Final Report

Support to Brighton and Hove City Council

This report provides Brighton and Hove City Council with information on the relative cost and performance of different collection options modelled to help inform the future development of household waste collections in the city.

Project code: RCY147-009

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Our mission is to accelerate the move to a sustainable resource-efficient economy through re-inventing how we design, produce and sell products; re-thinking how we use and consume products; and re-defining what is possible through re-use and recycling.

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Executive summary

Introduction

Eunomia Research and Consulting Ltd. (Eunomia) was commissioned by WRAP, on behalf of Brighton and Hove City Council (BHCC), in November 2020 to carry out a two staged options appraisal to review the collection of household waste from kerbside properties, on-street properties with communal bins and flats.

The purpose of the options appraisal was to assess possible changes to the collection of household waste across the different property types in Brighton and Hove and provide BHCC with a high-level analysis of the cost, operational and performance impacts of the proposed options. The appraisal was undertaken in two stages. Firstly, to conduct a high-level assessment of the options to review the relative differences of each option compared with the current baseline service. Secondly, to test variants and sensitivities to the preferred option(s), to determine how additional changes may impact on the cost and performance.

This report presents the findings from the collection options appraisal accompanied by a qualitative assessment of the options, and the results of additional variants and sensitivities modelled on the preferred option(s).

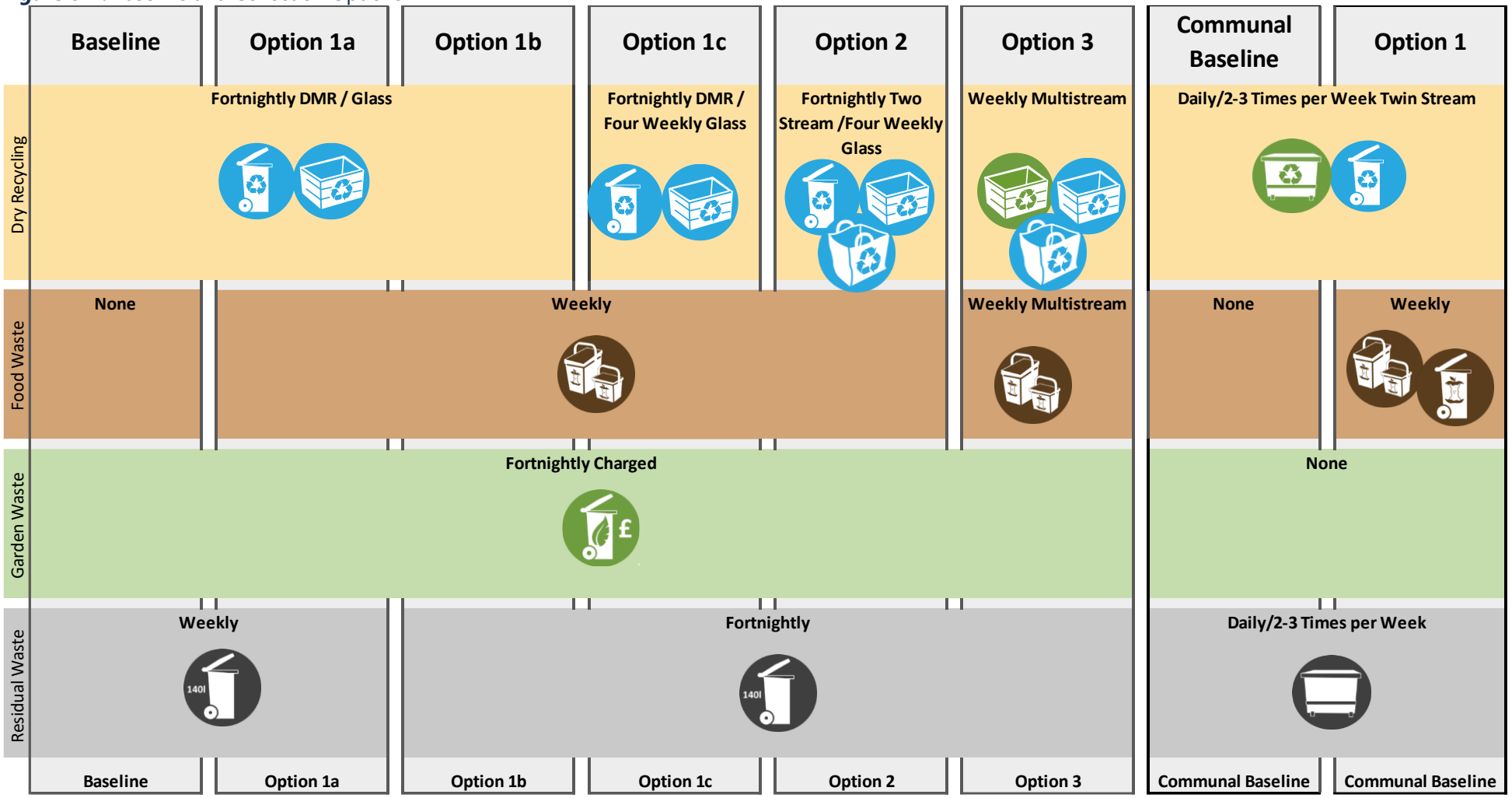
Options Modelled

Five options were modelled during Stage 1 using Eunomia's Hermes' tool. The options followed three methodologies for the collection of recycling; two-stream, three-stream and multi-stream, and assessed the impact of introducing the separate collection of food waste and changing the frequency of residual collections. The existing service provides a two-stream dry recycling collection with separately collected glass, alongside a weekly residual waste collection to all households, with some operational difference for flats and on-street communal properties.

It was decided not to test the impact of co-mingled glass with other materials as this was viewed as a backwards step, and unlikely to be compliant with potential changes in legislation as proposed in the Government's Resources & Waste Strategy and subsequent Environment Bill. The baseline and options modelled are illustrated in Figure 0-1 and the core kerbside options described as follows:

- **Baseline:** Weekly residual, fortnightly two-stream with separate glass (split-body RCV), no food waste and fortnightly charged garden waste.
- **Option 1a:** Weekly residual, fortnightly two-stream with separate glass (separate vehicles), weekly food waste and fortnightly charged garden waste.
- **Option 1b:** Fortnightly residual, fortnightly two-stream with separate glass (separate vehicles), weekly food waste and fortnightly charged garden waste.
  Option 1c: Fortnightly residual, fortnightly mixed recycling & four-weekly glass two-stream (separate vehicles), weekly food waste and fortnightly charged garden waste.
- **Option 2:** Fortnightly residual, alternate fortnightly mixed recycling and paper & card, four-weekly glass three-stream (separate vehicles), weekly food waste and fortnightly charged garden waste.
- **Option 3:** Fortnightly residual, weekly multi-stream recycling, weekly food waste and fortnightly charged garden waste.

Figure 0-1: Baseline and Collection Options



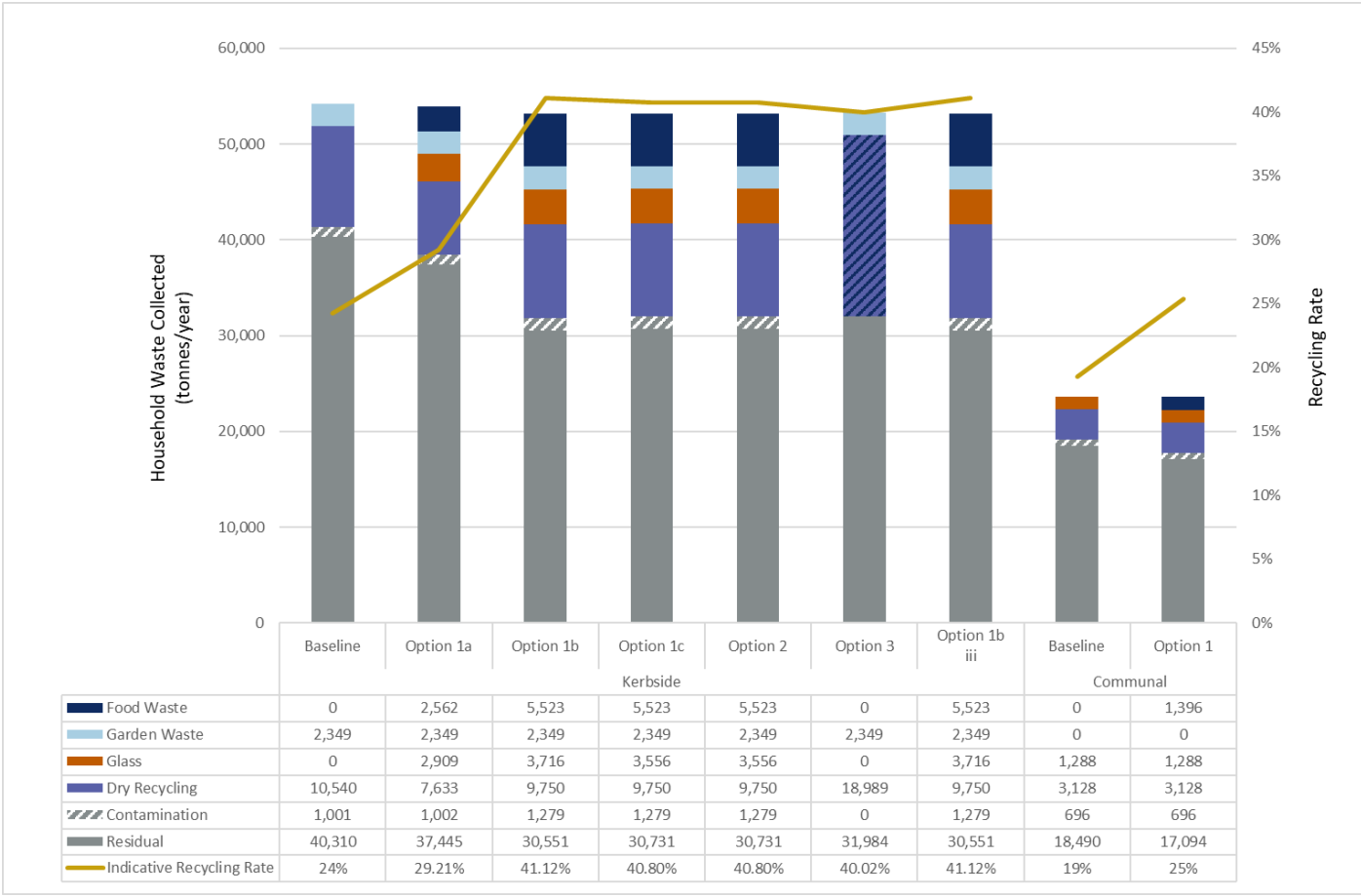
From the options modelled and the qualitative assessment undertaken as part of Stage 1, a 'preferred option' (Option 1b) was selected by BHCC to be taken forward to Stage 2 for further investigation. The following variants and sensitivities were modelled in addition to Option 1b:

- Free garden waste;
- Separate collection of glass in a 26t Toploader, and Food Waste in a 7.5t Toploader; and
- Treatment of food waste through anaerobic digestion (AD).

Results

Recycling Performance

In the Stage 1 modelling all options resulted in a predicted increase in recycling rate, this is largely due to the introduction of separate food waste collections driving a 5% rise in the kerbside recycling rate, and 6% in the communal recycling rate. In other options there is an increase in the kerbside recycling rate of 17%, taking the kerbside recycling rate up to 41%, which is attributable to the introduction of food waste collections, as well as the reduction in the frequency of residual collection from the current weekly service to fortnightly. The changes to recycling collections, such as collecting glass in a separate vehicle, or introducing a multi-stream collection have limited impact on the performance of the service.



	Baseline	Option 1a	Option 1b	Option 1c	Option 2	Option 3	Option 1b iii	Baseline	Option 1
	Kerbside							Communal	
Food Waste	0	2,562	5,523	5,523	5,523	0	5,523	0	1,396
Garden Waste	2,349	2,349	2,349	2,349	2,349	2,349	2,349	0	0
Glass	0	2,909	3,716	3,556	3,556	0	3,716	1,288	1,288
Dry Recycling	10,540	7,633	9,750	9,750	9,750	18,989	9,750	3,128	3,128
Contamination	1,001	1,002	1,279	1,279	1,279	0	1,279	696	696
Residual	40,310	37,445	30,551	30,731	30,731	31,984	30,551	18,490	17,094
Indicative Recycling Rate	24%	29.21%	41.12%	40.80%	40.80%	40.02%	41.12%	19%	25%

Figure 0-1: Stage 1 Performance

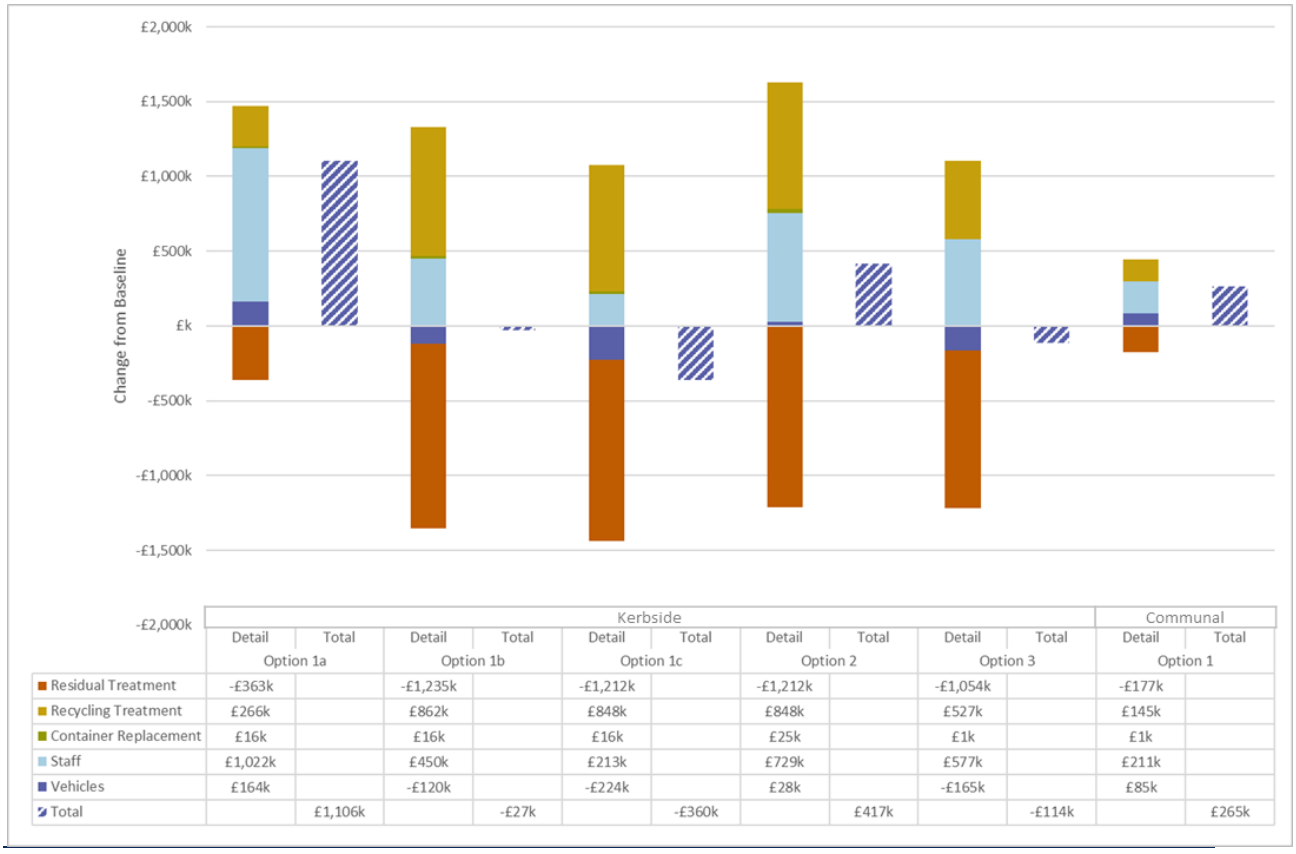
In Stage 2, the impact of a free garden waste service was found to increase recycling rates by between 3.5% and 4.5% across the different options dependant on the frequency of residual

collections. This results from garden waste that was previously composted or collected at HWRSs being collected at the kerbside and diversion from the kerbside residual stream.

Cost

In the Stage 1 modelling, Option 1c provides the lowest annual cost to BHCC due to the reduction in frequency of both residual and separate glass collections with a saving of £360k compared with the baseline, followed by Option 3 which provides a multi-stream collection with a saving of £110k. Option 1b also provides an overall saving, although minimal, of £30k when introducing separate collection of food waste and fortnightly residual collections. Option 1a shows an increase of £1m due to the introduction of separate food waste and glass collections alongside a weekly residual collection.

The introduction of food waste collection in the stage 1 modelling reflects an increase in cost of approximately £960k for kerbside collections in all of the options, and £265k for communal collections. It is possible to offset these additional operational costs through the avoided cost of disposal. No assumption has been made around the provision of caddy liners during the roll-out of food waste collections. In Option 1a this is only partially offset, however for Option 1b, 1c, 2 and 3 where the fortnightly residual collection drives higher food waste and dry recycling performance, it is possible to fully off-set the cost of introducing food waste.



	Kerbside										Communal	
	Option 1a		Option 1b		Option 1c		Option 2		Option 3		Option 1	
	Detail	Total	Detail	Total	Detail	Total	Detail	Total	Detail	Total	Detail	Total
Residual Treatment	-£363k		-£1,235k		-£1,212k		-£1,212k		-£1,054k		-£177k	
Recycling Treatment	£266k		£862k		£848k		£848k		£527k		£145k	
Container Replacement	£16k		£16k		£16k		£25k		£1k		£1k	
Staff	£1,022k		£450k		£213k		£729k		£577k		£211k	
Vehicles	£164k		-£120k		-£224k		£28k		-£165k		£85k	
Total		£1,106k		-£27k		-£360k		£417k		-£114k		£265k

Figure 0-2: Stage 1 Net Service Cost

In stage 2 the introduction of a free garden waste collection results in an overall net service cost increase of £1m resulting from additional collection vehicles and cost of treatment as well as a loss of income of £400k from garden waste subscriptions.
Treating food waste through AD rather than In-Vessel composting (IVC) is projected to provide further cost savings. Although the savings available will be dependent on any negotiation with BHCC's contractor Veolia and an AD site being accessible at a reasonable distance.

Resources

All options in Stage 1 require additional vehicles compared to the baseline, this is due to the introduction of the weekly food waste collections, and collecting dry recycling and glass on separate vehicles for Option 1a – 1c. Option 2 requires additional vehicles to collect paper and card as a third-stream of recycling, whilst Option 3 uses resource recovery vehicles (RRVs) to co-collect multi-stream recycling and food waste.

For communal collections an additional 3 food waste vehicles are required to collect food waste weekly.

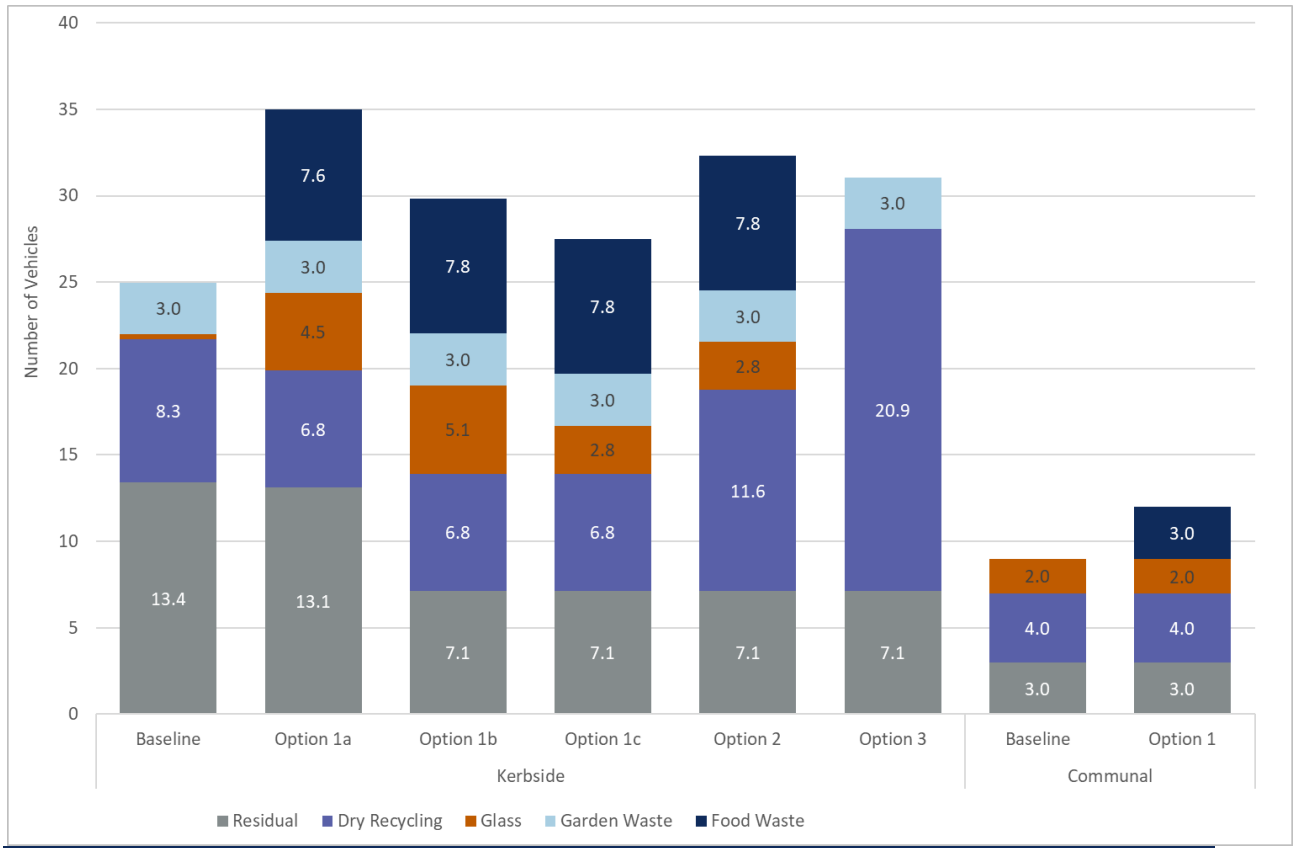


Figure 0-3: Stage 1 Vehicles

In Stage 2, the variant of Option 1b assessed the impact of using a 26t Toploader for glass and a 12t Toploader for food waste. Overall, there is a limited impact on the resource required, with 1 additional vehicle potentially required for glass collections and the same number of vehicles projected for the separate collection of food waste as shown in Figure 0-4.

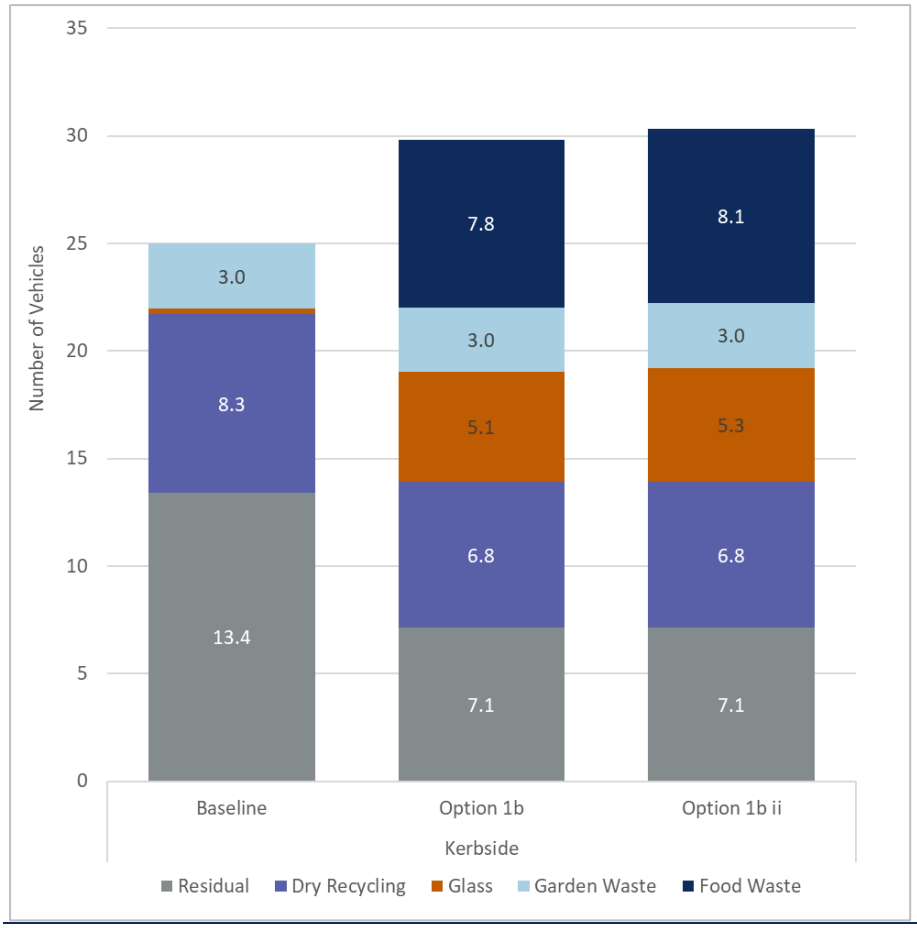


Figure 0-4: Stage 2 Vehicles

Carbon Modelling

The carbon modelling undertaken in Stage 1 shows that each of the options resulted in an overall reduction in tonnes CO2e/year. The modelling identified that the largest benefits were realised through a reduction in the amount of residual waste requiring treatment via the energy recovery process, and an increase in dry recycling. In each of the options, except Option 3, the additional passes required to collect food waste and glass on a separate vehicle increased emissions of transport, however the impact of this is minimal compared to the overall saving achieved.

Summary

There are several key points that have emerged from the modelling process which are worth noting whilst considering the options available to BHCC.

- All options modelled an increase in the recycling rates, driven initially by the introduction of food waste, and further increased due to the reduction of residual collection frequency.
- The impact of net service costs varies between the options. The impact of increased recycling in all options leads to an overall reduction in treatment costs, however the additional cost of collecting food waste is not offset by the treatment savings.
- Reducing the frequency of the residual collection allows the projected cost of introducing separate food waste collections to be **fully offset**, through the additional

savings in treatment costs (as a consequence of higher food waste yields associated with fortnightly residual collections) and the savings in residual collection costs.

- Reducing glass collection frequency further reduces the cost of operating services, with minimal performance reduction, where excess glass may be collected as residual.
- The changes to recycling systems such as separate collection of paper and card, and multi-stream, generally increase costs without any associated improvement in recycling performance. However, the multi-stream option and the separate collection of paper and card were found to reduce contamination whilst improving the quality of material collected for recycling.
- The impact of using Toploaders for the separate collection of food waste and glass is minimal, with some additional costs associated with the vehicles and slightly less operating efficiency. However, it should be noted that there are limited examples of authorities using these vehicles on household services, and as such the suitability of using these vehicles for the kerbside collection of household waste should be investigated further.

The sensitivities also provided some interesting points for consideration.

- Treating food waste through AD rather than IVC has a much higher carbon reduction impact compared to the baseline. Although there are cost savings that can be achieved, these need to be compared with any negotiation held with Veolia and the distance of the AD plant.
- The introduction of a free garden waste service improves the recycling rate at the kerbside by a further 3-4%, although some of this material is already captured as part of the HWRS services. The additional costs of providing free garden waste collections, including the loss of income, and treatment is £1m (although some of these costs may be offset by savings at the HWRS)

This report recommends that BHCC should consider any move to introduce the separate collection of food waste alongside a reduction in residual collection frequency, in order to maximise both the capture of food waste and recycling and minimise service delivery costs. This report provides a high-level overview of the potential resource requirements of the modelled options when compared with the baseline. However, should BHCC wish to further investigate the options, a more detailed operational analysis should be undertaken to determine potential collection round efficiencies.