

## Appendix 8: Compositional data evaluation criteria

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The following tables illustrate the considerations underpinning the evaluation criteria applied to the collated compositional data for various applications during the project. Please refer to the discussion in Appendix 3.2 for the context of these criteria. These criteria have been considered primarily for:

- selecting which studies should be included in various tasks;
- assessing the robustness of analyses derived for various sets of selected data;
- determining gaps in UK municipal waste compositional evidence.

The work done to date on the composition of the municipal waste stream can be split into three broad groups: kerbside; HWRC and other. There are specific criteria for each grouping that is relevant only to that grouping of studies. For that reason we have produced three criteria lists against which studies were evaluated / characterised. It is worth noting that, in the final analysis, there will always be an element of subjectivity in the assessment of whether the study is important for this project. This subjective judgement as well as considering the points below will have to take into account to what extent the data fills a potential gap.

Some of the points below can be viewed as characteristic criteria as opposed to evaluation criteria and as such might be deemed as 'bonuses' for the data set. These are listed towards the end of each table in italics i.e. for kerbside they include the chemical characteristics and size assay data. The fact that a criteria point appears in a table below does not necessarily mean that data for all collection systems and regions must be held for the data to be of use.

**Table A1.1: Kerbside compositional data evaluation criteria**

<b>Kerbside Evaluation Criteria</b>		
<b>Factor</b>	<b>Detail</b>	<b>Why important / interesting</b>
Age of study	Year the data was gathered	How contemporary is the data.
Seasonality (number of repeat phases)	Number and timing (month) of phase/s	Did the study look at the effect of seasonality on the waste stream/s by conducting multiple phases over the course of a calendar year/s.
Waste streams included	Kerbside residual weekly black sack	There is a huge range of collection services offered by LAs. These criteria will enable us to assess whether the complete data set covers, to a satisfactory level, all the <i>major</i> variations of collection system that are employed by LAs.
	Kerbside residual weekly WB	
	Kerbside residual fortnightly WB	
	Kerbside sorted weekly DR	
Geographical area of study	Location of study	Will show the coverage of the country/regions.
Number of households included	How many households were included in <u>each phase</u>	Will enable comparison between collection systems and/or areas. Also a study of 500 households, all other things being equal, will be given more weight than a study of 100 households.
Socio economic factoring	ACORN	Will enable an evaluation on how representative the study was for that LA/other area.
	MOSAIC	
	Council Tax Band	
	Urban	
	Rural	
Sample stratification	Other	Taken with the point above will enable assessment of how well the sample was compiled in respect to project aims.
	Random loads from RCVs/other	
	Stratified	
	Proportional stratified	
	Cluster	
	Other	

Kerbside Evaluation Criteria		
Factor	Detail	Why important / interesting
Material <u>sorted</u> kg	Kg sorted vs kg collected (sub sample)	Important to know the actual weight of material sorted that the data is based on. Some methodologies involve collecting substantial amounts of material and coning and quartering to arrive at a smaller weight sorted, and the results extrapolated.
Data weighting/manipulation	Yes	Knowing whether the data is weighted is important to see what manipulation has been carried out, and help make an assessment on validity.
	No	
Characterisation list used	Total no. categories	Suggested approach once we have compiled all the category lists for the obtained studies: <ol style="list-style-type: none"> <li>1. develop a common classification list</li> <li>2. reconcile category lists of individual studies</li> <li>3. where studies provide insufficient categories, estimate according to average break-down derived from more detailed studies</li> </ol>
Primary and secondary category lists	Whole sample sorted to whole list	Important to know if sub-samples have been sorted to a rolled-up (reduced) category list and had category detail extrapolated across from full sort on portion of sample.
	Sub-sample sorted to rolled-up list	
Material focus	<i>Food</i>	<i>Whether the study had a specific material stream as the focus.</i>
	<i>Paper</i>	
	<i>Garden</i>	
	<i>Plastic</i>	
Sort unit	Bulk	If the sort was done as a bulk sort what break was used to define the sort level i.e. RCV, ACORN category, Road etc. Will inform the ability to scrutinise the data in more detail.
	Individual household	
Sort method	<i>Table</i>	
	<i>Sieves</i>	
	<i>Sub-sampling cone &amp; quartering</i>	

<b>Kerbside Evaluation Criteria</b>		
<b>Factor</b>	<b>Detail</b>	<b>Why important / interesting</b>
<i>Fines</i>	<i>Classified as under fraction</i>	
	<i>Classified via negative hand pick</i>	
<i>Size assay</i>	<i>Yes</i>	
	<i>No</i>	
<i>Size assay method</i>	<i>Mixed waste</i>	
	<i>Separated categories</i>	
<i>Chemical analysis</i>	<i>Yes</i>	
	<i>No</i>	
<i>Chemical analysis method</i>	<i>Mixed waste</i>	<i>Homogenised mixed samples verses sending off separate materials and modelling the results based on the composition results.</i>
	<i>Separated categories</i>	
<i>Chemical &amp; physical characteristics</i>	<i>Calorific value</i>	
	<i>Organic carbon</i>	
	<i>Nitrogen</i>	
	<i>Chlorine</i>	
	<i>Mercury</i>	
	<i>Cadmium</i>	
	<i>Lead</i>	
	<i>Arsenic</i>	
	<i>Sulphur</i>	
	<i>Moisture content</i>	
<i>Ash content</i>		

**Table A1.2: HWRC compositional data evaluation criteria**

<b>HWRC Evaluation Criteria</b>		
<b>Factor</b>	<b>Detail</b>	<b>Why important / interesting</b>
Age of study	Year the data was gathered	How contemporary is the data.
Seasonality (number of repeat phases)	Number and timing (month) of phase/s	This is very important for HWRC due to the effect of the growing season and DIY (home improvement) season.
Method of analysis	Input site user study	No way of assessing data quality for input verses output for residual as they are very different methodologies. There is no way of telling for certain where the material on an input study would have ended up.
	Output residual study	
Weekday and weekend analysis	Weekend	The use of sites is different in the week compared with weekends.
	Week day	
Geographical area of study	Location of study	Will show the coverage of the country/regions.
Size of study	No. bins / users included in the study	Enable assessment on scope of the work.
Material <u>sorted</u> kg	Kg sorted vs kg sampled (sub sample)	Important to know the actual weight of material sorted that the data is based on.
Characterisation list used	Total no. categories	<p>HWRC the categorisation is incredible varied due to the nature of how sites are run and materials recycled. Sub divisions are potentially greater than kerbside, e.g. if running a paint recycling scheme might want paint classified by type and potential for reuse.</p> <p>As with the kerbside list the approach once we have compiled all the category lists for the obtained studies (there is likely to be more work involved for HWRC as a result of the variation of categories):</p> <ol style="list-style-type: none"> <li>1. develop a common classification list</li> <li>2. reconcile category lists of individual studies</li> <li>3. where studies provide insufficient categories, estimate according to average break-down derived from more detailed studies</li> </ol>

<b>HWRC Evaluation Criteria</b>		
<b>Factor</b>	<b>Detail</b>	<b>Why important / interesting</b>
Sort method	Detailed hand pick / general visual classification	Physical classification of the data is more accurate than visual assessments.
<i>Separate black bag sort</i>	<i>Y/N</i>	
<i>Size assay</i>	<i>Y/N</i>	
<i>Chemical characteristics</i>	<i>Y/N</i>	
<i>HWRC type</i>	<i>Split level</i>	
	<i>Single level yard</i>	
<i>Materials recycled on site</i>	<i>No. materials recycled</i>	

**Table A1.2: Other municipal waste compositional data evaluation criteria**

These criteria apply to municipal waste streams such as street cleansing/litter, commercial wastes, bulky collection wastes and other streams.

<b>'Other' Evaluation Criteria</b>		
<b>Factor</b>	<b>Detail</b>	<b>Why important / interesting</b>
Age of study	Year the data was gathered	How contemporary is the data.
Seasonality (number of repeat phases)	Number and timing (month) of phase/s	Did the study look at the effect of seasonality on the waste stream/s by conducting multiple phases over the course of a calendar year/s. This is very important for HWRC due to the effect of the growing season and DIY season.
Geographical area of study	Location of study	Will show the coverage of the country/regions.
Size of study	No. street bins / no. & type of businesses etc.	Enable assessment on scope of the work.
Material <u>sorted</u> kg	Kg sorted vs kg sampled (sub sample)	Important to know the actual weight of material sorted that the data is based on.
Characterisation list used	Total no. categories	The approach once we have compiled all the category lists for the obtained studies (there is likely to be more work involved for HWRC as a result of the variation of categories): <ol style="list-style-type: none"> <li>1. develop a common classification list</li> <li>2. reconcile category lists of individual studies</li> <li>3. where studies provide insufficient categories, estimate according to average break-down derived from more detailed studies</li> </ol>
Sort method	Detailed hand pick / general visual classification	Physical classification of the data is more accurate than visual assessments.
<i>Size assay</i>	Y/N	
<i>Chemical characteristics</i>	Y/N	

