Desktop Review Modelling

Methodology and options modelled

The aim of the desktop review is to complete a detailed data gathering exercise to replicate current operations and costs for the service (the 'Baseline' scenario), so that a number of alternative collection profile options could be developed as follows:

- **Option 1**: Dry recycling collection changes to a weekly twin-stream (fibres separate) via a split back Refuse Collection Vehicle (RCV), including the collection of glass with other plastic and metal containers. All kerbside households restricted to a limited number of black sacks for residual waste, collected via a single body RCV.
- **Variant A:** as per changes in Option 1 with addition of a dedicated food waste collection via a dedicated fleet of small RCVs.
- **Variant B:** as per changes in Option 1, but with the addition of a pod on the dry recycling split back RCV for the co-collection of food waste.
- **Variant C:** as per changes in Option 1, but with the addition of a pod on the residual RCV for the co-collection of food waste.
- **Option 2:** Dry recycling collection changes to a weekly multi-stream collection via a 'Resource Recovery Vehicle' (RRV). All kerbside households restricted to a limited number of black sacks for residual waste, collected via a single body RCV.
- **Variant A:** as per changes in Option 2, with the inclusion of glass collection via RRV. A weekly separate food waste collection via a dedicated fleet of small RCVs is also introduced.
- **Variant B:** as per changes in 2 Variant A, with dry recycling (Inc. glass) collected via triple stackers. Food waste is now co-collected on the RRV with dry recycling.
- **Option 3:** Current service (Baseline) with dry-recycling alternate weekly and residual alternate weekly. Food waste collected separately. Glass co-mingled with recycling using current fleet.
- **Variant A:** Current service (Baseline) with dry-recycling alternate weekly and residual alternate weekly. Food waste collected separately. Glass co-mingled with recycling using new integrated bin lift fleet and wheelie bins.

All operational modelling was completed using WRAP's Kerbside Assessment Tool (KAT) which allows current collections to be modelled and potential kerbside collection profile options to be forecast and evaluated. Costs were calculated for each option by identifying the performance and resources necessary to deliver each of the modelled options. The financial assessment considered operational costs including staff costs, vehicle maintenance and fuel, and fees for treating, sorting and/or disposal of materials. Capital costs were calculated to provide an estimated initial investment required for each option for vehicles and containers.

Key results

The modelling outputs provide analysis on a number of factors including kerbside recycling performance, resource requirements, operational cost and capital cost, summarised as:

- **Recycling Performance:** The Baseline recycling rate, is 37.0%. Restricting the number of black refuse sacks collected from households could marginally increase the recycling rate to 39%. This option was not supported by Cabinet and a fair use policy is being developed. Introducing a weekly food waste collection and separate weekly glass collection provides the greatest increase in recycling to around 49%.

  Resource Requirements:

- 1 Variant A and 2 Variant A all require a fleet of 6.9 dedicated food waste collection vehicles with a crew of driver plus two loaders.
- In Option 1, residual waste is collected via 7.2 single body RCVs and dry recycling is collected via 9.5 split back RCVs (not including narrow access vehicles and rural rounds), with paper and card collected separately from containers. Where a weekly food waste service is introduced, as in Options 1 Variant A and 1 Variant B, the number of residual RCV's required is reduced to 6.1.
- In Option 1 Variant B, 12.7 split back RCVs with pods (excluding narrow access) are required for the co-collection of food waste with dry recycling. In Option 1 Variant C, food is co-collected with residual waste, requiring 7.4 RCV's with pods. Both of these vehicle types account for an extra loader (driver plus three loaders) to assist in the loading of food waste on to the vehicle.
- In Option 2, residual waste is collected via 7.8 RCVs (excluding narrow access vehicles) and dry recycling is collected via 9.4 Resource Recovery Vehicles. The addition of glass to the dry recycling collection service (Option 2 Variant A) increases the number of Resource Recovery Vehicles to 10.8. Co-collecting food waste (Option 4 Variant B) increases the number required to 13.7. For both variants the number of residual RCVs decreases to 6.1.
- In Option 3, utilising the current service, but collecting alternate weekly, using current fleet arrangements, but adding up to 8 7.5 tonne vehicles to collect food separately. Glass to be collected via a plastic box/basket, co-mingled with recycling on current fleet.
- In Option 3A we would need investment in a new integrated bin lift fleet and wheelie bins for residual and recycling waste. Food collected as Option 3 but glass would be co-mingled with recycling, so no separate box is required.

- **Operational Cost:** The calculated operational costs for food and glass collection services only will be detailed in the main review report.

Glass Health and Safety Implications

As with all collection services, safe working practices should be adopted and systems designed to minimise risk to those operating and encountering the service. Glass collection can be noisy and if not managed carefully could result in collection crew exceeding the daily noise exposure of 85dB (the upper exposure action value of the Control of Noise at Work Regulations 2005). Noise is generated by the impact of glass when transferring between boxes and bins, loading and tipping.

Measures to reduce noise exposure should be taken which include reducing staff exposure to noise by varying work patterns, selection of materials chosen in the construction and lining of contact areas such as troughs and stillages, deflectors to reduce the height of fall and dampen reverberated sound and brush flaps on apertures and plastic curtains on rear end loaders. When commissioning vehicles and equipment it is important to specify the purpose and noise reduction performance required. It is not enough to just provide hearing protection to staff; measures must be taken to reduce noise levels to as low as reasonably practicable through other means. If in some cases or for some tasks hearing protection is advised, then care must be taken in selecting a product that does not present new risks while working around the vehicle in the street.

To summarise, the table below considers the glass health and safety implications of different collection systems appraised.

Kerbside glass collection health and safety comparison

Collection Type	Risk exposure
Glass presented co-mingled with plastics and metals in a wheeled bin (applies to two-stream [fibres separate] options)	Assessments completed by WRAP show higher noise levels than fully co-mingled, potentially due to less buffering from fibres.
Separate glass collection in box (applies to kerbside sort and two-stream [glass separate] options)	Single stream is louder with glass on glass impact. Noise can be reduced by acoustic material linings on troughs and stillages. Greater risks re manual handling mitigated by smaller boxes and staff training.
Glass collected with recycling, not single streamed and co-mingled, using a small box/basket.	Noise significantly reduced with this method.

Conclusions

This desktop review presents the results of a collections options appraisal to identify an optimal collection profile for the Council. It considers the implications of introducing services in-line with the Framework for Greater Consistency in Household Recycling in England.

The modelling outputs provide analysis on a number of factors including kerbside recycling performance, resource requirements, operational costs, summarised as:

Recycling Performance:

- The current (Baseline) service recycling rate is 37.0%.
- Introducing a weekly food waste collection and alternate glass and recycling collections provides the greatest increase in recycling to around 49%.

Modelling assumptions

This provides the key outputs from the Baseline data and assumptions provided by WRAP, Waste Data Flow and KCC disposal data before commencement of modelling.

Impact of dry recycling collection methodology and inclusion of glass

In order to model the relative performance of moving to different dry recycling collection methods (e.g. co-mingled to twin stream or multi-stream), WRAP's Indicative Cost and Performance (ICP) online tool has been used. The tool benchmarks services based on rurality index, providing assumed yield changes (including contamination) based on scheme performance collated by WRAP. Whilst the online tool helps to identify the relative performance of each collection system, the current performance of the council has been the primary source for in the yield changes.

Key Assumptions

- Increase of 0.168 kg/hh/yr[i] in dry recycling for each 1 litre per week decrease in residual equivalent weekly containment capacity.
- The ready reckoner estimates an expected yield for separate food waste of 84.59 kg/hh/yr plus or minus 13.0 kg/hh/yr. In light of no current recycling performance, we have reduced the expected yield to 78.09 kg/hh/yr (i.e. midway towards the lower end of the ready reckoner range). The food waste yields of other similar authorities (rurality group 6) are included in this estimate, which show an average of 76.5 kg/hh/yr.
- The depot used is assumed to be the same location used in the Baseline (TN14 6EP).
- It is assumed residual waste will be tipped at the same location used in the Baseline (Waste transfer station: TN14 6EP).
- It is assumed twin stream and multi stream dry recycling will be delivered to the same location currently used (Waste transfer station: TN14 6EP).

- For food waste collected separately it is assumed that the same waste transfer station (TN14 6EP) would be used for the bulking and hauling of food waste, ahead of its onward journey to an anaerobic digestion (AD) plant.

Financial assumptions

The following tables provide the general modelling assumptions for vehicles, staff and containers using standard industry costs. Cells highlighted in light blue show actual values of the average amount of purchased vehicles by the Council. Green cells show the KAT model assumptions.

Vehicle assumptions

			Notes
26t RCV	Unit cost	£248000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£32,857	
	Annual running cost	£28,216	Aligned with current running costs
26t RCV split back (50:50)	Unit cost	£260,000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£35,000	
	Annual running cost*	£28,216	Includes running costs (tyres, oil, maintenance) and standing costs (insurance, tax and licencing)
26t RCV split back (70:30)	Unit cost	£260,000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£31,286	
	Annual running cost*	£28,216	Includes running costs (tyres, oil, maintenance) and standing costs (insurance, tax and licencing)
18t RCV split back (narrow)	Unit cost	£187,300	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£27,471	
	Annual running cost*	£27,727	Includes running costs (tyres, oil, maintenance) and standing costs (insurance, tax and licencing)

Toploader	Unit cost	£170,000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£25,000	
	Annual running cost*	£28,216	Aligned with current running costs
26t RCV with POD	Unit cost	£255,000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£32,286	
	Annual running cost*	£28,216	Aligned with current running costs
26t RCV split back with POD	Unit cost	£280,000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£37,286	
	Annual running cost*	£28,216	Aligned with current running costs
Resource Recovery Vehicle (RRV)	Unit cost	£185,000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£25,714	
	Annual running cost*	£25,000	Aligned with current running costs
12t RCV	Unit cost	£151000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£19,798	
	Annual running cost*	£25,239	Includes running costs (tyres, oil, maintenance) and standing costs (insurance, tax and licencing)
7.5t RCV	Unit cost	£115,000	
	Expected lifespan (years)	7	

	Annual fleet renewal contribution	£15,000	
	Annual running cost*	£17,500	Aligned with current running costs
3.5T Cage Tipper (50:50)	Unit cost	£64000	
	Expected lifespan (years)	7	
	Annual fleet renewal contribution	£9,301	
	Annual running cost*	£12,519	Includes running costs (tyres, oil, maintenance) and standing costs (insurance, tax and licencing)
Bin lift retrofit	Unit cost per vehicle	£40,000	Terburg

*Annual running costs generally include insurance, management fee, licence, maintenance and fuel etc.

The figures presented in the table below include salaries plus employer costs, for example National Insurance, holiday and sickness cover, pension etc. and are based on standard industry costs.

Staff assumptions

			Notes
Driver	Cost per annum	£34,072	Includes costs for national insurance, holidays / sickness etc.
Loader	Cost per annum	£29,330	Includes costs for national insurance, holidays / sickness etc.
Supervisor	Cost per annum	Default (£40,219)	Cost is calculated at 5% of total crew costs

Container assumptions – Standard Industry Costs

			Notes
240 litre wheeled bin	Unit cost	£17.15	
140 litre wheeled bin	Unit cost	£19.75	
Residual sacks	Per 1000 sacks	£31.25	
Recycling sacks	Per 1000 sacks	£35.00	
Garden sacks	Per 1000 sacks	£220.00	
55 litre box	Unit cost	£2.50	
Reusable sack	Unit cost	£1.27	
Triple stacker	Unit cost	£35.00	
Food waste bin	Unit cost	£2.30	
Food waste caddy	Unit cost	£0.98	
Food waste liners (compostable)	Per annum per participating household	£2.60	Based on cost of 2p per liner, with each participating household provided with 2.5 liners per week
Food waste liners (polyethene)	Per annum per participating household	£0.65	Based on cost of 0.5p per liner, with each participating household provided with 2.5 liners per week

[i] Kilograms per household per year