**£115,081**
Year 2 Cost Per Tonne	**£410**
Year 2 Cost Per Opted-In Household	**£64.80**
Year 2 Cost Per Local Authority Household	**£2.72**

Table 22: Summary of Performance for Worked Example 4

Performance	Value
Tonnes Collected Per Annum	280.44
Impact on Recycling Rate	0.46%
Year 1 Cost Per Tonne	£641
Year 2 Cost Per Tonne	£410
Year 1 Cost Per Opted-In Household	£101.17
Year 2 Cost Per Opted-In Household	£64.80
Year 1 Cost Per Local Authority Household	£4.25
Year 2 Cost Per Local Authority Household	£2.72

3.4.1.1 Customer Experience

- Customer satisfaction with this service is medium, it is considered easy to use and householders are unlikely to experience problems when using the service.
- Most households present one 80 litre blue recycling sack for collection per week irrespective of the fill level. While a fortnightly collection service would be acceptable for the majority of households, approximately one third of households considered this frequency insufficient for their needs. Therefore, in order to attract the maximum number of households to the service, collections should remain weekly.
- The 80 litre blue recycling sacks were considered suitable for AHP collection, although some households would prefer sacks to be provided with ties or an outdoor container in place of the blue recycling sacks. One third of households are using their own container to store their recycling sacks at their homes before collection.
- The 30 litre tiger sacks were considered suitable for AHP collection, although some households would prefer sacks to be provided with ties and scented. Three tiger sacks per week provide sufficient capacity for the majority of households. However, for a proportion of incontinence product users there may a requirement for additional sacks.
- Householders are motivated to use this service with the main reasons cited as the environmental benefits, including the recognition that it was good to recycle these types of products and that the provision of a specific AHP collection container provided additional capacity in the residual bin.

3.4.1.2 Summary of Worked Example 4 Service

A summary of the costs and performance for this worked example are detailed in Table 24.0.

Table 23: Summary of Service

Performance	Value	Rank (relative to other Worked Examples, 1=poorest performer, 4=best performer)
Year 1 Total Cost	£179,671	4
Year 2 Total Cost	£115,081	1
Customer Acceptability	Medium	1
Tonnes Collected Per Annum	280.44	1
Impact on Recycling Rate	0.46%	1
	TOTAL SCORE	**8**

4 Conclusions

A summary of the key outputs from each of the four Worked Examples is provided in Table 25 to allow comparison between the kerbside services in terms of cost, performance and customer satisfaction.

Table 24: Comparison of Worked Example Kerbside Services

	Worked Example 1: Kerbside 120L Bin, 30 L Tiger Sacks	Worked Example 2: Kerbside 120L Bin, No Sacks	Worked Example 3: Kerbside 80L Blue Sacks, 87L Container	Worked Example 4: Kerbside 80L Blue Sacks, 30L Tiger Sacks
Tonnes Per Annum	288.41	288.41	376.46	280.44
Impact on Recycling Rate	0.47%	0.47%	0.62%	0.46%
Year 1 Cost	£231,703	£206,066	£300,775	£179,671
Year 2 Cost	£92,384	£66,747	£111,569	£115,081
Year 1 Cost Per Tonne	£803	£714	£799	£641
Year 2 Cost Per Tonne	£320	£231	£296	£410
Year 1 Cost Per Opt-In Household	£126.89	£112.85	£126.16	£101.17
Year 2 Cost Per Opt-In Household	£50.59	£36.55	£46.80	£64.80
Year 1 Cost Per Local Authority Household	£5.48	£4.88	£7.12	£4.25
Year 2 Cost Per Local Authority Household	£2.19	£1.58	£2.64	£2.72
TOTAL SCORE	**12**	**14**	**13**	**8**

Sensitivity testing of the model for increases in opt-in rates of 10% and 30% resulted in no change in the overall ranking across the collection schemes. The effect of increases in opt-in rates for costs and performance are presented in Appendix 3. Therefore, the following conclusions have been drawn:

- Recommendations for a weekly AHP kerbside collection service are for a containerised system with no sacks. This service performed the best overall due to the low ongoing revenue costs and high public acceptability;

- The least preferred collection service is the sack only service as the ongoing revenue costs are high and customer acceptability is lower than found for other container types.

5 Risk Analysis

*5.1 **Logistical Risks***

It is anticipated that potential logistical risks include:

- Low opt-in rates;
- Low average yields;
- Low participation rates;
- Lack of public acceptability;
- Ineffective communication materials;
- High contamination rates.

Table 26 outlines the key risks associated with a kerbside collection service and the potential abatement measures.

Table 25 - Logistical risks in kerbside AHP scheme

Risk Factor	Risk	Perceived Risk	Abatement Measures
Low Opt-In Rates	High	Low opt-in will result in poor overall scheme performance	Effective communications and optimised collection service
Low Average Yields	Medium	Low average yields will increase the overall cost per tonne of scheme	Average yields to be monitored to determine impact and intervention undertaken if required
Lack of Public Acceptability	Medium/Low	Lack of public acceptability will translate to low opt-in rates and poor overall performance	Effective communications and optimised collection service
High Contamination Rates	Medium/Low	High contamination rates may lead to an overestimate of capture and impact on recovery at reprocessor	Visual inspection in first weeks of scheme and feedback from reprocessor and communications intervention if required
Ineffective Communication Materials	Low	Ineffective use of service resulting in low yield which will increase the cost per tonne of scheme	Consumer testing of communication materials prior to use

5.2 ***Health and Safety Risks***

Risk and hazard analysis is best when it is based on operational assumptions linked to scheme operation.

Many of the possible hazards in relation to collection of AHPs at kerbside are already identified in existing local authority risk assessment documents in relation to vehicle movements at collection, container loading and unloading and slips, trips and falls. Specifically there will be existing documents that can be amended such as:

Risk assessment:

- Refuse Collection Processes;
- Mounting and Demounting Refuse Containers;
- Duties relating to the cleaning of RCV's including cabs, bodies and chassis.

Safe working methods:

- Refuse Collection Operations (Drivers & Loaders);
- Mounting and De-Mounting a container from Hufferman RCV;
- Refuse Collection Vehicle Cleaning.

In addition, there is specific guidance available such as:

- Managing Offensive Hygiene Waste (HSE);
- Health Hazards in the Waste and Recycling Industry (HSE);

Best Practice Guidance for the Management of Hygiene Waste for Key Producers in Northern Ireland and Scotland (SNIFFER).

6 Appendix 1 – Modelled Cost Assumptions

- The gate fee used was £80 per tonne;
- The figures allocated for vehicles are based on the capital cost of the vehicles and their percentage utilisation, in order to take into account any allocation to other tasks when not in use for AHP collections;
- Containers vary between services:
    - 120 litre wheeled bins were provided at a unit cost of £23.50;
    - 87 litre non-wheeled indoor or outdoor containers were provided at a unit cost of £44.78.
- Vehicle maintenance was based on 3.5% of the total vehicle cost per year;
- Fuel costs were calculated assuming 0.21km travelled between households and fuel efficiency of the collection vehicles of 0.15km per litre and a diesel price of £1.40 per litre;
- Bin washing, which includes removal, sanitisation and replacement of the container at another opt-in households is based on £3.50 per container;
- Recycling sacks were provided in three of the four kerbside schemes at a cost of:
    - 30 litre tiger sacks at a unit cost of £0.09; an annual supply of 156 (3 per week) cost £14.04 per household per year;
    - 80 litre blue sacks at a unit cost of £0.17; an annual supply of 104 (2 per week) cost £17.68.
- Staff costs were provided as:
    - Driver £9.60 per hour;
    - Collection staff £8.57 per hour;
    - Agency staff £9.00 per hour.
- Communications
    - Beginning of Service Communications
        - An opt-in leaflet was produced for all households (42,262) at a unit cost of £0.18;
        - An opt-in leaflet was fulfilled and posted to all households (42,262) at a unit cost of £0.35;
        - Posters were produced for the whole area (250) at a unit cost of £1.89;
        - Decals were applied to all bin services (120 litre and 87 litre), but were not required for the sack only service. One decal was required for every household which opted-in to each of the bin services at a unit cost of £0.55;
        - Postcards were produced for all households that opted-in at a unit cost of £0.43 for all services;

- Postcards were fulfilled and posted to all households who opted-in at a unit cost of £0.35 for all services;

- Ongoing Annual Communications

  - An opt-in leaflet was produced for all households (42,262) at a unit cost of £0.18;

  - An opt-in leaflet was fulfilled and posted to all households (42,262) at a unit cost of £0.35;

  - Assuming a steady state where there was 10% turnover of new households that opted-in, the following were required:

    - One decal was required for every new household which opted-in to each of the bin services at a unit cost of £0.55;

    - Postcards for all new households that opted-in at a unit cost of £0.43 for all services;

    - Postcards were fulfilled and posted to all new households who opted-in at a unit cost of £0.35 for all services.

7 Appendix 2 - AHP Collection from HWRCs

A full Worked Example for HWRCs is excluded from this report as the opt-in rates achieved for this type of service were low at 6-14% compared to opt-in rates of 35-47% in the kerbside schemes as detailed in the ZWS Scottish AHP Trials Technical Report 2012-13. The HWRC service provided is:

Table 26: Collection Design for HWRC AHP Service

Parameter	
Container	N/A for Householder; 1,280 Litre Container at HWRC
Recycling Sacks	80 Litre Sacks, 2 Per Week (104 Per Household Per Annum)
Vehicle	N/A

A summary has been produced to allow a comparison of the performance, costs and customer satisfaction between collections from HWRC and kerbside. For the purposes of this comparison, this assumes an opt-in HWRC collection service comprising of a 1280 litre container located at the HWRC. Each householder is provided with an initial supply of four 80 litre blue recycling sacks and is requested to place the used AHP products into the sacks before transporting these to the HWRC. Replacement sacks are provided by Recycling Attendants at the sites. An average of 208 recycling sacks were estimated to be used per year[14].

*7.1 **Results***

A summary of the key performance outputs from a HWRC Worked Example are stated in Table 28, based on a 14% opt-in rate.

[14] Based on an average number of 4 sacks used per household per week, estimated from the ZWS Evaluation of the AHP Collection Trials in Scotland (2013)

Table 27: Comparison of Worked Example Kerbside Services and HWRC

	Worked Example 1: Kerbside 120L Bin, 30 L Tiger Sacks	Worked Example 2: Kerbside 120L Bin, No Sacks	Worked Example 3: Kerbside 80L Blue Sacks, 87L Container	Worked Example 4: Kerbside 80L Blue Sacks, 30L Tiger Sacks	HWRC: 80L Blue Recycling Sacks
Tonnes Per Annum	288.41	288.41	376.46	280.44	112.30
Impact on Recycling Rate	0.47%	0.47%	0.62%	0.46%	0.18%
Year 1 Cost	£231,703	£206,066	£300,775	£179,671	£56,813
Year 1 Cost Per Tonne	£803	£714	£799	£641	£506
Year 1 Cost Per Opt-In Household	£126.89	£112.85	£126.16	£101.17	£79.91
Year 1 Cost Per Local Authority Household	£5.48	£4.88	£7.12	£4.25	£1.34
Year 2 Cost	£92,384	£66,747	£111,569	£115,081	£49,842
Year 2 Cost Per Tonne	£320	£231	£296	£410	£444
Year 2 Cost Per Opt-In Household	£50.59	£36.55	£46.80	£64.80	£70.10
Year 2 Cost Per Local Authority Household	£2.19	£1.58	£2.64	£2.72	£1.18

7.1.1 ***Customer Experience***

- The primary motivation for opting-in to the service is the environmental benefit. The correlation between more space in the residual bin and recycling AHP was lower than found for kerbside services.

- The customer satisfaction with this service is lower than found for the kerbside schemes due to the requirement to transport AHP waste to the HWRC. There is a higher proportion of people who started then stopped using the service as a result of the additional effort required. Approximately half of participating households indicated that a kerbside service would be preferable.

7.2 ***Conclusion***

It is not recommended that an HWRC service is used for AHP recycling primarily due to the lack of acceptability of this service type for the customer.

8 Appendix 3 – Model Sensitivities

The overall performance for each AHP collection service is primarily dependant on the opt-in rate achieved and the number of households who continue to use the service.

Table 29 and 30 demonstrate the impact of a 10% and 30% increase in the opt-in rate on the service costs and performance.

Table 28: Sensitivity Analysis - 10% Opt-In Rate Increase

	Worked Example 1: Kerbside 120L Bin, 30 L Tiger Sacks	**Worked Example 2: Kerbside 120L Bin, No Sacks**	**Worked Example 3: Kerbside 80L Blue Sacks, 87L Container**	**Worked Example 4: Kerbside 80L Blue Sacks, 30L Tiger Sacks**
Original Opt-In Rate	36%	36%	47%	35%
Adjusted Opt-In Rate	46%	46%	57%	45%
Tonnes Per Annum	368.49 **(+80.08)**	368.49 **(+80.08)**	456.70 **(+80.24)**	360.51 **(+80.07)**
Impact on Recycling Rate	0.60% **(+0.13%)**	0.60% **(+0.13%)**	0.75% **(+0.13%)**	0.59% **(+0.13%)**
Year 1 Cost	£293,644 **(+£61,941)**	£260,875 **(+£54,809)**	£358,955 **(+£58,180)**	£221,742 **(+£42,071)**
Year 1 Cost Per Tonne	£797 (-£6)	£708 (-£6)	£786 (-£13)	£615 (-£26)
Year 1 Cost Per Opt-In Household	£125.81 (-£1.08)	£111.77 (-£1.08)	£124.12 (-£2.04)	£97.13 (-£4.04)
Year 1 Cost Per Local Authority Household	£6.95 **(+£1.47)**	£6.17 **(+£1.29)**	£8.49 **(+£1.37)**	£5.52 **(+£1.27)**
Year 2 Cost	£112,530 **(+£20,146)**	£79,760 **(+£13,013)**	£130,143 **(+£18,574)**	£140,546 **(+£25,465)**
Year 2 Cost Per Tonne	£305 (-£15)	£216 (-£15)	£285 (-£11)	£390 (-£20)
Year 2 Cost Per Opt-In Household	£48.21 (-£2.38)	£34.17 (-£2.38)	£45.00 (-£1.80)	£61.56 (-£3.24)
Year 2 Cost Per Local Authority Household	£2.66 **(+£0.47)**	£1.89 **(+£0.31)**	£3.08 **(+£0.44)**	£3.33 **(+£0.61)**

Table 29: Sensitivity Analysis – 30% Opt-In Rate Increase

	Worked Example 1: Kerbside 120L Bin, 30 L Tiger Sacks	Worked Example 2: Kerbside 120L Bin, No Sacks	Worked Example 3: Kerbside 80L Blue Sacks, 87L Container	Worked Example 4: Kerbside 80L Blue Sacks, 30L Tiger Sacks
Original Opt-In Rate	36%	36%	47%	35%
Adjusted Opt-In Rate	66%	66%	77%	65%
Tonnes Per Annum	528.64 **(+240.23)**	528.64 **(+240.23)**	616.70 **(+328.29)**	520.67 **(+232.26)**
Impact on Recycling Rate	0.87% **(+0.40%)**	0.87% **(+0.40%)**	1.01% **(+0.39%)**	0.85% **(+0.39%)**
Year 1 Cost	£406,074 **(+£174,371)**	£359,068 **(+£153,002)**	£476,925 **(+£176,150)**	£307,633 **(+£127,962)**
Year 1 Cost Per Tonne	£768 (-£35)	£679 (-£35)	£773 (-£26)	£591 (-£50)
Year 1 Cost Per Opt-In Household	£121.29 (-£5.60)	£107.25 (-£5.60)	£122.10 (-£4.06)	£93.31 (-£7.86)
Year 1 Cost Per Local Authority Household	£9.61 **(+£4.13)**	£8.50 **(+£3.62)**	£11.28 **(+£4.16)**	£7.28 **(+£3.03)**
Year 2 Cost	£151,166 **(+£58,782)**	£104,160 **(+£37,413)**	£168,992 **(+£57,423)**	£193,225 **(+£78,144)**
Year 2 Cost Per Tonne	£286 (-£34)	£197 (-£34)	£274 (-£22)	£371 (-£39)
Year 2 Cost Per Opt-In Household	£45.15 (-£5.44)	£31.11 (-£5.44)	£43.26 (-£3.54)	£58.61 (-£6.19)
Year 2 Cost Per Local Authority Household	£3.58 **(+£1.39)**	£2.46 **(+£0.88)**	£4.00 **(+£1.36)**	£4.57 **(+£1.85)**