Food Waste Collection: Update to WRAP Biowaste Cost Benefit Study

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Contents

1.0 Synopsis

Studies commissioned by WRAP in 2006 and undertaken by Eunomia led to the publication of two reports[1,2] which were influential in steering the government to support separate food waste collection and Anaerobic Digestion (AD) in the 2007 Waste Strategy for England.

The work made claims that the separate collection and treatment of household food wastes appeared overall to deliver greater net benefits than the combined collection and treatment of food wastes with garden wastes. It was also claimed that the system would be cheaper for local authorities, taking into account the marginal cost of disposal.

However, in mid 2006 when the collection appraisal work was undertaken there was only very limited UK experience in operating separate food waste collections, with limited performance and operational data. As such, assumptions used in the original modelling were, in the main, based on experience from overseas.

Since that time the number of UK food waste collection operations has seen a dramatic increase. As of the turn of this financial year, 54 local authorities were operating some form of dedicated food waste collection in all or part of their area, and a further 56 authorities were collecting food mixed with garden waste. Indeed, the original work led to WRAP proceeding with a programme of 19 collection trials for food waste in order to gain more direct UK experience of such collections[3].

The experience gained and data generated indicated that some of the assumptions in the original work were in need of updating. As well as the new information now available related to collection timings, changes have also been observed concerning gate fees, treatment costs and landfill tax. An overhaul of the original modelling was deemed necessary in order to check that the findings and recommendations of the previous reports are still robust.

2.0 Methodology

The original study undertook cost and performance modelling of a variety of organics collection and treatment scenarios through the following two stage approach:

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[1] WRAP/Eunomia, Dealing with Food Waste in the UK, March 2007.

[2] WRAP/Eunomia, Managing Biowastes from Households in the UK: Applying Life-cycle Thinking in the Framework of Cost-benefit Analysis, May 2007. Both at: www.wrap.org.uk/local_authorities/biowaste

[3] WRAP/Resource Futures, Evaluation of WRAP Separate Food Waste Collection Trials, September 2008. Available at www.wrap.org.uk/fwct

- collection option financial cost modelling (referred to as 'private costs' and including all true expenditure on labour, vehicles, gate fees on disposal or treatment, landfill tax, income from material sales etc.); and
- treatment option environmental cost modelling (referred to as 'external costs' and including monetised impacts on the environment such as human health and climate change impacts).[4]

The scope of the work was extensive and the modelling methodologies used were particularly involved. Indeed, the main report runs to 204 pages plus 144 pages of appendices. The intention here is not to redo this complete work, but to reassess the original findings in light of new information related to the collection modelling side of the work.

For this report, a full set of the generic collection options are re-run with the updated assumptions in a like for like manner. 'Original' and 'Updated' results are compared directly. This report presents a summarised analysis of the impact of these changes.

In order to keep the scope of the reassessment as succinct as possible we are, in the main, remodelling only the >200m^2 garden size options here. This, we believe, is sufficient to demonstrate the impact that new UK specific data may have on the modelling since differences between the original >200m^2 and <200m^2 results were not significant enough to lead to different conclusions for local authorities with such characteristic differences. As such, the key messages from our modelling work may be considered robust enough to be applied in the general case for much of the UK on the basis of one set of modelling results.

The models assessed, therefore, follow the same methodology as presented in the original "Managing Biowastes" report and include all >200m^2 collection system options described in Section 6.1, and including the full range of approaches to organic treatment. Effectively, the options reassessed here are the ones shown in Figure 46 in the original report (page 112). They can be summarised as follows:

- No biowaste collection (base case scenario – BC);
- No biowaste collection, but with recycling captures that are equivalent to the main options, providing a direct comparator for the alternative options that isolates the impacts of the biowaste collection (intermediate base case – IBC);
- Charged garden waste collection (£GW);
- Free garden waste collection (GW);
- Weekly food waste collection, coupled to three different organic waste treatment options as follows:
    - digestion of food waste and windrow composting of HWRC garden waste (food waste only with composting and digestion – KOc/d);

[4] The original report was careful to ensure no double counting occurred where environmental costs were already internalised in financial costs.

- in-vessel composting of kerbside food and HWRC garden waste (KOc);
- digestion of both the kerbside food and HWRC garden waste (KOd);

- Weekly food waste collection but with incentivised home composting. Same three organic treatment options (K+);
- Fortnightly mixed food and garden waste collection in wheeled bins (total biowaste scenario – TB);
- Weekly food with separate charged garden waste collection (K,£GW). Two treatment options;
- Weekly food with separate free garden waste collection (K,GW). Same two treatment options.

Alongside the options listed above, the residual waste collection system used in each case is also a crucial determinant in the cost differentials between the no organic waste collection and organic waste collection options. In the original modelling, the switch in the >200m^2 garden size options was from a weekly wheeled bin collection of residual waste to a fortnightly (alternate week) wheeled bin collection of residual and garden waste. In the <200m^2 garden options, the switch was from a weekly sack-based residual waste collection to fortnightly collections in wheeled bins. As may be expected, the benefit from switching from a weekly wheeled bin based system is much greater than if switching from a weekly sack-based approach (since the sack system is itself lower in cost). Consequently, the main modelling conducted here (as seen in the original >200m^2 modelling) includes the switch from weekly to fortnightly wheeled bins. We also, however, include the more conservative results for the switch from weekly sacks to fortnightly bins as a sensitivity appraisal.

3.0 Changes to the Assumptions

The following sections document the major changes that needed to be incorporated in the updated modelling.

3.1 Householder Performance

The mass flows used in the original work have had to change to reflect actual observed captures of food waste as derived from WRAP-funded trials, which gathered comprehensive data from a range of English trial authorities. The original food waste captures are shown in Table 1 alongside updated values based on the recent data from the WRAP food waste trials.[5] As can be observed, the absolute quantities of both food waste arisings and food waste capture are lower than previously modelled. The

[5] The main reason for the differences can be traced, essentially, to assumptions about the quantity of waste being collected at the doorstep in the original report. We chose a round figure for total waste arisings (1 tonne per household) that was close to the actual figure for the sake of convenience. This was, on reflection, too high (and hence quantities of food waste were also too high), but the intention was to examine relative performance of the systems being examined rather than to model real systems as in this follow-up work.

net impact, however, is to leave overall food waste captures in percentage terms at very similar levels to the previous work.

Table 1: Food Waste Kerbside Captures

kg/hhld/yr or %	Separate food waste collection options	Food collection with incentivised home composting	Combined food / garden waste collection
Original food waste arisings	236	227	238
Original food waste capture absolute	153	147	59
Original food waste capture %	**65%**	**65%**	**25%**
Updated food waste arisings	180	172	185
Updated food waste capture absolute	108	104	38
Updated food waste capture %	**60%**	**60%**	**21%**

The changes illustrated in Table 1 may raise some concern about the methodology employed in the original work and the effects of the updated modelling on performance. Modification to the mass flows not only impacts on the collection modelling (the impact of which we are assessing here), but also on the environmental cost modelling (which we have not intended to review). However, the fact that the percentage captures remain very similar in the two studies gives some comfort that the changes will not materially affect the modelling. The absolute magnitude of the net environmental impacts per household would change with the updated figures, but the changes in relative terms would be much as they were in the initial report.

As such, we consider that although the revised modelling is based on lower food waste arisings than we had originally modelled, the environmental analysis remains relatively robust and the external cost modelling does not need to be revisited.

In other respects, kerbside material mass flows remain unchanged. Quantities of other materials that are recycled and disposed of are identical in both the original and updated studies.

3.2 Collection Operations

3.2.1 General

As mentioned at the end of Section 2.0, the original modelling used an intermediate base case with weekly bin-based residual collection. This methodology is reproduced here. However, results based on a background of weekly sack-based residual collection are also calculated to identify the sensitivity to this consideration and the significance of the resultant cost-benefit in this situation.

Experience in the English trials suggests the desirability of supplying biobags (liners for kitchen caddies) to participating households. These biobags are added to the modelling options and included in the costs (as they were in the original study). WRAP suggests that the more effective trial areas are observing about £3.50 in bag costs per participating household per year (or £2.00 per household across the local authority area). At 3p per bag, this suggests households are using an average of just over 2 bags per week. Although the modelling includes these costs, it may be possible to avoid VAT and thus reduce costs slightly if the supply of liners were supported directly by the Council.

Fuel costs have been increased to £1.15 / litre of diesel (anticipated to be a reasonable longer term fuel cost, discounting VAT which is not paid by local authority collection operations).

3.2.2 Food Waste Vehicle Operations

The dedicated food waste collection vehicle operations are the fundamental reason for the update to this work. Originally we modelled driver-only operation and had to estimate likely participation, set-out and daily vehicle pass rate statistics. The WRAP trials have now provided actual operational data which is applied here. As well as set-out data for a variety of Local Authorities, the data covers balances of productive and non-productive time; the available collection time is set against downtime with both travel time to and from rounds and treatment facilities, and time spent on breaks taken into account.

One major difference to our previous modelling is that vehicles being operated in the UK for food waste collections are tending to be driver-plus-1-operator; authorities have seemed reluctant to opt for driver-only systems, often citing health and safety reasons and contract policy. The additional loader makes kerbside collection somewhat quicker and increases the number of pick-ups that are possible per day, but on the flipside there is an increase in the cost per vehicle in use.

The data we draw upon is taken directly from the operational trials. We use average figures from the Preston, Calderdale, West Devon, South Shropshire, Mid Beds and Oldham trials. Summarised statistics which feed into the modelling are shown in Table 2. This table also includes calculations (in blue) on the figures provided (in black) to scale up to a longer working day. This up-scaling is done because the round sizing in the trials resulted in crews finishing early; in subsequent systems WRAP will now be advising on larger round sizes to make full use of the working day.

Table 2: Operational Data from WRAP Collection Trails, and Calculations Thereupon

Number of pick-ups per day	780
Average set-out rate	56%
Average participation rate	8% higher than set-out*
Pass rate per day	1,400
Average work time per day	06:29
Time not collecting per day (breaks, travel to / from round)	108 minutes
Minutes collecting	281
Average pick-ups per minute	2.78
Desired working time per day (37.5 hour week)	07:30 or 450 minutes
Minutes collecting	342
Achievable pick-ups per day	949
Achievable passes per day	1,696

**But does not impact on the modelling – see below.*

Evidence suggests that daily food waste set-out rates are lower than previously modelled (56% compared to a 67% used in the original modelling). Participation rates are of less relevance to this study since collection operations are only affected by daily set-out rates and overall quantities of material set out. WRAP trials found the average difference between participation and set-out rates to be approximately 8%.

However, since the values for both overall material capture and set-out rates are known, participation rates do not impact on the analysis.

The analysis shown in blue suggests that around 1,700 passes per day are achievable. It is useful to note that just 890 passes were modelled in the original study (albeit with driver-only operation). WRAP did note that there was spare capacity in the trial collection days, since rounds had been designed conservatively to allow for any initial service quality issues to be managed effectively. WRAP confirm that the pick-up rates suggested should be achievable within the working time available each day. However, when attempting to use this data within Eunomia's own collection cost model, it was identified that if the vehicle collects much more than about 950 pick-ups then its containment capacity is reached and it would need to tip off twice a day (which would simply eat into the working time available). As such, we have deliberately limited the working time in the day for food waste collections slightly and model a total of 1,650 passes and 920 pick-ups. This suggests that there is scope for vehicle optimisation such that the daily load (in mass terms) is marginally increased, but with minimal effect on cost.

3.3 Other Key Changes

Latest gate fee prices have been used in the new set of modelling. In-vessel composting prices have increased by £5/t to reflect the increased process control seen on these systems operating in the UK (due to operational problems suffered with the basic static clamp systems such as the feedstock mix leading to anaerobic conditions and resultant odour). On the other hand, AD costs have reduced in recent times, in part due to greater market penetration, but also as a result of the announcement of the potential eligibility for double ROCs from the electricity generation, plus the additional value being placed upon nutrients in digestate following gas price increases (with gas use representing a high cost in fertiliser production). A £5/t reduction to £55/t has been used for mixed food and garden waste digestion, and a £10 reduction to £50/t has been used for food waste digestion only.

Disposal prices are increased in the updated modelling to reflect the increase in landfill tax to £48/t in 2010/11, whereas the previous ceiling was £35/t for 2011/12. Little change has been observed concerning landfill gate fees and so the original rate of £23 has been used.

It was suggested that benefits in respect of LA(T)S should be factored into the analysis presented here. In truth, the approach ought to reflect the marginal cost of avoiding the disposal of an additional tonne of biowaste. In England, this might depend upon the nature of the contracts within which an authority currently operates, and the value of landfill allowances, etc. In non-traded schemes, such as Wales, the value of avoiding disposal depends very much on whether the authority's situation is such that food waste collection puts its balance of allowances closer to surplus, or whether it already has a surplus on its allowances account. If the authority has a negative balance, then arguably, the avoided cost of disposal is the cost of landfilling plus the cost of fines which could be levied on the authority. When in surplus, the avoided cost is effectively the cost of the treatment / disposal option being used.

The issue is clearly complex and will affect each region differently. As a sensitivity test, we have run the model in the situation where the avoided option for residual waste is no longer landfill, but a new incinerator. In recent work for WRAP, gate fees for such facilities would appear to be of the order £80 per tonne. The model has therefore been re-run with this £80 disposal cost, but with other assumptions set equivalent to the scenarios with the (more optimistic) base case that includes weekly bin-based residual collections.

In any case, the point in the original cost-benefit work was to assess the overall social costs of particular systems, including both economic and environmental costs. LATS is a direct measure to reduce organic waste to landfill. In essence then LATS is directly attempting to 'internalise' the external costs associated with landfill's greenhouse gas emissions. As such, we can consider that any potential LATS costs are either included in the environmental costs calculated in the original modelling or are not relevant where residual waste goes to incineration.

What may be said is that where authorities are expecting LATS penalties, the observed financial cost-benefit associated with the higher biowaste diversion scenarios would be greater still.

Although we have not attempted to redo the environmental analysis, we consider it of significant interest to consider the collection modelling results in the context of the overall social cost-benefit. As such, we have been able to directly lift the external costs (or benefits) from the original work and overlay these on the private costs.

4.0 Results

In order to demonstrate the difference between the original and updated modelling, we have reproduced the chart (Figure 46) from page 112 of the original report as

Figure 1 below and shown the updated modelling alongside as Figure 2.

The most striking difference is that baseline and intermediate baseline costs are much greater in the update. This is unsurprising since landfill tax is now modelled at £48 rather than £35 per tonne and a substantial proportion of material is being landfilled in these cases. However, individual scenarios have increased by greater and lesser degrees, and the reasons for this are more numerous and intricate. As such, it is best to display the results of both studies on the same chart in the form of incremental costs relative to the intermediate base case. Figure 3 can not only be used to demonstrate the key messages borne out of the original modelling, but crucially, it compares directly with the updated modelling to distinguish whether the methodological changes necessitate a rethink in the conclusions that should be made.

The results of the modelling with external costs included are shown in Figure 4 (the environmental modelling was not conducted for all options so in those cases where the external costs are unknown, the private costs are shown faded). Interestingly, the environmental cost savings associated with food waste collection significantly compensates for increased collection/treatment costs and results in overall cost reductions – which may be considered as a net social improvement.

The free garden waste collection options do not lead to such positive results, especially where food waste is mixed into existing garden waste collection systems. In these cases no overall environmental improvement is seen, primarily due to the increase in material collected through kerbside systems. Figure 4 shows that for the options where the external costs are known, in all cases, the net social cost of a separate food waste collection system is better (more negative) than any competing option collecting garden waste.

Figure 1 to Figure 4 all use the more optimistic bin-based intermediate base case, meaning the cost differential of adding the organic waste collection includes a saving from a switch from weekly bin-based to fortnightly bin-based residual waste. In this situation, separate food waste collection can deliver up to £6.20 in whole system (private) cost savings and an additional £2.50 of environmental improvement. These are the true comparators which update the original work for the >200m² options.

We also include the more conservative impacts of switching from weekly sack-based residual in Figure 5 and Figure 6. Though we have not conducted specific modelling to update the <200m² scenarios originally modelled, this switch is more representative of those options. In these cases the net costs are less positive, but the modelling still demonstrates increased savings compared to the original work.

Figure 1: Original Results Summary

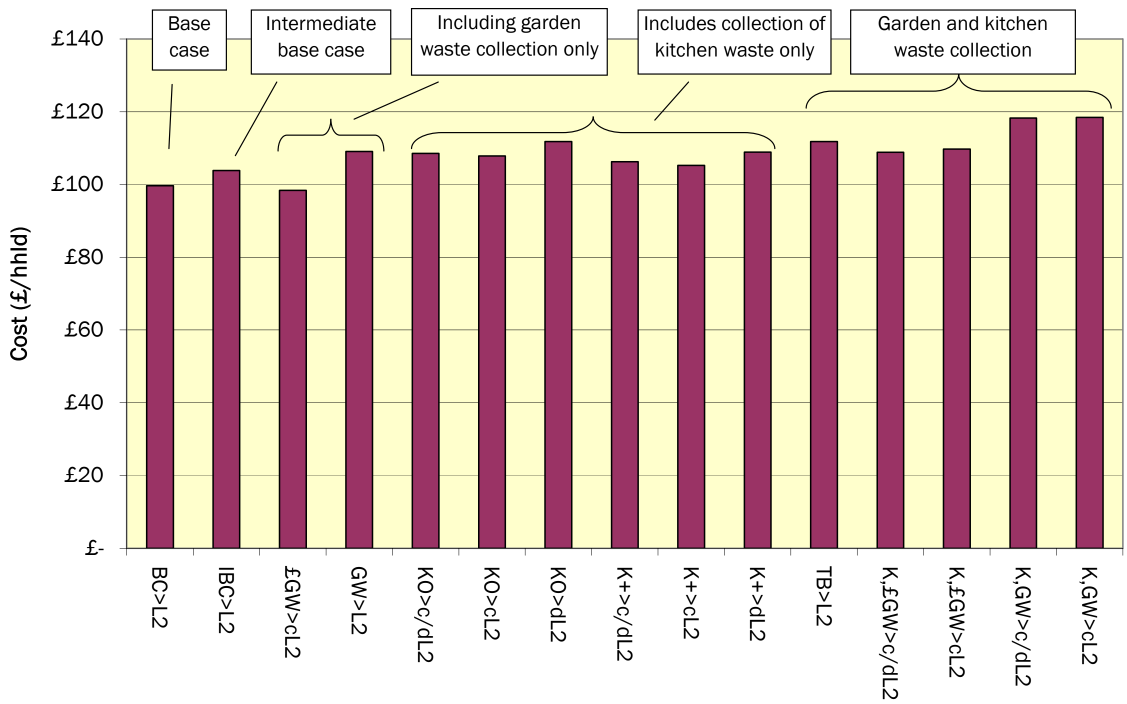


Figure 2: Updated Results Summary

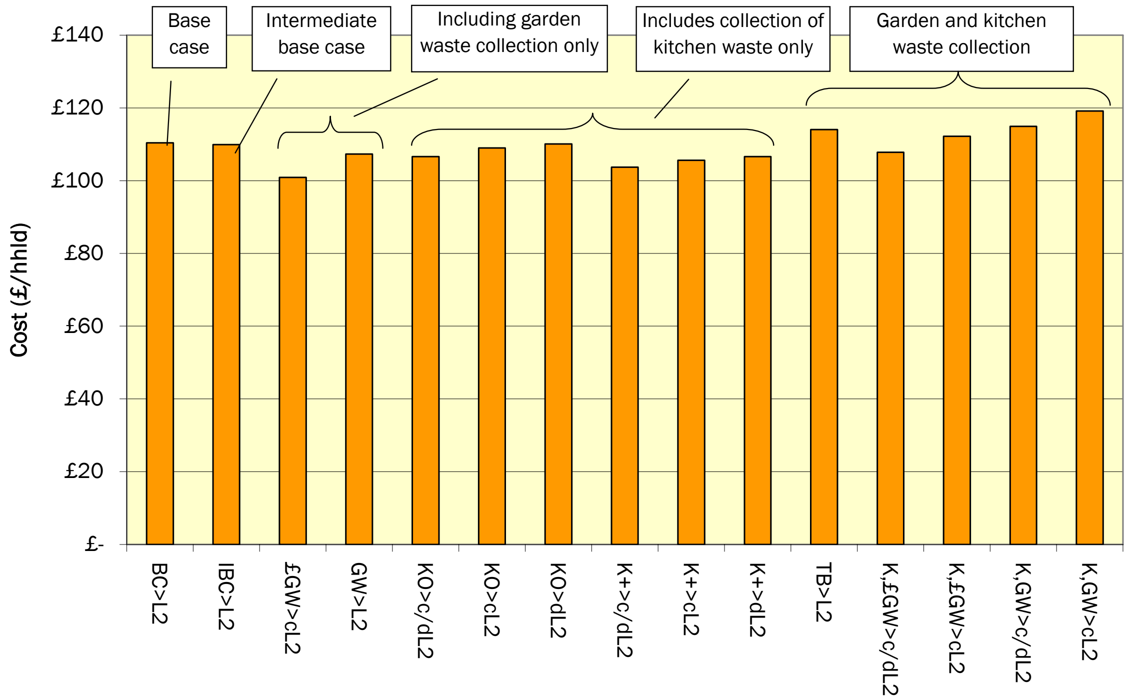


Figure 3: Incremental Cost Comparisons (switch from weekly bin-based residual)

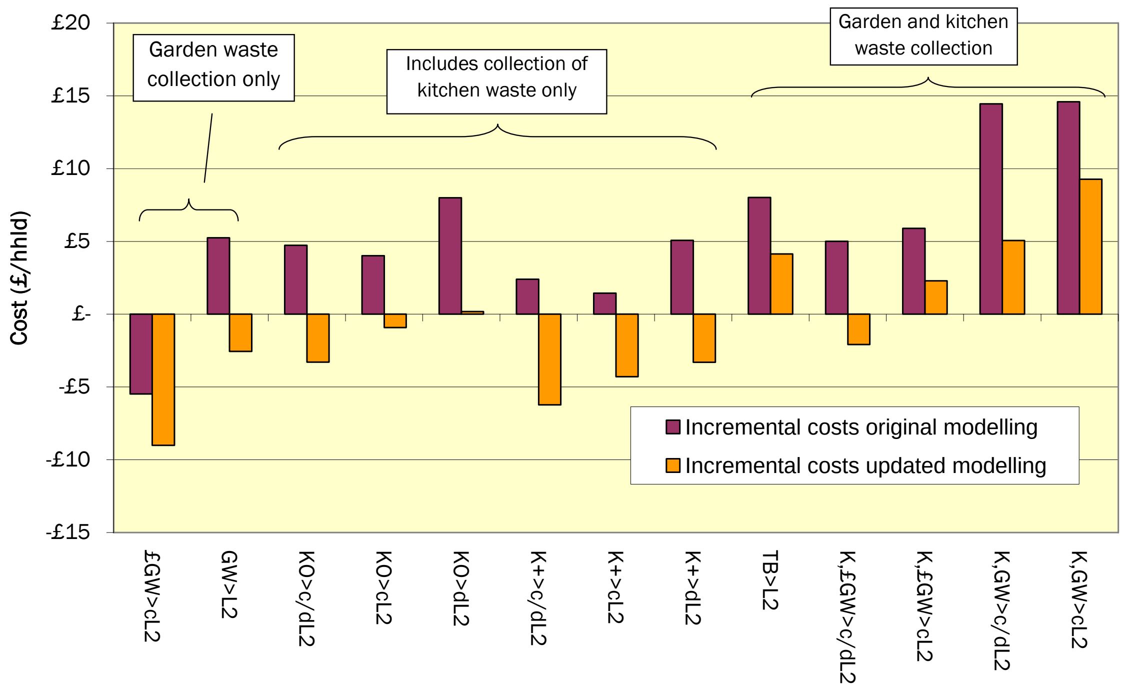


Figure 4: Incremental Costs Shown with External Costs Where Known (bin-based switch)

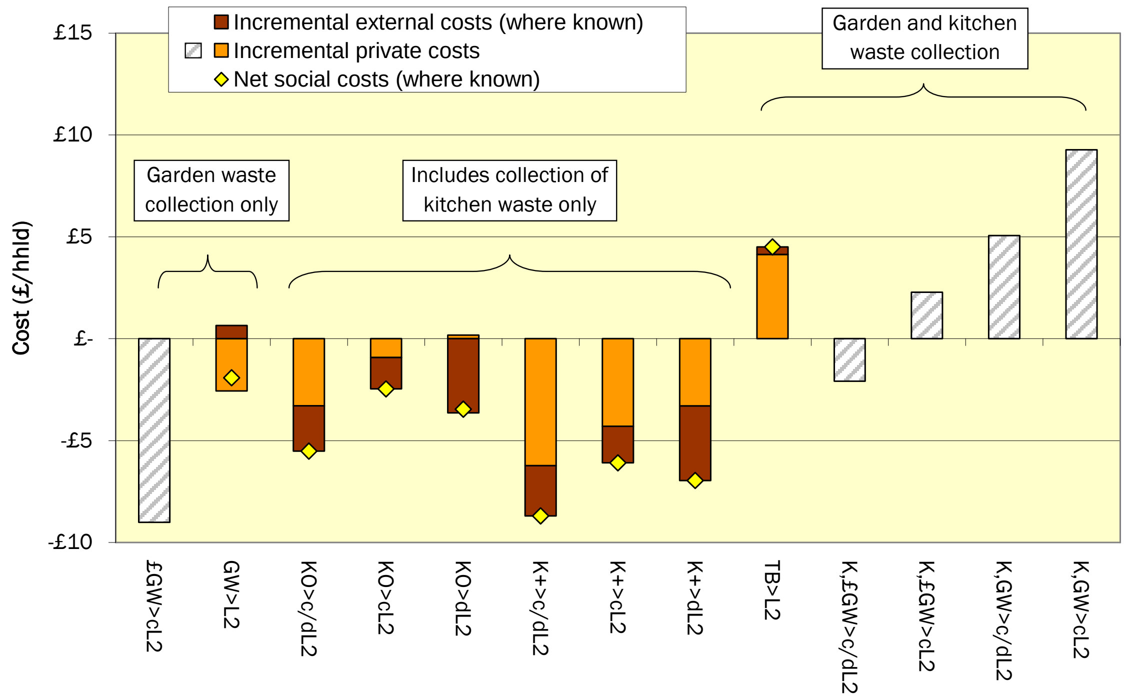


Figure 5: Incremental Cost Comparisons (switch from weekly sack-based residual)

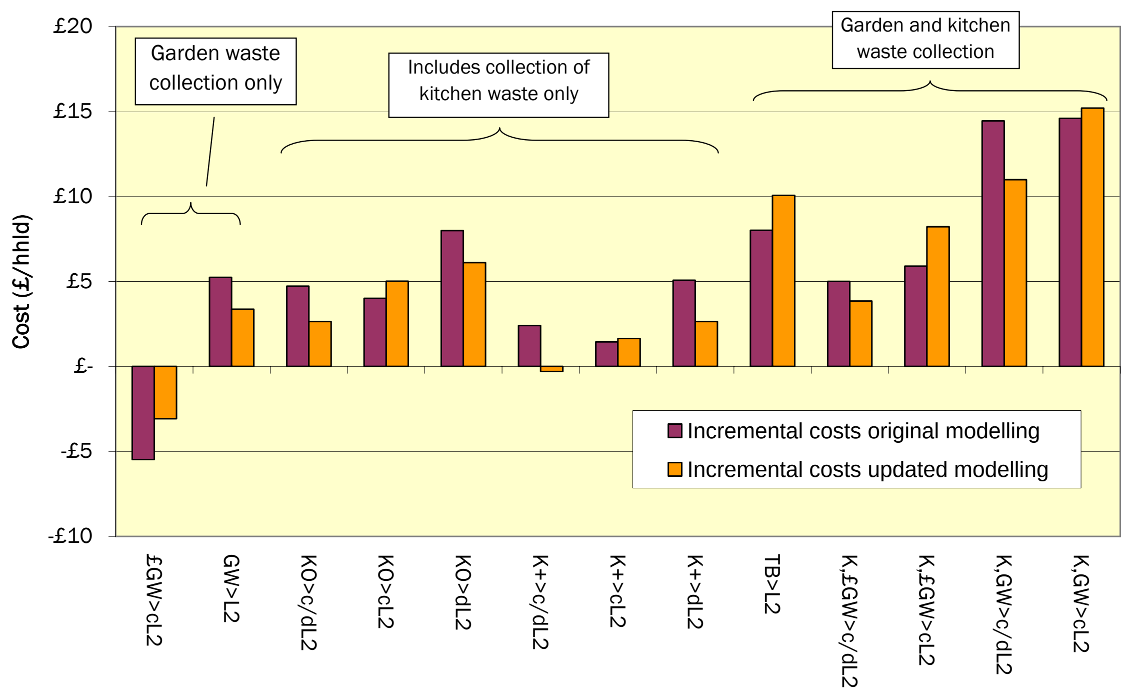
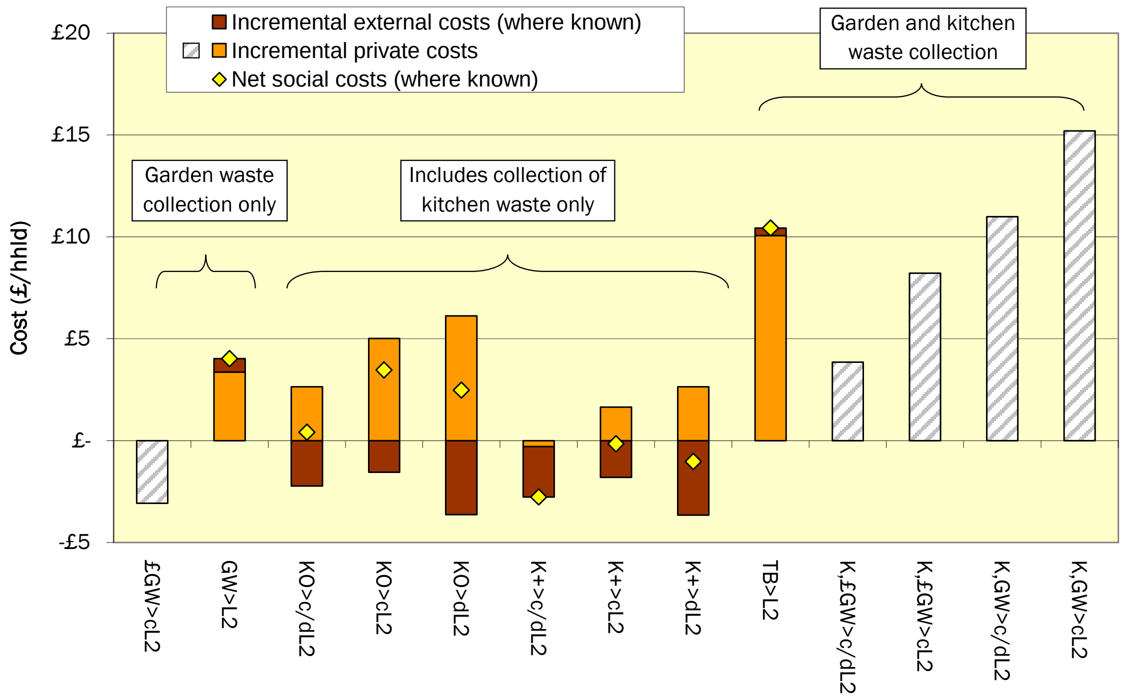
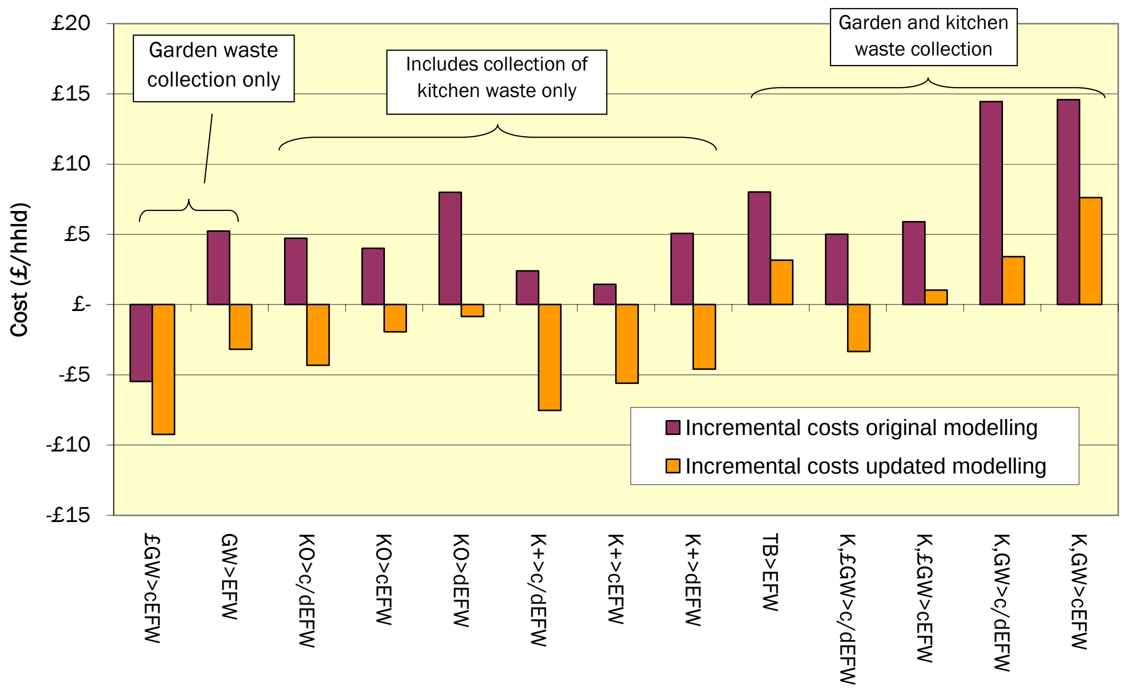


Figure 6: Incremental Costs Shown with External Costs Where Known (sack-based switch)



We also include, as a sensitivity test, a complete set of results for where residual waste goes to incineration (cost of disposal at £80/tonne as opposed to £73/tonne). Shown in Figure 7, this uses the more optimistic weekly bin-based residual collection system in the base case and as such gives a direct comparison to Figure 3. As can be seen, additional cost savings are associated with the options that lead to the generation of less residual waste.

Figure 7: Incremental Cost Comparisons (switch from weekly bin-based residual), Incineration Gate Fee



5.0 Evaluation and Summary

5.1 Modelling Interrogation

The comparison of results shows that the original modelling and the conclusions derived from it largely 'hold good' under the revised modelling. The original report concludes that a sound management strategy for household biowaste is likely to include:

- Intensive promotion of home composting as a means of diverting appropriate biowastes from landfill at the lowest cost;
- Where kerbside garden waste collection services are provided, they should be designed so as to minimise the potential for attracting additional waste into the collection system. A number of measures are available to local authorities (notably appropriate containers and charging mechanisms);
- Separate collection of food wastes using efficient and lower-cost approaches to allow weekly collections at acceptable cost;

- Provision of appropriate containers to make the separation of food waste easy for residents and to encourage them to take part in the service[6]; and
- Close consideration to matching the method of collection to the treatment system being operated. AD and in-vessel composting could both be valuable, with AD bringing the higher environmental benefits.

Indeed, these messages drawn from the original modelling appear to be strengthened in the updated modelling (owing to changing market conditions, and notwithstanding increases in fuel costs). Food waste collection looks cheaper in relative terms in comparison to our previous evaluation, and the increase in the avoided cost of disposal improves the business case for separate collection where less residual waste is generated.

Considering these two sets of results, a question immediately presents itself: *"Why have the results not changed even though we are proposing more expensive collection vehicles with double the staffing, and including the provision of biobags to residents?"* The answer to this, for the most part, lies in the operation of the collection vehicles. It may help to summarise key details from the original and updated models, as shown in Table 3.

Table 3: Key Food Collection Assumptions Differences between the Modelling Studies

What we were expecting	Collection operations in practice
Driver-only operation of vehicles	Driver plus one
Vehicle cost £18,000	Vehicle cost £38,000
Set-out rate 67%	Set-out rate 56%
Pick-ups per day 600	Pick-ups per day 920
Passes per day 890	Passes per day 1,650

The impact of the first two of these changes is that the costs of collection will rise markedly – vehicles are twice as expensive and have to be crewed by twice as many staff. However, the higher pick-up rate of dual-operative crews means that fewer vehicles are needed overall. Even so, it will be noted that the average pick-up rate is less than double what we had estimated for one-person vehicles (based around what is achieved in Italian systems). It might be argued then, that more than half the number of vehicles would be needed.

However, a key point is that we over-estimated the set-out rate in our original modelling. This means that in the actual observed situation, with lower set-out rates, the number of households served (passes per day) by each dual-operative vehicle is approximately double the number of households served by a single-operative vehicle. Since vehicle requirements are inversely proportional to achievable daily pass rates, the doubling of the crew per vehicle is thus offset by a near halving of the vehicle

[6] Although not modelled for the original report, recent advice from WRAP is that system design should include the provision of biobags to participants as a key measure for achieving high capture rates. We have included the costs of biobags in the updated modelling.

requirement. Consequently, there are only small differences between this approach and the assumptions originally made for the single-operative options. Some marginal fuel cost savings are also achieved (despite increases in fuel prices), since fewer vehicles are travelling more efficiently on a reduced number of rounds.

It is worth speculating whether in more densely populated areas, an increase in set-out rates might lead to an increase in vehicle requirements. Much depends upon whether the higher density of pick-ups which are associated with higher set-out rates could lead to a compensating increase in the number of pick-ups that are achievable per day (so maintaining the number of households served per vehicle).

It is important to take this opportunity to investigate the sensitivity of the modelling to pass rates (since certain more rural authorities may struggle to achieve the rates used in the modelling). On the basis of the pass rates shown in Table 3 above, the KO>c/d option (where food waste is separately collected for digestion and HWRC garden waste is open air composted) is shown in Figure 3 to have a financial cost-benefit of over £3 per household; these are much more significant savings than in the original modelling due to lower anaerobic digestion gate fees and a more significant cost saving from avoided disposal when compared to the intermediate baseline. In order to reduce this saving to a net zero cost-benefit, the pass rate would have to fall to 1,130 and the pick-ups to 630. Although this is clearly a sensitive determinant in the modelling, an authority operating dual-operative vehicles that only achieves an average of a little over 600 pick-ups per day we consider would have to be very rural indeed. Arguably, it is in exactly these situations where local authorities might want to consider 'driver-only' rounds on the basis that for much of the time, a member of staff would be contributing little or nothing to productivity. Driver-only collections – even if they might not necessarily add value in urban and suburban contexts (though they may do so in such areas where vehicle movement is more difficult) – come into their own in more sparsely populated areas where the intention is to run a separate pass for food waste collections.

Alternatively, in the most remote areas, food waste could be collected in a different system configuration such as in separate compartments along with other materials on the same vehicle. More generally, this sensitivity analysis stresses that Local Authorities need to ensure that they design efficient collection rounds, matching staffing and vehicle use to the nature of the round so as to minimise collection costs.

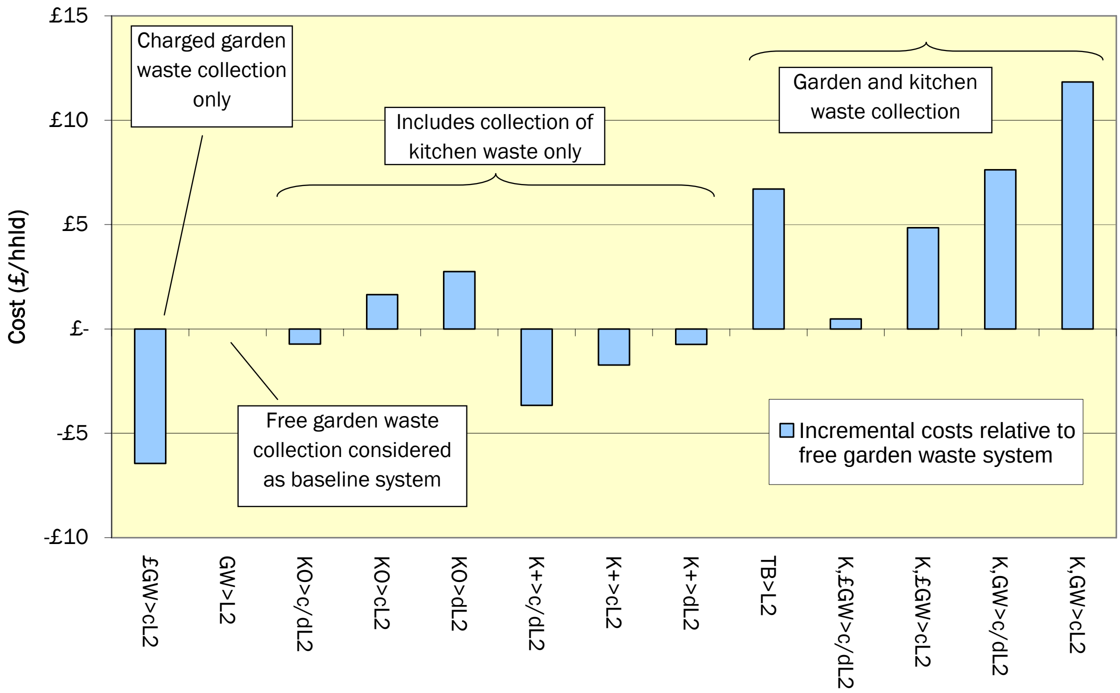
The costs of organic waste treatment increasingly favour separate collection of food waste. An important factor here is that food waste can be digested, or even mixed in desired proportions with garden waste (collected separately or from civic amenity sites) for in-vessel composting – rather than relying on the mix generated by householders in a combined collection.

In relation to the TB scenario (fortnightly mixed food and garden waste collection), percentage food and garden waste captures have remained relatively constant (though the absolute quantity of food waste has reduced). No change has been included in the operation of the vehicles. Increases in disposal prices and in-vessel treatment costs have occurred in the updated modelling, with disposal remaining significantly more expensive than treatment. The net impact of these changes is that the incremental cost of a new mixed food and garden waste collection system has reduced, but still it still remains one of the most expensive methods to collect organic waste. The external costs are also higher than where digestion is incorporated into the system. Furthermore, beyond the financial considerations, it is important to emphasise that this system will leave more food waste in the residual waste stream, heightening the need for residual waste treatment / disposal capacity.

5.1.1 Path-dependency Issues

It may be remarked that the modelling results shown here directly demonstrate the business case for the collection of food waste for those authorities that are also able to make the shift from weekly refuse to alternate weekly collection as part of the overall change. For authorities that have already made this shift without the collection of food waste, the considerations will be slightly different. In such cases, the baseline system is an alternate weekly collection of residual and garden waste. In effect, the GW option becomes the baseline against which the other options should be compared. The cost differentials shown in either Figure 3 or Figure 5 (the differentials are the same) are reproduced in Figure 8, but with all options shown relative to the free garden waste scenario (GW).

Figure 8: Incremental Costs Shown Relative to Free Garden Waste Collection



Of course, concerning the options that realistically will be available to individual authorities, much depends on current services offered.[7] It would, for instance, not generally be considered practical to remove a garden waste service and replace it with a food waste collection even though the chart would suggest that around £4 per household would be saved by doing so under the k+>c/d scenario. Respecting the barriers to such a move would rule out all of the food-only collection options. Commonly in the UK, collection authorities in this situation have taken what appears to be the easy option (concerning collection logistics) by adding food waste to the existing garden waste bin (the TB option). This results in almost £7 of additional collection cost per household. However, Table 1 has shown that this delivers very little additional biowaste diversion. Clearly this is not an approach that can be recommended on value for money grounds (and there are additional processing reasons why this is not a favourable option). Alternatively, the charged garden waste option (£GW), where there is no food waste collection, is estimated to be around £6.50 per household cheaper than the option with free collection of garden waste. This is sufficient to more or less offset the cost of an additional food waste collection service as illustrated in the K,£$GW_{c/d}$ scenario where both of these organic waste collection services are offered, with garden waste charged for, and food waste services provided free of charge on a weekly basis.

The general message is that if a local authority already offers a free garden waste collection, then further reductions in landfilled biowaste with a minimal increase in overall system costs can be achieved through the introduction of a separate collection for food waste combined with the levying of a charge on the garden waste collection.

It should be recognised that the changes in cost demonstrated in this report are dependant on disposal savings accruing to the body, or bodies, responsible for the service. We commonly observe that collection authorities struggle to make the financial case for food waste collection because they are hampered by 2 tier arrangements, with Counties not always willing to pass on the full benefits of avoided disposal. Although this short report is not the forum for addressing these issues, it is clear that a culture of strong partnership working, and all that this entails, must be fostered if authorities are to minimise the amount of food waste being sent for disposal using cost effective services.

5.2 Conclusion

In summary of our findings, we may conclude that separate food waste collection still outperforms both separate garden waste systems or mixed food and garden systems in the modelling. Indeed, if anything, the balance of costs and benefits asserts the superiority of the system more strongly than we had previously suggested. Despite higher costs per vehicle (and a methodological modelling change to driver plus 1

[7] Detailed discussion around the 'path dependent nature of choice' are given in Section 8.1 of "Dealing with Food Waste in the UK", Eunomia report for WRAP, March 2007 at www.wrap.org.uk/document.rm?id=3603

rather than driver only), overall collection efficiencies have proven to be more efficient which has meant that collection operations themselves look to be similarly cost effective, in relative terms, to the results of the previous modelling. Furthermore, recent shifts in the costs for treatment and disposal make the overall system costs for separate collection and treatment of food waste increasingly cost effective.

The modelling clearly demonstrates the business case for adding a food waste collection system as part of a broader service change from weekly to fortnightly residual waste (it is also notable that this resultant service structure should help encourage good performance). Effectively, the result will be to improve environmental performance (higher recycling/composting rates and lower residual waste) without an increase in overall system costs. Increases in collection costs are offset by lower treatment/disposal costs. However, where a local authority has already made the move to alternate week collection and wishes to further improve kerbside capture, it is possible to offer a separate pass for food waste without cost increases when a charge is also placed on the garden waste service. It is important to emphasise, however, that the financial case requires a rational deployment of vehicles which keep the food and garden waste fractions separate to allow for their treatment through different methods (with differing costs).