Waste (England and Wales) Regulations 2011 (amended)

Compliance assessment v3

Surrey Heath Borough Council

Introduction

New regulations have come into force which aim to promote high quality recycling and move us towards becoming a recycling society.

The Waste England and Wales Regulations 2011 (as amended) (the 'Waste Regulations') require any organisation that collects waste to:

- Comply with the waste hierarchy
- Collect paper, metal, plastic and glass by separate collection, by January 2015, unless:
    - It is not necessary to 'facilitate or improve recovery' and,
    - It is not technically, environmentally and economically practicable to do so

Failure to comply with the Waste Regulations could result in a judicial review of an authority's collection systems, possibly resulting in:

- Payment of damages & legal costs to the claimant (likely to be a reprocessor or group of reprocessors)
- Compliance, stop and/or restoration notices from the Environment Agency

The Waste Regulations are complicated and there is much uncertainty around how to comply with them. Defra have not provided any guidance, however a WRAP led consortium of local government networks have produced a 'Route Map'[1] to help local authorities assess their compliance with the regulations. This has been described by the Environment Agency as good practice.

Surrey Waste Partnership (SWP) has used the Route Map as a basis for assessing the compliance of each Waste Collection Authority (WCA) with the Waste Regulations. Surrey County Council (SCC) undertook the compliance modelling using data supplied by participating WCAs.

This report presents the results of the compliance modelling for Surrey Heath Borough Council (SHBC).

[1] Available here: http://www.wrap.org.uk/content/requirements-waste-regulations

Methodology

The Route Map advocates using three key 'tests' to see if an authority is complying with the Waste Regulations. These are the:

- Necessity test – to test if each of the four key materials (glass, metal, paper and plastic) needs to be collected by separate collections in order to 'facilitate or improve recovery'
- Practicability (TEEP) test – to test if separate collections are technically, environmentally and economically practicable for each of the four key materials
- Waste hierarchy test – to test if each material collected by the WCA is being managed as far up the waste hierarchy as possible

To undertake the tests we have produced a Waste Regulations compliance model for SHBC. The model is designed to compare the waste tonnage flows, economic costs and environmental impacts of the current collection system and two other hypothetical collection systems, described in Table 1.

The compliance modelling takes a whole system approach, looking at the economic and environmental impacts of each system, right from the provision of bins through to the reprocessing of materials into new products. It also measures the tonnage of closed loop recycling that the system produces, which is required for the Necessity Test.

Figure 1 summarises the main areas where economic costs[2], environmental impacts[3] and recycling tonnages were estimated during the modelling.

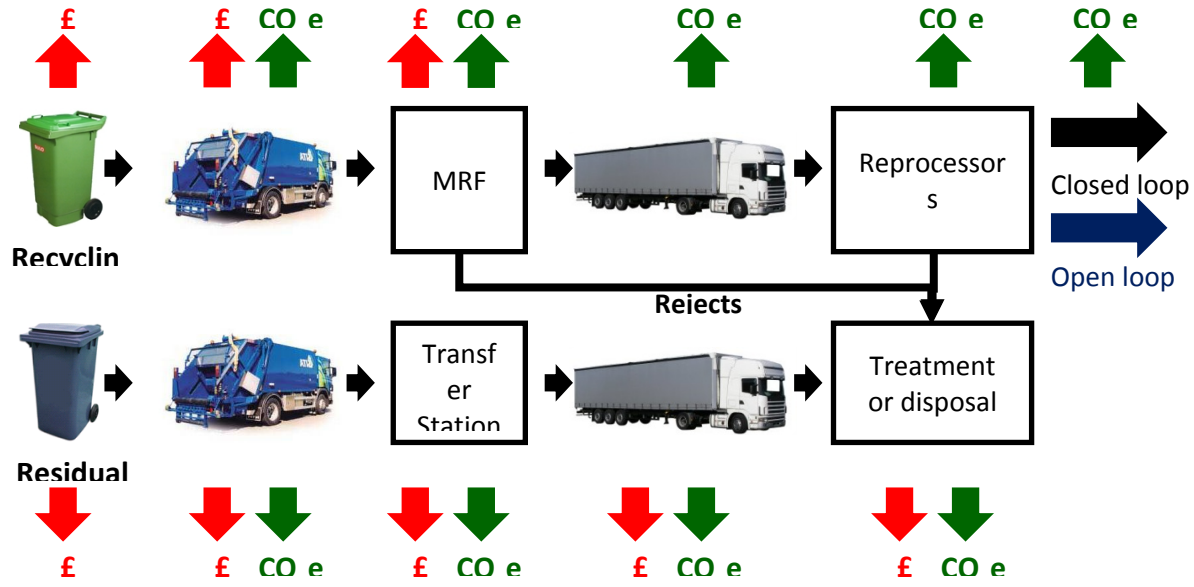

Figure 1: Summary of areas where costs, environmental impacts and recycling tonnages are assessed for a fully comingled collection system

The compliance model was produced by adapting two existing models:

- WRAP's Kerbside Assessment Tool (KAT) to model collection costs
- DEFRA's greenhouse gas emissions tool to model environmental impacts

[2] Economic costs are in £ to both the WCA and SCC
[3] Environmental impacts are in total CO_2 equivalent

A more detailed description of the modelling methodology and the assumptions used is provided in SHBC's Technical Annexe document.

As mentioned above, the model was produced to compare the current collection system and the following two hypothetical 'optimised' collection systems:

- **Separate** – a fully separate collection system, collecting each of the four key materials and food separately
- **Comingled** – a fully comingled collection system with separate food

The key assumptions used in modelling each of these collection systems are summarised in Table 1 and described more comprehensively in the Technical Annexe.

Table 1: Key assumptions used in modelling the collection systems

<table>
<tr><th>Factor</th><th>Current</th><th>Separate</th><th>Comingled</th></tr>
<tr><td>Collection frequency</td><td>Fortnightly refuse and recycling, weekly food</td><td>Fortnightly refuse, weekly recycling and food</td><td>Fortnightly refuse and recycling, weekly food</td></tr>
<tr><td>Type of recycling vehicle</td><td rowspan="2">RCV with pod (26t) for main rounds, RCV (11m3) for tight access recycling and RCV (7.5t) for tight access food</td><td>30m^3 stillage vehicle for main round, 10m^3 stillage vehicle for tight access recycling and RCV (7.5t) for tight access food</td><td rowspan="2">RCV with pod (26t) for main rounds, RCV (11m3) for tight access recycling and RCV (7.5t) for tight access food</td></tr>
<tr><td>Type of refuse vehicle</td><td>RCV (20m3) for main round, RCV (12m^3) for tight access</td></tr>
<tr><td>Recycling containers</td><td>240l wheeled bin for commingled and 23l caddy for food waste</td><td>3 x 40l boxes for separate collection material and 23l caddy for food waste</td><td>240l wheeled bin for commingled and 23l caddy for food waste</td></tr>
<tr><td>Refuse containers</td><td colspan="3">240 litre wheeled bins</td></tr>
<tr><td>Quantities of materials captured</td><td>2013/14 tonnages as provided by the WCA</td><td colspan="2">2012/13 yields originating from the WRAP portal were generated for each type of collection system and each material. The upper quartile yields were chosen from WCAs with a similar 'rurality' to SHBC, to represent what yields might be expected from running these collection systems at a well performing level in SHBC.</td></tr>
<tr><td>Final reprocessor for recyclables and destination for residual</td><td>Current reprocessors and residual waste destinations</td><td colspan="2">Recyclables are assumed to go to the closest suitable reprocessor (selected from the range of reprocessors used by Surrey WCAs) for each grade of material.
Residual waste is assumed to go to the same destination as currently used.</td></tr>
</table>

The 'optimised' systems above have been chosen based on the Route Map's recommendation that, when assessing how separate collections could perform and what they could cost, the options chosen should reflect well-performing, 'optimised' schemes. By choosing 'optimised' systems for each of the options it will ensure that the comparison is fair and reasonable when comparing different types of system.

Ideally, it would be possible to accurately predict how the performance of the current system would change if a separate collection system was introduced. However, there are very few examples of local authorities recently changing from comingled systems to separate systems, so there is insufficient data to provide an evidence based indication of how performance could change. This compliance assessment uses an evidence based

approach, which looks at how different types of collection systems perform across the country and uses data from local authorities that are comparable with SHBC.

The separate collection system described in Table 1 has been set up based on standard industry configurations from WRAPs KAT model. This configuration was approved by WRAP for use in a 2012/13 assessment of possible region-wide collection systems used by the South East 7 work programme. As Table 1 describes, performance in terms of material capture of the scheme has been based on nationally observed performance levels of comparable, well performing systems.

To ensure that a fair comparison is made between the separate collection system and a comingled system, a comparable comingled system has been modelled that is also 'optimised'. This is identical in configuration to SHBC's current collection system, but (to make it comparable with the optimised separate system) it uses nationally observed material capture levels and assumes that recyclables go to the closest suitable reprocessor.

When undertaking the Route Map tests, these comparable optimised systems are used to determine whether separate collections are Necessary and TEEP. Differences between the optimised comingled system and the current system are used to identify areas where the current system can be improved to reduce costs and environmental impacts.

Collection services in scope

The assessment was undertaken for SHBC's core collection rounds and tight access rounds only, as these represent by far the largest part of its waste collection service. It was not done for any other collections.

Outputs

The modelling produced output data for each of the systems which was then used in the three Route Map tests. The data used in each test is explained in Table 2.

Table 2: Output data used in each of the Route Map tests for each system

Test		**Data from modelling**
Necessity test		Tonnes of material sent to closed loop recycling
TEEP test	Technical	N/A
	Environmental	Total environmental impact in CO_2 equivalent which includes the impacts of waste collection, sorting/bulking, onward transport and treatment.
	Economic	Includes all costs associated with bin and vehicle provision, collection and management of materials. It does not include the costs of redeveloping infrastructure or of terminating/varying existing contracts.
Hierarchy test		Uses the results of the Necessity and TEEP tests to justify departures from the waste hierarchy

For each test, the data was compared for the optimised systems to help determine if separate collections are necessary to facilitate or improve recovery, and are TEEP.

Results

Necessity test

The necessity test is intended to determine if separate collections are required to 'facilitate or improve' recovery, i.e. deliver more 'high quality recycling'. The Route Map says that high quality recycling can be defined as closed loop recycling i.e. reprocessing a material back into a product of similar quality to what it was originally.

The purpose of this test is, therefore, to determine the tonnages of material sent to closed loop recycling by each system. For the avoidance of doubt these tonnages do not include waste material removed as rejects along the way at sorting and reprocessing facilities. Therefore, closed loop recycling is material accepted by a closed loop reprocessor minus any rejects removed by the reprocessor.

The quantities of closed loop recycling produced by each system are shown in the colour-coded cells in Table 3.

Table 3: Quantities of the key materials and residual waste managed by each system

Material	Open or closed loop recycling	Optimised collection systems			Current system
		Separate	Comingled		
Paper & card	Open	0	0		0
	Closed	5,183	6,879		5,404
Glass	Open	555	2,211		2,823
	Closed	1,358	0		0
Metal	Open	0	0		0
	Closed	332	443		418
Plastic	Open	0	0		658
	Closed	1,110	1,167		488
Sub total	**Open**	**555**	**2,211**		**3,482**
	Closed	**7,983**	**8,489**		**6,310**
Residual	**N/A**	10,561	8,399		9,307
Total		**19,099**	**19,099**		**19,099**

Colour coding denotes relative quantities of closed loop recycling:
= Least, = Most

It can be seen from Table 3 that, when the optimised systems are compared, the comingled system produces the most closed loop recycling for paper/card, metals and plastic. However it sends no glass to closed loop recycling, compared to almost 1,400 tonnes produced by the separate system.

The comingled system captures more material at the kerbside than separate collections, which, with the exception of glass, results in more closed loop recycling despite the loss of some material as MRF rejects. However the MRF that Surrey Heath use is not able to sort the glass in such a way that allows it to be sent to a closed loop reprocessor.

Despite producing no closed loop glass, the comingled system produces the most closed loop recycling overall.

Discussion

The necessity test requires an answer to the question: 'for each material, is separate collection necessary to facilitate or improve recovery?'

The results in Table 3 suggest that separate collections may be necessary to improve the recovery of glass. However it can be seen that if separate collections replaced comingled collections, the recovery of the other three materials and the total quantity of closed loop recycling would be much reduced.

For three of Surrey's other WCAs, a further system has been modelled where only glass is collected separately. For all of the WCAs it was found that this separate glass system produced more closed loop glass but less of the other key materials than a comingled system. It also produced less closed loop recycling overall. It is assumed that the same findings would be observed if a separate glass system was introduced by SHBC.

As the introduction of fully separate or separate glass collections are projected to cause a net decrease in the closed loop recycling of at least three of the key materials, it is concluded that separate collections are not necessary to facilitate or improve recovery.

TEEP test

If separate collections pass the necessity test for any of the materials, the Route Map suggests that a TEEP test should be undertaken.

The TEEP test determines if separate collections are practicable technically, environmentally and economically. Separate collections should be introduced if they pass all aspects of the TEEP test, but a failure on any one of the criteria means that they are not required.

Separate collections have failed the necessity test, however the TEEP test has been undertaken anyway, as suggested by the Route Map, to ensure that all of the circumstances have been considered to demonstrate clear compliance.

Technical

It has been assumed that separate collections are technically practicable as they are successfully operated in many authorities throughout England which have a wide-range of geographies. There may be a small number of difficult to reach properties in the SHBC area where separate collections might not be possible but these have not been included as part of the test, which focuses on the core kerbside collection.

Result of technical practicability test: PASS

Environmental

The environmental impact of each system has been calculated for all key materials and the remaining residual waste, from collection of the waste through to reprocessing or final disposal. The results are shown in Table 4 in terms of CO_2 equivalent emissions.

Table 4: Annual environmental impacts (kg CO_2e) of managing the key materials and residual waste

Collection system	Collection	Transfer & primary processing	Onward haulage	Recycling	Disposal	**Total**
Separate	246,874	49,981	989,352	(4,497,928)	663,550	**(2,548,171)**
Comingled	283,190	93,745	684,748	(5,360,613)	1,309,592	**(2,989,338)**
Current	247,425	91,556	1,192,596	(4,391,476)	690,693	**(2,169,206)**

Colour coding denotes relative environmental impacts:
= Highest, = Lowest

The results in Table 4 show that whilst both systems provide an environmental benefit, the benefit provided by separate collections is lower than that provided by the comingled system.

From looking at the detail of the results, it can be seen that the separate collection system has a relatively low impact from transfer and primary processing because the material does not require sorting in a MRF. However, it has a high impact for onward haulage because the mixed paper that it produces is not suitable for reprocessing in the UK, meaning that it is sent to the Far East.

Interestingly separate collections have a far lower disposal impact than comingled collections. This is because they capture less paper, meaning more is left in the residual waste which mostly goes to EfW for thermal treatment. DEFRA's greenhouse gas emissions tool shows that sending paper to EfW is better for the environment than recycling it, so the environmental impact is reduced.

The comingled system has the lowest overall impact, mainly because it captures the most recycling, a large proportion of which is suitable for environmentally beneficial closed loop recycling.

Whilst the current system is not being used for comparative purposes it is important to note that it has a lower environmental benefit than the optimised systems. There are several reasons for this; firstly the current system sends a proportion of plastic to open loop recycling. Data from other SWP authorities shows that it should be possible to send all plastics to closed loop recycling (this has therefore been modelled for the optimised comingled system). Closed loop recycling is more environmentally beneficial than open loop recycling. Similarly the current system sends some grades of sorted plastics to the Far East, whilst the optimised comingled system assumes that some of this can be processed domestically, as has been proven possible by other SWP authorities. The same is true of paper/card.

From looking at the totals, we can conclude that separate collections do not provide an environmental benefit when compared to a comingled system. It is therefore deemed that separate collection is not environmentally practicable for SHBC.

Result of environmental practicability test: FAIL

Economic

The economic test compares the costs of each system in terms of collecting and managing the four key materials and the remaining residual waste.

The costs are modelled on a 'cost to the taxpayer' basis and include costs incurred by both SHBC and SCC. Recycling credits are not included as they are a cost neutral financial mechanism that is a financial transfer between two authorities. Table 5 shows a summary of the costs for each system with a split between collection and management to provide some indication of where costs are incurred.

Table 5: Annual costs of managing the key materials and residual waste

Collection system	Collection	Management	Provision of containers	**Total**
Separate	£2,315,643	£1,107,933	£260,628	**£3,684,204**
Comingled	£1,357,525	£1,158,142	£337,155	**£2,852,822**
Current	£1,199,413	£1,279,714	£334,227	**£2,813,354**

Colour coding denotes relative total costs of the systems:
= Highest, = Lowest

Table 5 shows that the separate collection system is estimated to be the most expensive of the optimised systems and costs £831,000 more than the comingled system.

Although the current system has not been used for the comparative purposes, it can be seen that its costs are similar to those of the optimised comingled system.

An interesting pattern is observed in the detail of the results. Under collection costs, the separate system is far more expensive than the comingled system because of the larger number of vehicles that are required to operate it. However, separate collections have lower management costs as a result of gaining income for many of the recyclables collected, whereas under the comingled system, a gate fee must be paid to have these mixed recyclables sorted. This difference is tempered though by separate collections having larger quantities of expensive residual waste to manage.

The comingled system is the lowest costing system because it has:

- relatively low collection costs as a result of requiring fewer collection vehicles, and
- the highest material capture rates and therefore the least amounts of expensive residual material to manage.

It is important to note that, according to the Route Map, economically practicable does not necessarily mean the cheapest option, and separate collections could still be practicable if the cost is not excessive or disproportionate to the benefits. However, the separate system appears to have no environmental benefits over the comingled system and is £831,000 more expensive, which represents a significant proportion of SHBC's waste management budget. Therefore it is deemed that separate collections are not economically practicable in this case.

Result of economic practicability test: FAIL

Summary of the TEEP tests

The sections above indicate that, while separate collections are likely to be technically practicable, they are not environmentally or economically practicable.

Waste hierarchy test

Unlike the necessity and TEEP tests, the waste hierarchy test applies to all materials collected by a WCA.

Under this test, each material collected by the WCA is assessed to check it is managed as high as reasonably possible on the waste hierarchy[4], and that any departures from the hierarchy are suitably justified. Departures from the hierarchy can be justified by any of the following principles: environmental protection, technical feasibility, economic viability, protection of resources, human health or social impacts.

To undertake the hierarchy test, we must first set a 'reasonable' hierarchy position for each material that is collected. Prevention is the ideal position, and both SHBC and SWP are actively seeking to prevent waste materials arising via communication campaigns and the lobbying of central government and waste producers. After prevention, the next highest reasonable hierarchy position was chosen and compared against the actual position on the hierarchy where the waste is being managed under the current system. Any departures from the hierarchy were then justified where possible. The results of this test are shown in Appendix 1.

Appendix 1 shows that all materials, including the four key materials, are either being managed in compliance with the waste hierarchy or are justifiable departures.

Conclusions

The results of this assessment indicate that separate collections are not necessary to facilitate high quality recycling of the four key materials. They are technically practicable, but neither economically nor environmentally practicable.

The current system appears to be operating in accordance with the waste hierarchy. Therefore this report does not recommend any changes to the format of the current collection system to ensure compliance with the Waste Regulations.

However, this assessment has identified the following areas where SHBC could influence changes in order to reduce the environmental impact of its current system:

- sending more paper/card and plastic to UK and European markets rather than the Far East could reduce the environmental impacts of haulage by over 400,000 kg CO_2 e per year
- sending more plastic to closed loop reprocessors could reduce the environmental impacts of managing the material by over 800,000 kg CO_2 e per year

The above changes will require dialogue with the MRF operator to see if they are possible with the current configuration of the MRF.

On-going compliance

The Route Map is clear that 'assessing whether you comply with the law is not a "once and for all" task' and reassessment must take place when key factors change.

A Sensitivity Analysis has been undertaken to determine what the key factors are that could influence the results of the compliance assessments.

For environmental practicability these are:

[4] Guidance on the waste hierarchy available here: https://www.gov.uk/government/publications/guidance-on-applying-the-waste-hierarchy

- Quantities of recyclables captured
- Proportion of residual waste sent to landfill or energy from waste

For economic practicability these are:

- Quantities of recyclables captured
- The gate fee for the treatment of residual waste
- The cost (per tonne) of bulking residual waste

Changes in the quantities of material captured has a significant impact on the results because recycling material is both far cheaper and less environmentally damaging than treating it as residual waste. If new evidence emerges suggesting that the systems could capture different quantities of materials from what has been modelled, the results could change.

The type of residual waste treatment, e.g. landfill or EfW, has a large influence on the environmental impacts. This is because landfill has a far greater environmental impact than EfW. The different systems produce different quantities of residual waste, therefore changes to treatment type could affect each system to a different extent, possibly causing changes to the overall results.

Similarly, residual waste is expensive to manage because there is a lot of it. Therefore changes to the unit costs of managing it could affect the overall results.

To ensure that changes to these variables are considered, compliance assessments will be updated at least annually. However if urgent changes to the methodology are deemed necessary as a result of additional guidance being published or clarification emerging from case law, compliance assessments will be updated ahead of the annual review.