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Projected HWRC Performance and Improvements in England, 2005 to 2008

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EXECUTIVE SUMMARY

This document reports on the findings of a survey of English local authorities responsible for providing Household Waste Recycling Centres (HWRCs). The project's chief aim is to identify projected recycling rates for the periods 2005/06, 2006/07 and 2007/08, and to "reality-test" these against various existing and estimated information, including projections made in a similar survey conducted at the end of 2003¹.

At the time of writing, the most recent actual HWRC tonnage data is for 2002/03, as reported in the 2003 projections report. Data should become available early in 2006 regarding HWRC tonnages for 2004/05 via Waste Data Flow (WDF). While this will not allow direct calibration of estimations made for the current projection period, it will allow the projections for 2004/05 that were made in the 2003 survey to be calibrated. This, in turn, will provide a measure of the accuracy of the projection methodology used.

The project further aims to report on aspects of HWRC provision which relate to HWRC performance and improvement. These include contractual arrangements, planned investments, barriers to making HWRC improvements, externally driven improvement initiatives, and support requirements.

Completed questionnaires were received from 95 of 127 local authorities responsible for operating HWRCs in England². This represents a response rate of 75%, considered to be high given the current workload of local authority waste and recycling officers, and the fact that the survey coincided with WDF requesting data from local authorities.

Key findings

- Projected HWRC recycling rates for England are 44.9%, 48.2% and 50.8% for 2005/06, 2006/07 and 2007/08 respectively.
- The rate of increase in projected recycling rates has slowed to 3 percentage points per annum between 2005 and 2008, from 5 percentage points between 2002 and 2005.
- 44% of responding authorities report no contractor targets in place for any of the three years in the period.
- The responding authorities report that £54 million is currently allocated towards improving HWRCs, with a further £31 million awaiting budget approval.
- Investment has been found to be heavily skewed towards major infrastructural improvements, leaving just £3.4 million for "softer" measures such as increased staffing, improved signage, and deterring trade abuse.
- Authorities reported on externally driven improvement initiatives amounting to a spend of £21 million, and resulting in an average HWRC recycling rate increment of 5.4 percentage points per initiative.

The projections for English HWRC recycling rates, as detailed in Section 3, are 44.9% for 2005/06, 48.2% for 2006/07 and 50.8% for 2007/08. These rates are based upon the simple arithmetic average for all of the authorities that responded to this survey with projected rates for their HWRCs. Section 3 further analyses the available information to calibrate and test these projections.

The rate of increase in projected recycling rates has slowed from 5 percentage points per year – the rate determined during the previous survey for the period 2003/04 to 2005/06 – to 3 percentage points per year for the period 2005/06 to 2007/08. See Section 3.3 for more details.

An important finding is that 59.3% of material that would be required to be recycled - in order for the projections for 2005/06 to 2007/08 to be met - is obligated under contractor targets. Section 4 details further findings related to

¹ See Network Recycling, *Projected Recycling Rates for CA Sites in England, 2003 to 2004*, Eric Bridgwater and Paul Roberts, 2003. Downloadable at <http://lasupport.defra.gov.uk>, click on "Support Products / Toolkits" and then on "Civic Amenity Sites".

² 127 authorities on basis of: excluding Westminster City Council and Corporation of London, which do not provide CA sites; excluding Wokingham Council, which does not operate a CA site, but pays towards the running of sites in neighbouring authorities; counting individual London Boroughs in North and West London Waste Authorities as separate authorities; counting the 4 boroughs in East London Waste Authority as one authority, since contractual arrangements mean that all CA sites in these boroughs are managed as if they were under the control of one authority.

contractual arrangements. 44% of responding authorities have no contractor targets in place for any of the three years in the period, while for those authorities that have set contractor targets 97% of the projected recycled tonnage was covered under contractor targets, and projected rates were higher. Section 4 goes on to analyse contract lengths and expiry dates, and the enforcement mechanisms utilised by authorities. Projected HWRC recycling rates have been found to be higher under contracts where the targets are enforced by penalty and bonus.

Section 5 analyses the information gained on authorities' HWRC investment plans. Some £54 million has been allocated towards improving HWRCs in the projection period, with a further £31 million awaiting budget approval. The proportion of the total investment which is planned to be spent on site development (new or relocated sites) and redevelopment (major infrastructural work on existing sites) was found to be 96%, leaving only relatively small amounts earmarked for "softer" (and arguably more cost-effective) measures such as increasing staffing (£293,000), improving signage (£375,000), deterring trade abuse (£530,000) and increasing the segregation of materials (£712,000, 58% of which is for segregation of Waste Electrical and Electronic Equipment - WEEE).

Authorities were asked whether there are any barriers to making improvements to their HWRCs. Infrastructure / location issues were highlighted by 58% of responding authorities, and planning / licensing issues by 37%, indicating that authorities are generally viewing site size and major infrastructural constraints as the most pressing obstacles in making improvements to HWRCs. Further details on barriers to HWRC improvement can be found in Section 6.

Authorities reported on £21 million worth of funded externally driven projects. These initiatives were reported as having an average estimated effect adding 5.4 percentage points on to HWRC recycling rates. Specifically, of the two main funding organisations, Defra funded initiatives were estimated at an average 5.6 percentage point increment, and WRAP initiatives at 5.8%. Further details can be found in Section 7.

Support that would be considered by authorities to be useful in improving HWRCs covers a wide range of issues – see Section 8 – most notable amongst which are market development, requirements for separation of WEEE, and staffing issues.

Report structure

Introduction and methodology are covered in Sections 1 and 2.

Section 3 presents the findings related to projected HWRC recycling rates.

Sections 4, 5, 6, 7 and 8 present findings related to, respectively, contractual arrangements, investment plans, barriers to HWRC improvement, externally driven improvement initiatives, and support requirements.

Appendix 1 contains a copy of the questionnaire. Appendix 2 contains details of assumptions and calculations used in the body of the report. Appendix 3 (**confidential**) contains details that may be used to prioritise targeted improvement initiatives towards poorer performing authorities, to help them maximise their HWRC recycling rates. **This Appendix is confidential as it contains details on individual authorities. It should be removed from any copies of this report that are destined for the public domain.**

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1. INTRODUCTION

1.1 AIMS OF THIS PROJECT

This project is effectively a follow up to a similar project that was conducted by Network Recycling in the autumn of 2003.

The chief aim of the project is to predict likely recycling performance for Household Waste Recycling Centres (HWRCs) in England for the period 2005 to 2008. The purposes of the project can be more specifically stated as:

- To ascertain predicted recycling rates for HWRCs for the periods 2005/6, 2006/7 and 2007/8 & 2005/6, by authority for all Waste Disposal Authorities and Unitary Authorities in England, for as many authorities as possible, given the methodology, resources and time schedule of the project; and collation and analysis of additional information to enable these recycling rate projections to be interpreted and calibrated in the context of significant relevant factors (i.e. prior actual and projected HWRC recycling rates, contractor targets, and authorities' HWRC tonnage throughputs).
- To collate additional information pertaining to management of HWRCs: contract management arrangements, HWRC investment plans, perceived barriers and support requirements to improving HWRC recycling performance, and the impact of various initiatives on improvement of English HWRCs.
- To identify authorities which may be targeted for improvements in their HWRC recycling rates, through reviewing projected HWRC recycling performance and analysing these rates in association with estimated tonnage throughputs, along with other factors such as contract management arrangements and investment plans, to determine a basis for prioritisation of targeted intervention.

As stated in the covering letter that accompanied the questionnaire survey, "Collated information from all the questionnaire replies may be published or released to other organisations, at Defra's discretion; however information relating to individual authorities or contractors will not be identifiable from any such published or released information". Therefore, information relating to individual authorities has been separated from collated information, and appears only in Appendix 3. **For this reason, copies of this report containing Appendix 3 should be treated as confidential.**

We would like to thank all local authorities who responded to the survey.

1.2 ABBREVIATIONS USED IN THIS REPORT

The following abbreviations are used throughout this report:

BVPI = Best Value Performance Indicator³

DSO = Direct Service Organisation (*ie the Council managing CA sites, often through a LAWDC [Local Authority Waste Disposal Company]*)

HHW = Hazardous Household Waste

HWRC = Household Waste Recycling Centre [*ie facilities provided under EPA 1990 s 51(1)(b) and/or Refuse Disposal (Amenity) Act 1978 c3 s1*]

LBC = London Borough Council

LTCS = Landfill Tax Credits Scheme

na = not applicable

NACAS = National Assessment of Civic Amenity Sites (*see References*)

³ BVPI RRs (Best Value Performance Indicator Recycling Rates) exclude separated inert material (ie soil & rubble) and re-use items from recycling rate calculations.

pa = per annum

RR = Recycling Rate (*BVPI definition, unless otherwise stated*)

WA = Waste Authority

WEEE = Waste Electronic and Electrical Equipment

This report makes frequent references to the National Assessment of Civic Amenity Sites (NACAS) project. This was a Landfill Tax Credit Scheme (LTCS) funded project, funded by Biffaward with third party contributions from the National Association of Waste Disposal Officers and the West of England Strategic Partnership. The project was jointly managed by Network Recycling Ltd and Future West and followed on from a previous project, "Trade Waste input to Civic Amenity Sites". NACAS is the most comprehensive review of HWRC practice ever to be published in the UK. The NACAS report can be viewed and downloaded at www.networkrecycling.co.uk/downloadable-reports.htm.

2. METHODOLOGY

Projected HWRC recycling rates were collated by a national questionnaire sent to all local authorities in England responsible for providing HWRCs conducted during November 2005. The questionnaire covers the projection period 2005/06, 2006/07 and 2007/08. The questionnaire form is included in Appendix 1.

This exercise effectively repeated a survey that was carried out two years previously, with a number of notable changes: -

- Due to the collection of tonnage data from local authorities via Waste Data Flow (WDF), this survey did not attempt to gather actual tonnage information. Therefore the projections and tonnage information presented in this report are not “actual” – i.e. they do not come from Waste Data Flow (WDF). When information becomes available from WDF it would be useful to further calibrate the analysis and projections made herein.
- Some of the information that was collated during the last survey was not asked for this time because it was felt that they had been adequately addressed by the first survey and by the National Assessment of Civic Amenity Sites Project (NACAS); (in particular, information on projected financial resource requirements for improving HWRCs was not collected in this second survey).
- Additional issues addressed in this survey are the impact of various initiatives on improving English HWRCs and local authorities’ support requirements for making improvements to HWRCs.

Most responding authorities were able to provide projected HWRC recycling rates for the periods 2005/06, 2006/07 and 2007/08. However the following must be noted:

- where a projection was only specified for one or two of the 3 periods, this figure would subsequently apply to future periods.
- BVPI definitions have been used throughout. Where an authority has given non-BVPI projections / targets, 10 percentage points have been deducted in order to estimate the BVPI rates.

Due to the probable variation in the way in which projections are made by authorities, and other factors which may adversely affect the accuracy of projections - such as a disparity in the understanding of how improvements to HWRCs may affect recycling performance, or external unforeseen factors outside the control of local authorities, the projection data (along with other relevant data) has been analysed in a number of ways in order to test its robustness.

These tests and calibrations can be summarised thus: -

- Comparison of the current set of projections with prior projections, most notably for the year in which there is a direct overlap, 2005/06.
- A measure of whether the sample we are analysing (i.e. the “responding authorities”) is representative of overall performance.
- A determination of the projected HWRC recycling rates taking into account differentials in authorities’ HWRC tonnage throughputs.
- A measure of what proportion of projected HWRC recycling is encompassed by HWRC contractors’ recycling rate targets.

The survey researched additional aspects of HWRC management, summarised below: -

- Length of contract and expiry date for current CA site management contracts.
- HWRC recycling rate targets which may currently be set for contractors for the periods 2005/6, 2006/7 and 2007/8, and the mechanisms by which any such targets are enforced (e.g. financial penalty for failing to achieve target).
- Current plans for improving HWRCs, including amount budgeted and whether the budget is currently approved.

- Barriers to improving HWRCs.
- Feedback on initiatives driven from outside local authorities (e.g. Defra or WRAP).
- Support that local authorities (and/or their HWRC contractors) consider would be useful in helping them improve the performance of their HWRCs.

The original deadline for returning questionnaires was 25th November 2005. Further telephone work was conducted to maximise the response rate during the following two weeks. Returned questionnaires were entered into a bespoke Access database and data was subsequently analysed using Excel spreadsheets.

3. PROJECTED HWRC RECYCLING RATES

3.1 SIMPLE ANALYSIS OF MEAN PROJECTED RATES

The simplest form of analysis we can perform on the returned projection data is to take the average projected HWRC recycling rate for all responding authorities for each of the three years in the study⁴. Table 3.1 shows the recycling rates calculated on this basis.

Table 3.1 Simple-average (mean) projected HWRC recycling rates for all responding authorities (2005 to 2008)

	2005/06	2006/07	2007/08
Projected HWRC Recycling Rate (%) (mean for all responding authorities)	44.9	48.2	50.8

NB: BVPI definitions have been used for calculating recycling rates (i.e. inert and reuse are excluded).

3.2 FINE TUNING THE PROJECTIONS

The figures presented in 3.1 can be tested in a number of ways, with more sophisticated analysis performed on the data in order to arrive at more robust projections of HWRC recycling rates.

In order to do this, we can ask a series of questions: -

- Can there be any direct comparison of these projections with existing tonnage data?
- Can there be any direct comparison of these projections with previous projections?
- Are responding authorities representative of overall performance?
- Can we check the simple-average projections to encompass differentials in authorities' HWRC capacity?
- How realistic are these projected recycling rates?

3.2.1 *Can there be any direct comparison of these projections with existing tonnage data?*

The simple answer to this question is obviously "not yet", as we are not at the end of the first period. However, accurate information will soon become available for the period 2004/05 from Waste Data Flow (WDF). This will allow the projections for 2004/05 that were made in the first survey of this kind at the end of 2003⁵ to be calibrated.

Similarly, when WDF information becomes available for the period 2005/06, the projections made in this report will be able to be tested against actual tonnage flows.

3.2.2 *Can there be any direct comparison of these projections with previous projections?*

Since both the previous study and this study encompass the period 2005/06, we are able to directly compare the projections made here with those made previously.

⁴ For more detail on the calculation of simple average recycling rates see Appendix 2, Section A2.2.

⁵ Network Recycling, *Projected Recycling Rates for CA Sites in England, 2003 to 2004*, Eric Bridgwater and Paul Roberts, 2003

Table 3.2 shows that a like-for-like comparison of the projected rates made in the two studies was just 0.1 percentage points different.

Table 3.2 *Projected HWRC recycling rates (2005/06) - simple average (mean) for all responding authorities (previous and current study)*

	Simple average (mean) HWRC recycling rate (%)
Projection made in 2003 study	45.0
Projection made in this study	44.9

It must be noted that what we are comparing here are figures based on a simple averaging of the projected rates sent in by responding authorities. While we must be careful in concluding very much from the similarity in the figures, it is fair to say that it is to some extent a verification of the accuracy of the predictions made by authorities in the 2003 survey, assuming that the projections made in this survey for 2005/06 are going to be a fairly accurate representation of actual HWRC recycling rates that will be achieved in 2005/06.

For more comment regarding how the projections for the period 2003 to 2006 relate to the period 2005 to 2008, see Section 3.3.

3.2.3 Are responding authorities representative of overall performance?

Another way of comparing the previous data to the current is to determine whether we have a representative sample of authorities.

We have actual HWRC recycling rates for 2002/03⁶, which we can use to compare the full sample of authorities with the sample of responding authorities.

Table 3.3 shows that the recycling rate - calculated for authorities that have responded to *the current* survey - was 30.9% in 2002/03, compared to an overall rate of 29.2%.

Table 3.3 *Actual recycling rates (2002/03) - simple average (mean)*

	Simple average (mean) recycling rate (%)
Full study sample	29.2%
Responding authorities (current study)	30.9%

Thus, we can see that there is a slight difference (1.7%) between the two figures. There was a slightly higher 2002/03 HWRC recycling rate for the authorities that have responded to this survey than for the overall England-wide sample. We can tentatively suggest that this may be due to under performing authorities being less inclined to reply to this type of survey. However, the difference is so small that our current sample is likely to be a good representation.

3.2.4 Can we check the simple-average projections to encompass differentials in authorities' HWRC capacity?

A more sophisticated approach than taking a simple arithmetic mean of all responding authorities, is to calibrate the projected rates according to the tonnage throughputs. In this calculation, an authority that, for example, has an overall throughput of 34,000 tonnes per annum has proportionately twice the impact (on the overall England average projected recycling rate) of an authority that has a throughput of 17,000 tonnes.

⁶ The figure presented here differs slightly to that given in *Projected Recycling Rates for CA Sites in England, 2003 to 2004* (30.8%). This is because data for authorities that did not respond to the original projections survey has been sourced from the National Assessment of Civic Amenity Sites project, to create a full dataset (with the exception of Cheltenham).

The rates displayed in Table 3.4 have been calculated by determining the total projected recycling tonnage and the overall tonnage throughputs for all of the responding authorities, for each period. For a more detailed explanation of the assumptions and calculations used to arrive at these figures see Appendix 2, Section A2.3.

Table 3.4 *Projected recycling rates (2005 to 2008) – adjusted according to authorities’ HWRC tonnage throughputs*

	2005/06	2006/07	2007/08
Projected Recycling Rate (%) (adjusted to tonnage throughputs)	46.8	50.0	52.2
Projected Recycling Rate (%) (simple arithmetic mean)	44.9	48.2	50.8
Difference (percentage points)	1.9	1.8	1.4

Table 3.4 allows us to compare the figures derived from a simple arithmetic mean calculation against the tonnage-adjusted rates. We can see that there is a difference of between 1.4 and 1.9 percentage points between the simple mean and the tonnage-adjusted mean.

On the face of it, this difference is telling us that the projected recycling rate performance of those authorities with higher tonnage throughputs is better than those with smaller throughputs. However, due to the assumptions and corrections that have been made to the data, and the small difference in the above rates, nothing conclusive can be drawn about this issue.

However, we can see that there is a good correlation between the projections using the different methods of finding an average and, in the absence of recent actual HWRC tonnage data, it seems reasonable to use the simple-average projections as the basis for further discussion within this report.

3.2.5 How realistic are these projected recycling rates?

We can analyse the contractual targets information in order to estimate the quantity of material that would be required to be recycled in order to meet the contractual targets, and compare this to the quantity of material that would need to be recycled in order to meet the projected recycling rates.

Table 3.5 shows these estimates, and shows the proportion of material covered under contractual targets that would need to be recycled to meet the projected recycling rates.

Table 3.5 *Estimated projected and contractual recycling tonnages (2005 to 2008)*

		2005/06	2006/07	2007/08	Period total
Estimated HWRC recycling (tonnes)	To meet contractual targets	1,313,139	1,396,560	1,294,728	4,055,509
	To meet projected recycling rates	2,079,540	2,264,819	2,413,749	6,758,108
Percent of projected recycling fulfilled by contracted recycling		63.2%	61.7%	53.6%	59.3%

As can be seen in the above table, for the period as a whole, 59.3% of the tonnage required to be recycled to meet the projected rates is covered under contractual targets.

In reality this figure is likely to be considerably higher than this, for the following reasons: -

- Some authorities have awarded contracts for which the operation of HWRCs is only one aspect, and in some cases there are no specific HWRC targets while there are in fact contract-wide targets.
- These calculations are based upon current contractual targets. There are a number of responses stating targets for 2005/06 for example which also state that the contract expires in that year and so the years 2006/07 and 2007/08 have no targets. This may explain some of the decrease - in percentage of projection fulfilled by contracted recycling - seen in the table above (from 63.2% in 2005/06 to 53.6% for 2007/08). In reality it is thought likely that most authorities in this position would set new targets in for future contracts.

This compares favourably with the equivalent figure three years ago. At that time, 57% of the projected recycling tonnage was subject to contractual targets. This indicates that targets are becoming a more widespread measure in encouraging contractors to achieve higher recycling performance at HWRCs.

The fact that a majority of HWRC recycling tonnage required to meet the projected HWRC recycling rates is subject to contractual targets increases the reliability of the projected recycling rates presented in this report.

For details on the mechanisms that authorities use to persuade contractors to meet their recycling rate targets, see Section 4.

3.3 COMPARISON OF 2003 TO 2006 PROJECTIONS AND 2005 TO 2008 PROJECTIONS

Using information from both of the surveys, we have a set of projected HWRC recycling rates covering the period 2003/04 through to 2007/08, in addition to actual HWRC recycling rates for 2002/03.

Table 3.6 shows the projected recycling rates for this period. It also shows that the actual HWRC recycling rate in 2002/03 was 30.8%.

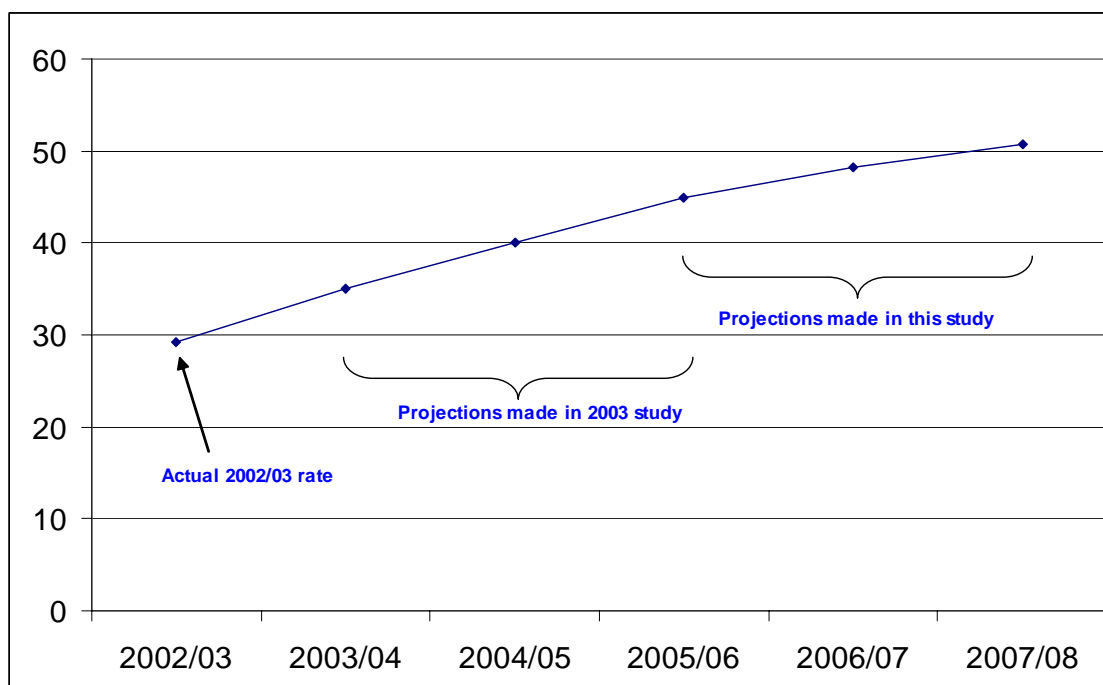
Since the two projection periods overlap in 2005/06, there are two projected rates for that year. This has been discussed in Section 3.2.2.

Table 3.6 Actual and projected HWRC recycling rates (2002 to 2008)

		2002/03 (Actual)	2003/05	2004/05	2005/06	2006/07	2007/08
Projected Recycling Rate (%)	Projection made in 2003 study	29.2	35.0	40.0	45.0	-	-
	Projection made in this study		-	-	44.9	48.2	50.8

Figure 3.1 displays these figures graphically.

Figure 3.1 Actual and projected HWRC recycling rates 2002 to 2008



A slowing down in the projected increase in HWRC recycling rates is evident when we compare the 2003 projections to those made during this survey. The rate of increase of 5 percentage points per annum has slowed to approximately 3 percentage points per annum.

It is worth considering why this slowing down in projected HWRC recycling rates may be taking place. The NACAS project identified a disparity between HWRC improvements contained in its theoretical cost model and the actual investments that authorities were planning in 2003. The amount of actual investment planned for HWRC improvements excluding the development of new sites amounted to £27 million, as opposed to £174 million of investment required to achieve 60% by 2005/06 under the NACAS cost model.

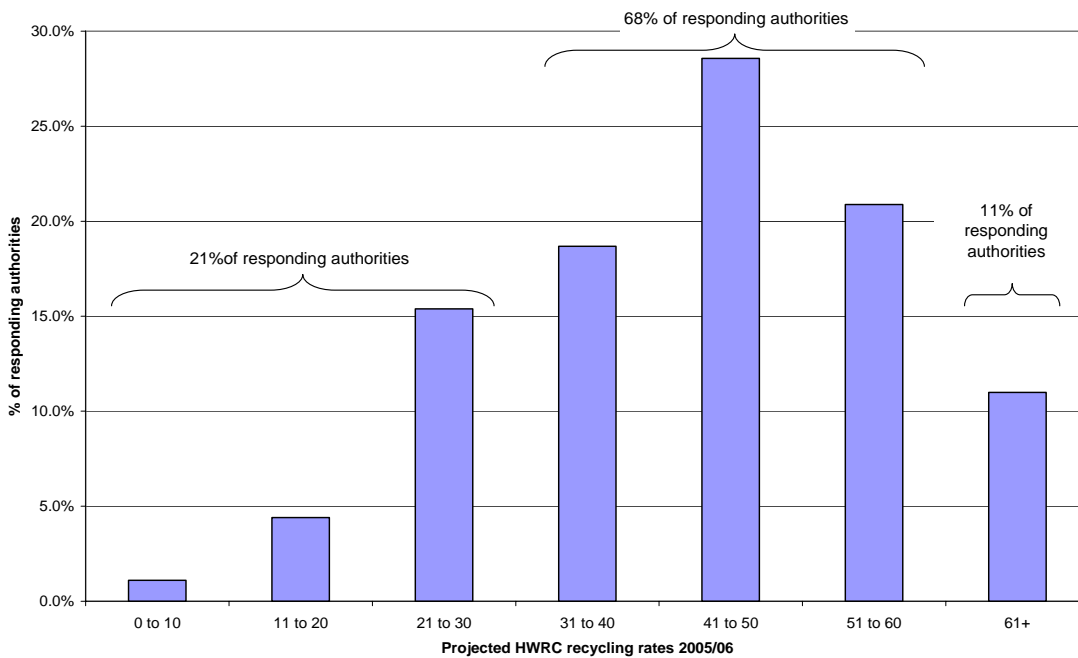
While nearly £85 million is planned for investment according to this survey, just £29.5 million of this is earmarked for spending on improvements that exclude development of new sites, again far behind the significantly higher NACAS cost model.

It is thought that many local authorities are not aiming as high as they might in improving HWRCs. The findings from the NACAS project suggest that HWRC recycling rates of 60 to 70% should realistically be achievable with a rethink in the aspects of HWRC operation invested in⁷. The fact that the average projected rates are slowing suggests that there is plenty of scope for HWRCs to perform at higher levels than those projected by England local authorities. Indeed, as can be seen in Section 3.4, there is a considerable spread in performance with 11% of responding local authorities projecting HWRC recycling rates above 60%.

3.4 VARIATION IN PROJECTED HWRC RECYCLING RATES

The Figure below displays the spread in projected HWRC recycling rates. We can see that approximately 21% of authorities are projecting their rates to be less than 30%. Some 68% of authorities are projecting rates in the range 30 to 60%, while a further 11% of authorities can be regarded as higher performing authorities, with projected rates above 60%.

Figure 3.2 Variation in projected HWRC recycling rates 2005/06



⁷ See Network Recycling and Future West, *National Assessment of Civic Amenity Sites (NACAS) Project*, Dr C. Cameron-Beaumont, E. Bridgwater and G. Seabrook, 2004, Page 317

4. CONTRACTUAL ARRANGEMENTS

A key device for the delivery of HWRC services by local authorities is the management contract, whereby day-to-day site operations are contracted out to private companies. Of the 594 HWRCs operated by responding local authorities or their contractors, just 32 (5.4%) were operated by local authorities Direct Service Organisations (DSOs) themselves.

It is therefore important to understand more about the contracts used to deliver HWRCs. This section of the report analyses the information we have obtained on this matter.

4.1 CONTRACTOR TARGETS

These are mechanisms placed in HWRC management contracts by local authorities in order to promote good performance. As we have seen in Section 3.2.5, 59.3% of material that would be required to be recycled in order for the projections stated in Section 3 to be met is obligated under contractor targets.

Other findings related to contractor targets are: -

- 40 out of the 91 authorities (44%) that gave a reply to this question had no contractor targets in place for any of the three years in the period.
- The contracted tonnages as a proportion of the projected recycled tonnage for authorities who have set contractor targets are shown in Table 4.1.

Table 4.1 Proportion of projected recycled tonnage that is subject to contracted targets

	2005/06	2006/07	2007/08	Full period
Contracted tonnage as % of projected recycled tonnage for authorities with targets	95.4%	98.3%	98.3%	97.3%

- As was found during the 2003 survey, projected HWRC recycling rates are considerably higher for those authorities that make use of contractor targets as a method to improve HWRC recycling performance.

Table 4.2 Comparison of HWRC recycling rates (simple-average) for authorities using and not using contractor targets

	2005/06	2006/07	2007/08
Authorities using contractor targets	48.7	51.8	54.2
Authorities <i>not</i> using contractor targets	40.0	43.5	46.4
Average for all authorities	44.9	48.2	50.8

4.2 CONTRACT DURATION AND EXPIRY DATES

Information was gathered from local authorities covering some 572 HWRCs (80% of HWRCs in England). Table 4.1 summarises these stated contract durations.

Table 4.1 Durations of HWRC contracts in England

Length Of HWRC management contract (yrs)	Number of contracts	Number of HWRCs	% of total number of HWRCs (England) ⁸
0 to 4	33	146	20.4%
5 to 9	47	196	27.5%
10 to 14	11	73	10.2%
15 to 19	6	25	3.5%
More than 20	19	100	14.0%
No contract / HWRCs managed by DSO	13	32	4.3%
Unknown ⁹	8	22	3.2%

The Table shows that some 48% of HWRCs have contract lengths of less than 9 years. This percentage has dropped from 60% when the survey was last conducted in 2003. At the same time the percentage of HWRCs covered by contracts of greater than 20 years has risen from 11.8% in 2003 to 14% now, suggesting a trend towards longer contracts.

Expiry dates of contracts were reported for 588 HWRCs. Table 4.2 summarises this information.

⁸ Assuming an England-wide total of 714 HWRCs.

⁹ Information was not provided by six authorities regarding the length of contract, corresponding to the operation of 22 sites.

Table 4.2 Expiry dates of HWRC contracts in England

Expiry dates of HWRC management contract	Number of contracts	Number of HWRCs	% of total number of HWRCs (England)
2005/06	17 (6)	79 (22)	11.1%
2006/07	11 (3)	38 (21)	5.3%
2007/08	33 (2)	197 (25)	27.6%
April 2008 to March 2011	32 (2)	121 (11)	16.9%
April 2011 to March 2014	2	4	0.6%
2014 onwards	25	117	16.4%
No contract / HWRCs managed by DSO	13	32	4.5%
Unknown ¹⁰	4 (2)	6 (4)	0.8%

Note: The figures given in brackets are the number of contracts / sites being operated under contract extensions.

We can see that 44% of England's HWRC contracts are due to expire during the period 2005/06 to 2007/08 (the period covered by the recycling rate projections made in this report). A further 16.9% of HWRC contracts are due to expire in the following three year period (April 2008 to March 2011).

4.3 CONTRACT ENFORCEMENT MECHANISMS

A valuable method of encouraging contractors to achieve their recycling targets is for authorities to use contractual enforcement mechanisms.

Categories of enforcement mechanisms described in the national questionnaire, to assist local authorities in responding to the question (Q4 in the questionnaire) are:-

- Penalty: financial penalty imposed if HWRC recycling rate target is not achieved
- Bonus: financial bonus earned if HWRC recycling rate target is achieved
- Annulment: contract is annulled if HWRC recycling rate target is not achieved

A summary of the types of enforcement mechanisms in place for responding authorities with contractor recycling rate targets is presented in Table 4.8:

¹⁰ Some authorities that did not specify the contract length did, in fact, provide the expiry date of the contract.

Table 4.2 Types of enforcement mechanisms applied to HWRC contracts

Contractor target enforcement mechanism:	No. authorities	%
Penalty	17 (16)	19.8%
Bonus	34 (32)	39.5%
Penalty and Bonus	16 (15)	18.6%
Contract Annulment	2 (2)	2.3%
Penalty, Bonus and Contract Annulment	1 (0)	1.2%
Other mechanism	5 (2)	5.8%
No mechanism	6 (3)	7.0%
Unspecified	5 (0)	5.8%
TOTAL	86	100.0%

Note: figures in brackets represent the number of authorities in each category that have stated contractor targets for HWRC recycling rates.

The table shows that the most common approach to incentivising contractors is to pay them a financial bonus if HWRC recycling rate targets are achieved (39.5%).

We can also analyse whether the targets that have been set for contractors are different for the differing methods of contract enforcement. Table 4.3 show what the average recycling rate targets are for contractors paid bonuses, those charged with penalties, and those with a combination of the two.

Table 4.3 Recycling rate targets for the differing contract enforcement mechanisms

Contract enforcement mechanism:	Simple-average recycling rates targets (%)		
	2005/06	2006/07	2007/08
Penalty	43.1	46.7	49
Bonus	45.6	48.0	47.6
Penalty and Bonus	49.9	51.6	57.1

We can see from the table that the authorities who are setting the more ambitious targets are those who are utilising both the “carrot” and the “stick” approach to contract enforcement, in that contractors are rewarded for good performance but stand the risk of being penalised for under-performing.

5. INVESTMENTS IN HWRCs

The survey revealed a current planned spend on HWRC improvements of nearly £85 million, 63% of which has budget approval.

The types of improvements planned for HWRCs varied greatly. In order to analyse this data, the following categories were used to describe various types of HWRC improvements:

- **Additional Recyclables:** separating new materials (which can increase recycling tonnages, depending on the types of materials and segregation efficiency for these materials; NACAS results also suggest that a wider range of recyclables may impact positively on site user behaviour, through increased public awareness).
- **Compaction:** compacting recyclables or residual waste (which can lower transport costs and increase efficiency of use of site space).
- **Contract Renewal:** some contract renewal processes can be complex and involve a financial cost; (well written contracts incorporating, for instance, contractor HWRC recycling rates targets may improve HWRC recycling rates).
- **Development of new sites:** ie building new HWRCs, or relocating existing sites.
- **Miscellaneous site improvements:** various measures, often including site refurbishment or improvements to specific aspects of site infrastructure; also includes introduction of sale of compost on site - derived from green waste collected on site (which may positively influence site user behaviour through increased public awareness).
- **Processing on site:** processing of collected materials on site (which may reduce transport and processing costs, and could impact positively on site user behaviour through increased public awareness).
- **Publicity:** any measures to publicise site or improve public awareness with regard to recycling (usually directed at HWRC users).
- **Redevelopment of existing sites:** mostly complete redevelopment of the infrastructure of existing sites.
- **Research:** various research, including HWRC compositional analysis and traffic counters to monitor site usage.
- **Security:** measures to deal with site security issues (ie break-ins from vandals or 'pickers')
- **Signage:** mostly practical bin signage; (NACAS results show that good signage is important in improving HWRC recycling rates).
- **Staffing:** investment in staff, through increases in staff numbers or staff training; (NACAS results indicate that staffing levels and staff motivation are important in improving HWRC recycling rates).
- **Trader controls:** measures to reduce site usage by unauthorised traders.
- **Traffic management:** measures to improve traffic management on site.

Table 5.1 summarises the planned investments in different aspects of HWRC improvement for both improvements that are budget-approved and those that are not.

Table 5.1 Summary of planned investments to HWRCs

Type of HWRC Improvement	Total (budget approved)	Total (budget not approved)	Total planned investment	% of total spend	Number of HWRCs
Additional segregation	£597,000	£115,000	£712,000	0.8%	203
Compaction	£0	£270,000	£270,000	0.3%	3
Development of new sites	£33,651,000	£21,800,000	£55,451,000	65.3%	66
General	£405,000	£480,000	£885,000	1.0%	91
Redevelopment of existing sites	£17,868,250	£8,075,000	£25,943,250	30.6%	130
Research	£0	£0	£0	0.0%	14
Security	£259,000	£84,000	£343,000	0.4%	42
Signage	£321,984	£53,000	£374,984	0.4%	157
Staffing	£223,000	£70,000	£293,000	0.3%	78
Trader controls	£245,000	£285,000	£530,000	0.6%	56
Traffic management	£130,000	£0	£130,000	0.2%	32
Total	£53,700,234	£31,232,000	£84,932,234		

It is clear that the lion's share (95.8%) of HWRC investment is split between development of new sites (65.3%) and redevelopment of existing sites (30.6%).

It is interesting to look at what materials authorities are planning to invest in to enable further segregation at HWRCs. Table 5.2 shows that of the biggest planned investment by a considerable margin is in the separation of WEEE items, accounting for almost 60% of the total spend on segregation. Of course, it must be noted that it is often the case that this sort of improvement is cost neutral, or that the costs are carried by the site contractors and so do not appear in this analysis. Looking at the number of HWRCs instead we can see that in non-monetary terms the separation of Waste Electrical & Electronic Equipment (WEEE) and Hazardous Household Waste (HHW) is planned to take place at 133 of the 203 – two thirds – of HWRCs where further segregation is planned.

Table 5.2 Analysis of investment plans for additional segregation

Material	Total (budget approved)	Total (budget not approved)	Total planned investment	Number of HWRCs
Fluorescent tubes	£0	£0	£0	2
General additional segregation	£250,000	£0	£250,000	46
Household hazardous waste (HHW)	£0	£0	£0	34
Plastic	£0	£0	£0	11
Repaint schemes	£0	£0	£0	1
Reuse	£10,000	£0	£10,000	2
Small recyclables	£37,000	£0	£37,000	6
Waste electrical and electronic equipment (WEEE)	£300,000	£115,000	£415,000	96
WEEE & HHW	£0	£0	£0	3
Wood	£0	£0	£0	2
TOTAL	£597,000	£115,000	£712,000	203

It is clear that authorities are focusing their expenditure on development of new sites and major redevelopment of existing sites, with just 4.2% of investment being planned for "softer" measures (i.e. staffing, signage, incentivisation, signage, traffic management). This is understandable in some respects in that the "harder" measures of engineering work are expensive, and necessary to improve ageing infrastructure and to meet the requirements of legislation such as Health and Safety Regulations and Disabilities Discrimination Act. Nevertheless,

it is many of the “softer” improvements (such as increased staffing and segregation, improved signage, better traffic management) that have been identified by NACAS as being crucial in improving HWRC recycling rates.

In other words, it is not always necessary to have an ‘all dancing all singing’ HWRC in order to achieve good HWRC performance. Indeed, it is perfectly feasible that such state of the art facilities could be developed whilst the soft measures are neglected. In these cases, NACAS findings suggest that poor to moderate HWRC recycling rates would be achieved. There appears to be an undue emphasis on major redevelopment and development schemes.

This raises the question as to whether investments are being planned in the most cost effective manner, in terms of achieving higher recycling rates. Of course, as already mentioned, there may be very good reasons for large scale engineering works to take place, and it may well be the case that within these planned developments and redevelopments there are plans to incorporate softer NACAS-style measures. However, development / redevelopment plans for individual sites would have to be examined in order to ensure that this is indeed the case.

6. BARRIERS TO IMPROVING HWRCs

Question 7 of the survey asked local authorities to report on any “factors which you consider are hindering (or may hinder in the future) the improvement of your HWRCs, and which you consider are beyond your direct control.”

The factors identified by responding authorities are summarised in Table 6.1.

Table 6.1 Barriers to improving HWRCs

Barrier to HWRC improvement	Number of authorities who stated this barrier	% of responding authorities
Contractual restraints	4	4.2%
Financial constraints	37	38.9%
General	18	18.9%
Infrastructure & Location	55	57.9%
Legislation	9	9.5%
Markets	30	31.6%
Planning & Licensing issues	35	36.8%
Public awareness	3	3.2%
Site abuse	4	4.2%
Staff	2	2.1%
Traffic management	1	1.1%

The most commonly stated obstacles to making improvements to HWRCs are infrastructure and location issues (58% of authorities stated this as an obstacle), planning and licensing issues (37%), financial constraints (39%) and lack of suitable markets (32%). The former two of these reflect the concentration of HWRC improvements on development and redevelopment, with many authorities stating a major hindrance as being lack of space for additional segregation at existing sites.

It seems paradoxical that a reconfiguration of investment towards the “softer” measures recommended by the NACAS project (such as increasing staffing levels, improving traffic management, or reducing trade abuse) has not taken place – as determined in Section 5 – and that judging from the findings of this section, many authorities do not see these softer measures as being particularly relevant in improving their HWRC performance. They are maintaining focus on large capital spending on infrastructural improvements.

7. HWRC IMPROVEMENT INITIATIVES

The questionnaire enquired of local authorities whether there have been any externally driven initiatives to improve the performances of their HWRCs. In analysing the data from this question it became clear that many authorities were reporting upon improvements that were driven from within their own departments or from their HWRC contractors. However, we can still determine the funding that has come from external organisations, as shown in Table 7.1 below:

Table 7.1 Improvement initiatives for HWRCs

Organisation	Number of local authorities	Amount of funding	Average recycling rate increment ¹¹
Council / contractor	21	£4,509,700	2.5
Defra	26	£8,495,352	5.6
Interreg	1	£10,000	Not identified
Local Public Service Agreement	1	£261,000	28.0
London Recycling Fund	3	£1,190,000	1.7
Network Recycling / NACAS	5	£123,000	6.0
NRF/HMR Pathfinder	1	£603,000	Not identified
SLR Waste Consultants	1	£700	Not identified
WRAP	29	£10,359,436	5.8
Grand Total	88	£25,552,188	5.4

Most of the support reported here appears to be effective. In particular the Defra and WRAP funded projects resulted in average increments of 5 to 6 percentage points on to HWRC recycling rates.

¹¹ The expected change in recycling rate due to initiatives was poorly reported. The figures given here are the averages of those authorities reporting an estimate. These figures are percentage point increases (i.e. an increment of 2.5% would see recycling rates move from 45% to 47.5%).

8. SUPPORT REQUIREMENTS

Table 8.1 summarises the support that local authorities and / or their HWRC contractors feel would be useful in improving their HWRC recycling rates.

Table 8.1 HWRC support requirements

Aspect of HWRC operations requiring support	Subcategory	Total number of authorities	Total number of sites
ADDITIONAL SEGREGATION	GENERAL	2	10
	PLASTIC AND WEEE	1	2
	REUSE	2	6
	WEEE & HHW	1	2
Subtotal		6	20
CONTRACTS	GENERAL	1	12
	INCENTIVISATION	2	3
Subtotal		3	15
DEVELOPMENT	ADVICE	2	18
	CONTRACTUAL IMPLICATIONS	1	12
	FUNDING	3	9
Subtotal		6	39
FUNDING	ADVICE AND FUNDING	2	9
	FUNDING	4	18
Subtotal		6	27
LEGISLATION	ADVICE ON LEGISLATION	3	48
	CHANGE IN BVPI TO INC RUBBLE	1	3
Subtotal		4	51
LICENSING	LICENCE	1	2
Subtotal		1	2
MARKETS	MARKETS	5	77
	MARKETS - MATTRESSES	1	19
	MARKETS - WOOD	1	8
	MARKETS - WOOD (LOW GRADE)	3	34
	MARKETS - WOOD, HARDCORE	1	2
	MARKETS - WOOD, PLASTIC	1	21
Subtotal		12	161
PUBLICITY		4	23
Subtotal		4	23
REDEVELOPMENT	ACCESS	1	2
	FUNDING	6	44
	TRAFFIC MANAGEMENT	1	4
Subtotal		8	50
RESEARCH	CASE STUDIES	1	1
	FUNDED SURVEY	1	5
	WASTE ANALYSIS	1	5
Research Total		3	11

Table 8.1 continued...

SECURITY	ABUSE TO STAFF	1	4
	FUNDING	1	9
	GENERAL	1	4
	TRADERS	1	3
Subtotal		4	20
SIGNAGE	ADVICE	1	5
	ADVICE AND FUNDING	1	1
	FUNDING	2	10
	GENERAL	1	2
	TRANSPORT FOR LONDON TO ALLOW SIGNS ON ROADS	1	1
Subtotal		6	19
STAFF	ADDITIONAL STAFF	6	31
	FUNDING	4	48
	GENERAL	2	23
	INCENTIVISATION	2	4
	TRAINING	30	175
Subtotal		44	281
TRADE CONTROLS	ALTERNATIVE TRADE WASTE DISPOSAL ROUTES	2	6
	ENFORCEMENT	4	13
	FUNDING CCTV	2	27
	FUNDING PERMIT SCHEME	1	9
	GENERAL	1	10
Subtotal		10	65
WEEE	ADVICE ON WEEE	1	5
	FUNDING	2	3
	GENERAL	1	1
	GUIDANCE	5	65
	INFRASTRUCTURE	1	12
Subtotal		10	86

While all of the support requirements are important in their own right, there are certain aspects of HWRC operation that authorities seem to be more commonly requiring support. These are: -

Market development: 12 authorities (covering 161 HWRCs) are calling for additional support for this, and of half of these require help with finding or developing markets for waste wood.

WEEE: it is worth mentioning that 12 authorities (covering 90 HWRCs) are calling for help regarding the WEEE regulations.

Staffing: the high figure of 44 authorities calling for support on staffing of HWRCs must be tempered by the possibility that many authorities were led by the example given in the questionnaire (see Appendix 1, question 10). It was evident on a number of returned questionnaires that many authorities stated the example of "customer care training" as being one of their support needs. While this complicates the issue somewhat – it is not possible to say with certainty that customer care training for staff is as valid a requirement as some of the other aspects that have arisen, due to the potential that the question was leading – it is likely that the example used has, by chance, coincided with the thinking of many authorities. It is therefore still regarded as a valid call by local authorities for support on this issue.

REFERENCES

Network Recycling, *Projected Recycling Rates for CA Sites in England, 2003 to 2004*, Eric Bridgwater and Paul Roberts, 2003

Network Recycling & Future West, *National Assessment of Civic Amenity Sites Project*, Dr Charlotte Cameron-Beaumont, Eric Bridgwater & Gary Seabrook, 2004.

APPENDIX 1 THE QUESTIONNAIRE

The questionnaire form is reproduced overleaf.

Questionnaire for Defra Waste Implementation Programme Local Authority Support Unit

HWRC¹² RESOURCE REQUIREMENTS

Please complete all the following questions by typing your answers in the spaces provided - the boxes will expand as you type.

Replies to all questions will be treated as confidential.

YOUR DETAILS

Q1. Name of local authority:	
Q2. Contact name & position:	

CONTRACT ARRANGEMENTS FOR MANAGING YOUR CA SITES

Q3 Identify the contractor(s) managing your HWRCs & length of the relevant contract(s):

If any information appears in the following table, it has been taken from your response to the previous questionnaire in 2003 – please check that these details are still correct and amend if necessary. If more than one contractor runs your HWRCs, please list details for each contractor using the extra rows provided in the table.

Name of contractor	No. of HWRCs run by this contractor	Length of current contract (years)	Expiry date of current contract

Q4 Indicate whether any of your HWRC contractors are required (or encouraged) to achieve HWRC Recycling Rate targets; and specify what those targets are for the period **2005/6 to 2007/8**

Use the current BVPI definition for stating Recycling Rate Targets (i.e. excluding separated rubble & re-use from Recycling Rate calculations, from both Denominator and Numerator)

Contractor	Enforcement mechanism	HWRC Recycling Rate target		
		2005/6	2006/7	2007/8

“Enforcement mechanism”: Various mechanisms are used by Local Authorities to encourage contractors to meet HWRC Recycling Rate targets. Specify what mechanisms are used for any of the targets that you state in the table above. You may use the following descriptions for the “Enforcement Mechanism” column:

- Penalty (= financial penalty imposed if HWRC Recycling Rate target is not achieved)
- Bonus (= financial bonus earned if HWRC Recycling Rate target is achieved)
- Annulment (= contract is annulled if HWRC Recycling Rate is not achieved)
- Other: briefly describe enforcement mechanism by typing in this box:

¹² Household Waste Recycling Centre, i.e. facilities provided under EPA 1990 s 51(1)(b) and/or Refuse Disposal (Amenity) Act 1978 c3 s1

PROJECTED FUTURE RECYCLING RATES FOR YOUR HWRCs

Q5 Indicate projected Recycling Rates for all your HWRCs (collectively) for the period **2005/6 to 2007/8**

Use the current BVPI definition for estimating projected Recycling Rates (i.e. excluding separated rubble & re-use from Recycling Rate calculations, from both Denominator and Numerator)

HWRCs ONLY:	2005/6	2006/7	2007/8
Projected Recycling Rate (%)			

You may have already calculated projected HWRC Recycling Rates through one or more of the following processes:

- If your authority has been awarded money from the Defra Waste Minimisation Fund, you will have been required to fill in returns indicating quarterly Recycling Rates projections - presumably these will include projections for HWRC Recycling Rates. If so, please quote average figures for HWRC Recycling Rates for each relevant financial year.*
- If your authority has formulated a Municipal Waste Management Strategy, it may include Recycling Rate projections - these may include HWRC Recycling Rates.*
- If your contractor is set HWRC Recycling Rate targets, you should have already stated these in Q5 above. Many authorities expect their HWRC contractors to exceed their HWRC Recycling Rate targets, though it is also possible in some cases that Recycling Rate targets may be missed. In this light, please indicate what Recycling Rates you expect your HWRCs to realistically achieve.*

IMPROVING YOUR HWRCs

Q6 Please use the table below to indicate the improvements¹³ that you as a local authority, and/or your HWRC contractor(s), currently have planned for your HWRCs.

Improvement of HWRCs encompasses a wide range of measures, such as: building new sites; redevelopment of existing sites; separation of new materials for reuse/recycling (ie WEEE); contractor and/or staffing incentives; staffing level increases; staff training; improved signage; traffic management; security (ie CCTV or fencing); trader controls (ie security guards, permit systems); research (ie waste analysis); many others.

Please include any measures which you feel are relevant to improving your HWRC Recycling Rates.

Type of improvement (<i>describe briefly</i>)	At which HWRC(s)?*	Planned completion date	Amount budgeted (£)	Budget approved? (Yes/No:)

* If you are introducing a particular improvement strategically across all your HWRCs, please type "All sites".

¹³ Include all improvements that are intended to directly or indirectly improve Recycling Rates at your HWRCs.

BARRIERS TO IMPROVING YOUR HWRCs

Q7 Please state any factors which you consider are hindering (or may hinder in the future) the improvement of your HWRCs, and which you consider are beyond your direct control.

Examples of such factors could be: • planning permission for new/relocated sites • licensing issues • lack of end markets for materials • any other factors you consider are relevant to your authority.

Factoring hindering HWRC improvement	Briefly explain why factor hinders HWRC improvement:

IMPACT OF PREVIOUS INITIATIVES TO IMPROVE HWRC PERFORMANCE

Q8 Please use the table below to tell us about HWRCs in your area that have been the target of externally driven improvement initiatives since April 2003?

(I.e. external to initiatives driven from within your local authority / HWRC contractor[s]. Examples of such initiatives could be WRAP grants, Defra DCS, NACAS consultancy)

Organisation responsible for initiative	Type of initiative (describe briefly)	At which HWRC(s)?*	Amount spent (£)	Estimated change in BVPI RR as a result of the initiative

**If the initiative focused on all your HWRCs, please type "All sites".*

Q9 Briefly give feedback on any initiatives that your authority / HWRC contractor[s] have been involved with since April 2003

Details of initiative:	
Feedback:	

FURTHER SUPPORT TO IMPROVE HWRC PERFORMANCE

Q10 What external* support do you and/or your HWRC contractor[s] consider would be useful to help improve further the performance of your HWRCs?

** i.e. external to your local authority / HWRC contractor. Please be specific about the external support required.*

Aspect of HWRC operation requiring support	Support requirement	Reason for support requirement	Please indicate the timescale for required support	On which HWRCs	
Example:	Staffing	Customer care training	Conflict between staff and site users	ASAP	All sites

**If the support is required at all of your HWRCs, please type "All sites".*

APPENDIX 2 ASSUMPTIONS & CALCULATIONS

Some of the calculations contained in this report require further explanation. There are also certain assumptions and corrections that have been made with regard to some of the data that require stating. This appendix contains details about these calculations, assumptions and corrections.

Note 1: BVPI definitions (i.e. excluding separated rubble and re-use items from recycling rate calculations) are used throughout this report unless stated otherwise.

Note 2: Recycling rate percentages are expressed in terms of a range from 0 – 100 for all of the formulae presented in this Appendix; i.e. a recycling rate of 55% would be represented by the figure “55”.

A2.1 General assumptions regarding stated recycling rate projections

- where a projection was only specified for one or two of the 3 periods, this figure would subsequently apply to future periods.
- Where an authority has given non-BVPI projections / targets, 10 percentage points have been deducted in order to estimate the BVPI rates¹⁴.
- If an authority stated a projection as a range of figures (for example 50% to 60%), the mid-point was taken as the projected rate (i.e. 55%).
- If an authority stated more than a certain recycling rate (e.g. >60%), the rate would be taken as the stated figure (i.e. 60%).

A2.2 Calculation of simple-average (mean) projected HWRC recycling rates

This calculation can be expressed thus: -

$$RR = \frac{r_1 + r_2 + r_3 + \dots + r_n}{n}$$

Where: -

RR is the simple-average (mean) projected HWRC recycling rate of responding authorities

r1 is the projected HWRC recycling rate for Authority 1

r2 is the projected HWRC recycling rate for Authority 2

r3 is the projected HWRC recycling rate for Authority 3

and so on for *n* number of authorities.

¹⁴ This adjustment is an approximation, based on the analysis of historical HWRC data.

A2.3 Tonnage-adjusted projections

These calculations assume that tonnage throughputs across all HWRCs in England have been increasing at a rate of 2% per annum. Thus, if *authority x* had a reported throughput of 12,000 tonnes in 2002/03, the calculation used here assumes that the 2005/06 throughput is 12,000 x 1.02³ (=12,734 tonnes), for 2006/07 it is 12,000 x 1.02⁴ (=12,989 tonnes), and for 2007/08 it is 12,000 x 1.02⁵ (=13,249 tonnes).

The tonnage-adjusted HWRC recycling rate calculation can be expressed in the following way:

$$\text{taRR} = \frac{t_1r_1 + t_2r_2 + t_3r_3 + \dots + t_n r_n}{t_1 + t_2 + t_3 + \dots + t_n}$$

Where: -

- taRR* is the annual projected HWRC recycling rate (tonnage adjusted)
- t₁, t₂, t₃, etc* is the estimated annual HWRC tonnage throughput for authorities 1, 2, 3 ,etc (see assumptions above)
- r₁, r₂, r₃, etc* is the projected HWRC recycling rate for authorities 1, 2, 3, etc
- n* is the number of authorities that replied to the survey

BVPI definitions (i.e. excluding separated rubble and re-use items from recycling rate calculations) are used in the calculations.

A2.4 Calculation of estimated contracted and projected HWRC recycling tonnages

The estimated contracted HWRC recycling tonnage calculation can be expressed in the following way: -

$$\text{Tc} = \frac{t_1c_1 + t_2c_2 + t_3c_3 + \dots + t_n c_n}{100}$$

Where: -

- Tc* is the annual estimated HWRC recycling tonnage covered under contract
- t₁, t₂, t₃, etc* is the estimated annual HWRC tonnage throughput for authorities 1, 2, 3 ,etc (see assumptions in Section A2.3)
- c₁, c₂, c₃, etc* is the contractor target HWRC recycling rates for authorities 1, 2, 3, etc
- n* is the number of authorities that replied to the survey

BVPI definitions (i.e. excluding separated rubble and re-use items from recycling rate calculations) are used in the calculations.

The estimated HWRC recycling tonnage calculation can be expressed in the following way: -

$$\text{Tp} = \frac{t_1r_1 + t_2r_2 + t_3r_3 + \dots + t_n r_n}{100}$$

Where: -

- Tp* is the annual estimated HWRC recycling tonnage covered under contract
- t₁, t₂, t₃, etc* is the estimated annual HWRC tonnage throughput for authorities 1, 2, 3 ,etc (see assumptions in Section A2.3)
- r₁, r₂, r₃, etc* is the projected HWRC recycling rates for authorities 1, 2, 3, etc
- n* is the number of authorities that replied to the survey

BVPI definitions (i.e. excluding separated rubble and re-use items from recycling rate calculations) are applied for all the above calculations.