at this rate...

exploring England's recycling challenges

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Prepared by SLR Consulting for SUEZ | recycling and recovery UK

SLR global environmental solutions

foreword

The UK's waste management scene has undergone a huge transformation within the relatively short space of 15 years, moving from single-digit household waste recycling at the turn of the millennium to 45 per cent in this last financial year, with a corresponding reduction in the tonnage of waste landfilled. This is testament to the effectiveness of powerful policy levers – such as landfill tax, European Union (EU) landfill diversion targets – and statutory household waste recycling targets placed on all local authorities. These latter targets were discontinued from April 2011 – though at a national level, the UK still has to meet a European Union household waste re-use and recycling target of 50 per cent by 2020.

After many years of large annual percentage increases, England's household waste recycling rate has begun to stagnate at around 45 per cent. Waste-watchers are now concerned that the UK is in danger of missing its EU target of 50 per cent by 2020, unless we rethink the way in which we collect household waste and refresh the policy instruments that have thus far been so successful in driving our recycling performance.

Aside from the immediate imperative of meeting a legal target, there is also concern that we are not getting as much value out of waste as we might and that we should redouble our efforts to achieve higher recycling rates, so that we can introduce more recovered waste streams back into the economy as secondary raw materials.

Are householders up for the challenge? Yes, according to research we commissioned in 2014 from Keep Britain Tidy. Presenting the outcomes of two citizens' juries, the report **The Ur[bin] Issue** amply demonstrates the commitment of householders in playing their part towards increasing recycling.

Building on the insights of the citizens' juries and our own analysis, we asked SLR Consulting to further explore what England needs to do in policy and operational terms to achieve a step change in our national recycling rate. Furthermore, if the success factors identified in the best performing UK member states were to be applied to England, what impact might they have on our own recycling performance?

SUEZ thanks SLR for undertaking this project and for distilling a set of clear operational and policy recommendations addressed to all actors involved in household waste management – from central to local government to the waste management sector and to householders.

We believe this report provides England's local authorities and policy makers with a blueprint for raising our household waste recycling rate to the next level, and hope that the recommendations initiate a debate on how we can move forward, especially in relation to meeting our EU 2020 target.

David Palmer-Jones
Chief Executive Officer
SUEZ | recycling and recovery UK

executive summary

England's recycling challenge

Household waste management in England has experienced a remarkable change since the turn of the millennium. Recycling has replaced landfill as the main method of managing household waste, rising from nine per cent of waste collected in 1999/2000 to almost 45 per cent in 2013/14. Until the late 1990s, the waste industry's primary objective was the safe disposal of waste, but now it is firmly focused on extracting value from waste.

While celebrating the strides England has made in improving its recycling performance, it is clear that there are opportunities to extract even more value from household waste. The devolved administrations in Wales and Scotland have set a statutory target of 70 per cent recycling by 2025 and the European Commission is currently reviewing a similar objective.

factors holding back England's household waste recycling rates

Recycling league tables show substantial variation across England's local authorities.

As part of this study, data on recycling activities in England was analysed against a range of geographic and socioeconomic factors and also compared with Europe's best recyclers. The factors identified as having the most influence on England's recycling performance were:

losing value in households

The vast majority of 'losses' of recyclable materials still occur in the home and at the kerbside. Only 42 per cent of England's household waste is segregated at source as recyclables, which is significantly lower than levels achieved in the best performing European countries. Recycling rates are particularly low for food (~10 per cent recycled), plastics (~15 per cent recycled) and textiles (~16 per cent recycled).

poor material capture

England's local authorities still only provide a limited proportion of households with collection systems for the major recyclables. Recycling rates are well below the optimum levels for materials such as metals and paper.

housing mix and multi-occupancy dwellings

Research indicates that recycling rates are falling in areas where there is an increase in multi-occupancy dwellings. Recycling rates also tend to be lower in areas where there are challenges with social deprivation, urban classifications, education, language and residential stability.

garden waste distorting comparisons

Local authorities with low population density tend to achieve significantly higher recycling rates than more urban authorities. Arguably, garden waste places some authorities at an 'unfair' advantage, distorting recycling league tables.

weaker policy levers

England is lagging behind the European Union's high-performing recyclers who use stronger incentives, such as 'pay-as-you-throw' schemes (where householders are charged for having non-recyclable waste collected) and landfill / incineration restrictions for some materials.

If all English local authorities adopted the practices of their best performing English counterparts, England's household waste recycling rate would rise from 45 per cent to 56 per cent (or 49 per cent if garden waste is excluded). Optimum rates can be achieved if local authorities focus on maximising recycling yields from multi-occupancy dwellings.

is tonnage the right metric to measure recycling performance?

This study also examined whether tonnage-based accounting is still the best way to measure England's recycling performance and looked at other 'value metrics', such as carbon impact, avoided energy use, monetary value and resource efficiency.

Defra, the Greater London Authority and Zero Waste Scotland have adopted, to varying degrees, a carbon metric. The choice of metric has a significant impact on materials prioritised for recycling. Using monetary value as an example, local authorities, by focusing on the right mix of materials, can perform well even if they achieve relatively low levels of recycling in tonnage terms.

recommendations

A new set of interventions is needed to raise recycling rates and maximise value recovery from household waste beyond what is being achieved through current policies and practices. Building on our analysis of factors holding back England's recycling performance and drawing on the experiences of other better-performing countries, the following interventions have been identified by this report:

Waste collection

National Government

- Pilot pay-as-you-throw schemes.
- Introduce a mandatory requirement for separate collection of food waste.

Local Government

- Ensure consistency in the type of materials collected from households for recycling.
- Provide universal access to consistent recycling services designed for specified locational characteristics.
- Ensure regular communications with householders, taking into consideration ethnic diversity and itinerant populations.
- Focus on improving recovery of recyclables from flats and multi-occupancy dwellings.
- Decrease the frequency of residual waste collection.
- Provide free collection of garden waste from households.
- Create strong partnership working between local authorities and the waste industry, with allowance for flexibility in contractual conditions.

Sorting and treatment

Local Government and waste industry

- Continue with efforts to minimise contamination through communications and enforcement.

Residual waste treatment

National Government

- Account for recycling of incinerator bottom ash as part of overall recycling performance.
- Develop measurements and metrics for re-use.

Local Government

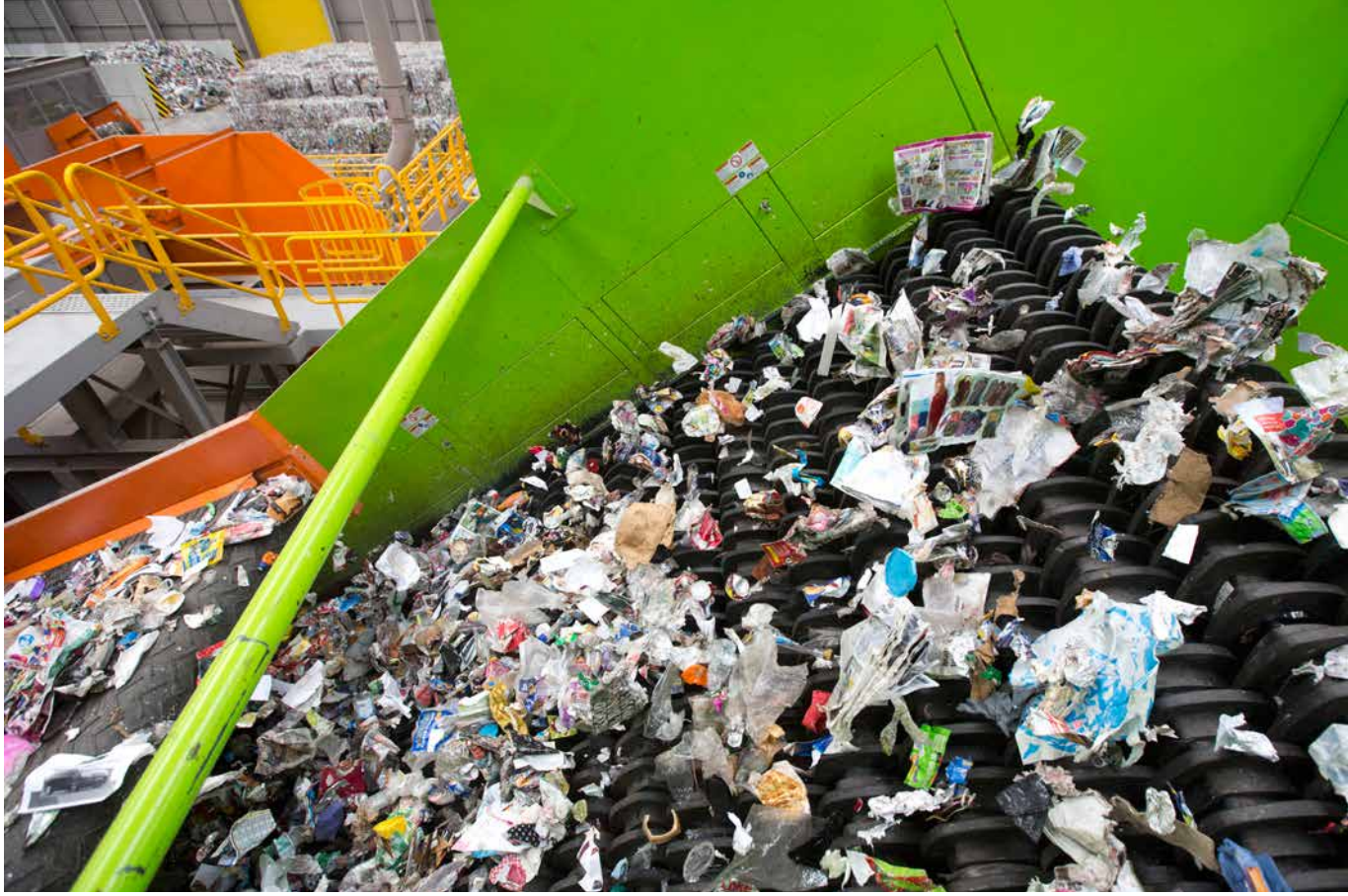
- Treatment contracts should be structured to incentivise the segregation of recyclables.

Overarching issues

- Create a clear policy framework with long-term certainty.
- Central government funding support for waste management services will be crucial if recycling rates are to be raised further – and maintained.
- Focus on the product design stage to increase reusability and recyclability of products.
- Reintroduce mandatory recycling targets at local authority level.
- Agree with the European Commission a consistent EU-wide approach to calculating and reporting recycling performance.
- Identify and trial the most appropriate future metrics for waste management performance.

The immediate priority for England is to ensure we achieve the European Union target of 50 per cent re-use and recycling of household waste by 2020. For this reason, England must accelerate its year-on-year performance, which has slowed to increments of about 0.1 per cent per year for the past three years, culminating in a re-use and recycling rate of 45 per cent for 2013/14.

We have selected the 'top five' actions that we believe can make the greatest impact in the period leading up to 2020.



Action	Indicative uplift in recycling for authority adopting scheme	Proportion of English authorities assumed to be impacted	Net impact on England's household waste recycling rate
1 Make separate collection of food waste a mandatory universal service with a weekly collection frequency. Reduce the collection frequency of dry recyclables and residual waste to two-weekly or longer intervals.	6%	50%	3%
2 Reintroduce re-use and recycling targets at local government level, but with a properly costed and funded ring-fenced settlement from central government.	-	—	-
3 Introduce pay-as-you-throw as a means of encouraging more sustainable waste management practices on the part of householders.	12%	25%	3%
4 Maintain strong communication programmes with householders, especially in challenging service situations (rental accommodation, student and itinerant populations, etc).	3%	75%	2%
5 Task Defra and the Environment Agency with developing a protocol to identify acceptable uses of incinerator bottom ash that can legitimately be counted towards England's recycling performance.	-	—	4%

section one

why this report now?

Over the last 15 years, there have been significant increases in materials recycling and energy recovery in England, and a corresponding reduction in waste sent to landfill. As stated in 1999/2000, only nine per cent of English household waste was recycled. On the basis of the latest annual estimate, this rate has now approached 45 per cent for the twelve months up to June 2014[1].

Much of this positive change has been driven by government interventions, such as landfill tax and the implementation of European legislation. In addition, tonnage-based targets[2] have played a vital role in influencing decision making within government and industry.

As the end dates for existing targets approach[3], attention is now turning towards the next set of waste management goals. The European Commission is currently developing its 'circular economy' policy package. In 2014, the Commission proposed that member states achieve a 70 per cent recycling rate by 2030, which triggered significant debate. For example, Defra stated that it would not support new targets 'unless there are clear economic and environmental benefits that exceed the costs'[4].

Goals and targets set over the next few months will steer our sector's development over the next 10 to 15 years. To set the industry on the right path, it is important to consider the ultimate objectives of waste management and how they translate into performance metrics. This report aims to examine these considerations by looking at two key issues:

- The scale of the challenge involved in increasing England's household waste recycling rate significantly beyond 50 per cent.
- The ongoing applicability of tonnage-based targets, and the range of other options for measuring and defining the 'value' (in the broadest sense) derived from waste.

Section two explores the first of these issues, beginning with an analysis of England's current recycling performance and assesses the efficiencies of the country's recycling supply chain. This performance data is then used to anticipate the optimal recycling rate that England is expected to achieve.

After having considered the scale of the challenge posed by higher recycling rates, section three addresses the broader question of the efficacy of tonnage-based targets. This includes a review of the historical role of recycling targets and their crucial part in transforming waste management practices in England. It recognises that recycling is not an end in itself, but a means to achieving wider goals – such as reducing greenhouse gas, energy and material resources – and reviews a range of alternative metrics for waste management performance. The choice of metric has a notable impact on the overall recycling rate and the importance of each material stream in achieving this rate.

This report focuses on household waste collected in England. There is abundant data on this waste stream, it is the subject of government targets and enables detailed analysis of recycling performance to be carried out, creating a foundation for more informed discussions about performance metrics. While other controlled waste streams – such as non-household waste collected by local authorities, commercial and industrial waste, and construction and demolition waste – are not considered explicitly, the findings of this report are also relevant to these other waste streams.

1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/402547/Statistis_Notice_Feb_2014_Final.pdf
2 In particular, targets requiring increases in the proportion of waste recycled and reductions in biodegradable municipal waste to landfill.
3 For example, the requirement for recycling of 50% of household waste by 2020 in Directive 2008/98/EC.
4 http://www.publications.parliament.uk/pa/cm201415/cmselect/cmenvfru/921/92104.htm

Section two

the challenge for England

Before considering how to set waste management targets, it is important to begin by characterising England's current recycling performance. This section of the report presents an analysis of the latest local authority level data on recycling household waste in England with:

- A high level review of the nation's current recycling performance, including a shortlist of the current top performing authorities.
- A detailed analysis of the current efficiencies of England's supply chain stages, which explains factors underlying this performance.
- A best practice review highlighting the success factors of countries within the European Union which have achieved the highest recycling performance rates.
- A review of the best performing local authorities, including investigation of correlations between demographic / economic / social indicators and recycling levels.
- An estimate of the optimum recycling rate that is achievable in England.

The term 'recycling' is used in its broadest sense, encompassing re-use of items, recycling of dry materials – such as paper, plastics, glass and metals – as well as organic waste sent to composting and anaerobic digestion.

5 Findings are based on an analysis of recycling data for financial year 2013/14 – the most recent available validated national dataset (https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables and http://www.wastedataflow.org/).

2.1 · current recycling performance

England's latest overall annualised household waste recycling rate approached 45 per cent. However, the variation on this average rate is substantial. For example, the highest performing local authority in 2013/14[5] was Calderdale Metropolitan Borough Council, reaching a rate of 60 per cent.

Analysis of waste performance data from Defra and WasteDataFlow suggests the highest recycling rates reported separately for dry recyclables, garden waste and food waste were 41 per cent, 28 per cent and nine per cent respectively, expressed as a proportion of total household waste.

Focusing on the best performing authorities, figure one lists the top five unitary authorities (UAs) and waste disposal authorities (WDAs) for total household waste recycling as well as separately for dry recyclables, garden waste and food waste.

Figure one · Best recycling performance reported by local authorities

	Unitary authorities Top five	%	Waste disposal authorities Top five	%
Dry recycling only	Bradford City MDC (MBC)	41%	Oxfordshire County Council	32%
	City of London	36%	Buckinghamshire County Council	31%
	Barnsley MBC	34%	Cumbria County Council	31%
	Kingston upon Hull City Council	34%	Suffolk County Council	30%
	Rutland County Council	33%	Cambridgeshire County Council	29%
Garden waste recycling only	East Riding of Yorkshire Council	28%	Leicestershire County Council	27%
	Rutland County Council	27%	North Yorkshire County Council	22%
	Cheshire West and Chester	23%	Lincolnshire County Council	22%
	Cheshire East	23%	Suffolk County Council	22%
	Shropshire	22%	Derbyshire County Council	22%
Food waste recycling only	Bromley LB	9%	Buckinghamshire County Council	8%
	Croydon LB	8%	Oxfordshire County Council	7%
	Southend-on-Sea Borough Council	7%	Cambridgeshire County Council	7%
	Royal Borough of Kingston upon Thames	7%	Somerset County Council	6%
	North Somerset Council	7%	Warwickshire County Council	6%
Total recycling	Calderdale MBC	60%	Oxfordshire County Council	59%
	Rutland County Council	60%	Cambridgeshire County Council	56%
	Cheshire West and Chester	58%	Devon County Council	55%
	East Riding of Yorkshire Council	57%	Buckinghamshire County Council	54%
	North Somerset Council	56%	Warwickshire County Council	53%

Sources: DEFRA, WasteDataFlow

If a local authority were to achieve the highest recycling rates reported separately for dry recyclables, garden waste and food waste, the total recycling rate could be as high as 78 per cent (i.e. 41 per cent + 28 per cent + nine per cent). However, achieving this top rate of recycling would depend heavily on composition and the availability of garden waste for recycling, which can be particularly challenging for urban areas with less garden waste arisings. If garden waste recycling performance is excluded, the highest recycling rate that a local authority could expect to achieve, based on the current individual best performance, is 50 per cent (i.e. 41 per cent + nine per cent).

Arguably, the inclusion of garden waste distorts performance statistics when comparing local authorities across England; favouring local authorities which have properties with relatively large gardens and collections for garden waste in place. Nonetheless, garden waste recycling can still be used, justifiably, to contribute towards overall national performance figures. If garden waste recycling was excluded from performance calculations and total household waste arisings, the recycling rate for England would have been about 33 per cent.

When garden waste is excluded to create a level playing field, the recycling league table is reshuffled. Figure two shows the top five best performing unitary authorities and waste disposal authorities under both sets of calculations (that is, with and without inclusion of garden waste recycled in household waste arisings).

Figure two · Best performers with and without inclusion of garden waste recycling

	Best performers when recycling of garden waste is included		Best performers if garden waste recycled is excluded from household waste arisings	
Unitary authorities	Calderdale	60%	Calderdale	56%
	Rutland	60%	North Somerset	47%
	Cheshire West and Chester	58%	Rutland	46%
	East Riding of Yorkshire	57%	Bradford City	46%
	North Somerset	56%	Southend-on-Sea	45%
Waste disposal authorities	Oxfordshire	59%	Oxfordshire	47%
	Cambridgeshire	56%	Buckinghamshire	44%
	Devon	55%	Surrey	41%
	Buckinghamshire	54%	Devon	41%
	Warwickshire	53%	Cambridgeshire	41%

Sources: DEFRA, WasteDataFlow

2.2 · supply chain review

Section 2.1 focused on the overall recycling rates achieved by England's best performing local authorities, demonstrating performance that exceeds the requirements of the revised Waste Framework Directive 2008/98/EC. Nevertheless, with an average English recycling rate approaching 45 per cent, the country as a whole still falls short of these aspirations.

The challenge to improve the country's recycling performance can be demonstrated by considering the recyclables 'supply chain' for waste collected by local authorities. This supply chain involves the following key stages:

composition

Material generated within households

capture

Separation by householders (ultimately dependent on householder behaviour, as influenced by local authority communications)

primary processing

Sorting (at a materials recycling facility) or bulking (at a transfer station)

rejects

Rejection of materials by treatment processes (for example, anaerobic digestion or in-vessel composting)

residual recycling

Any subsequent separation of recyclables from residual waste

reprocessing

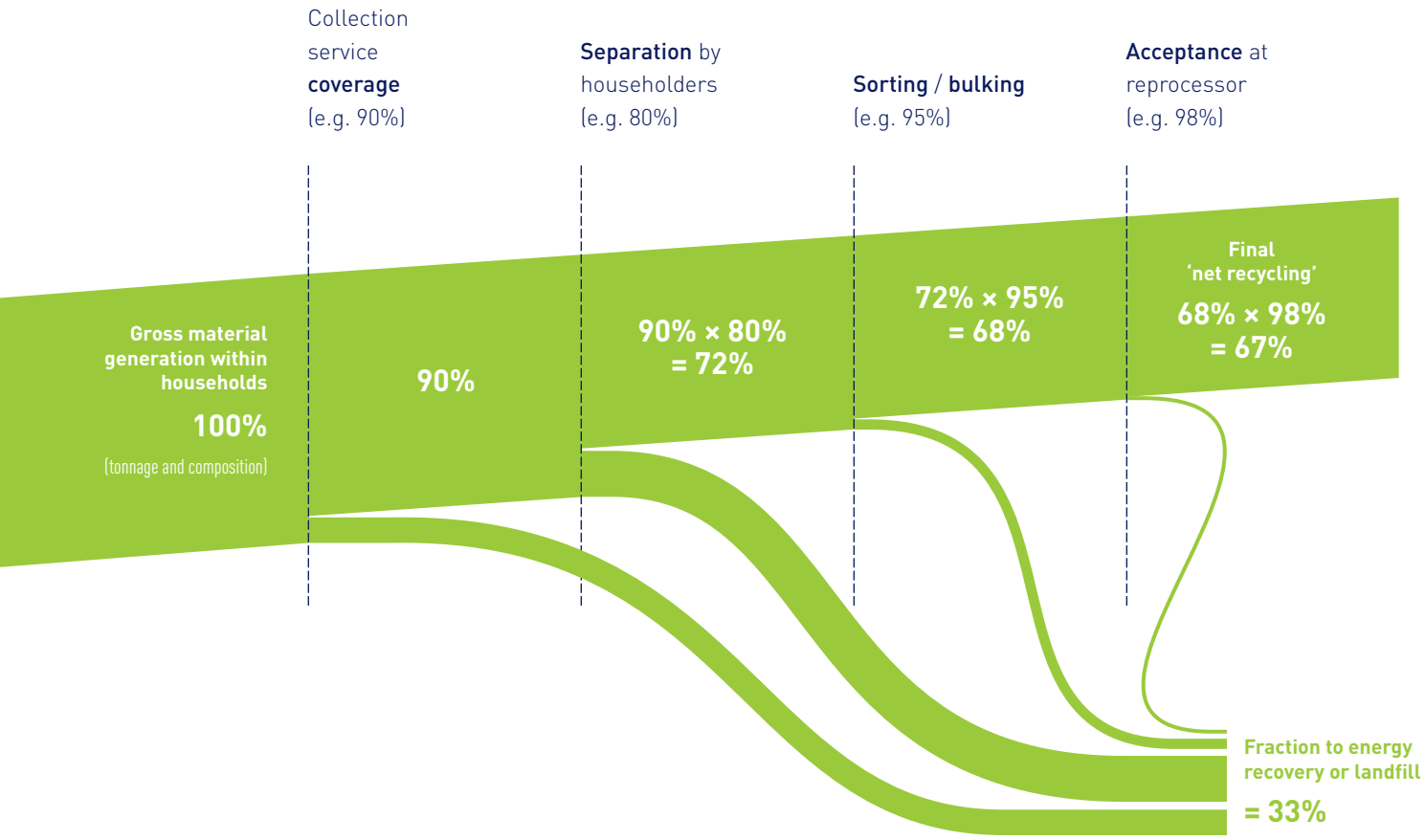
The acceptance of material at reprocessors (for example, a paper mill or glass container manufacturer)

The most recent household waste composition data for England and Wales is for 2006/07, presented in annex one.

Waste composition will change over time along with changes to household consumption patterns and other factors, such as the move towards electronic communications. Annex one looks at each waste material in turn and explores how these factors might affect future trends. As the effect of these changes on future waste composition is difficult to predict with any degree of certainty, the data for 2006/07 have been used to estimate material specific capture and recycling rates.

The remaining stages have an associated 'efficiency' which can be defined as the proportion of material passing through the stage as recyclables, net of any rejects. Figure three shows how the cumulative impact of these efficiencies can severely limit the level of recycling that can be achieved.

Figure three · Schematic example of the recyclables supply

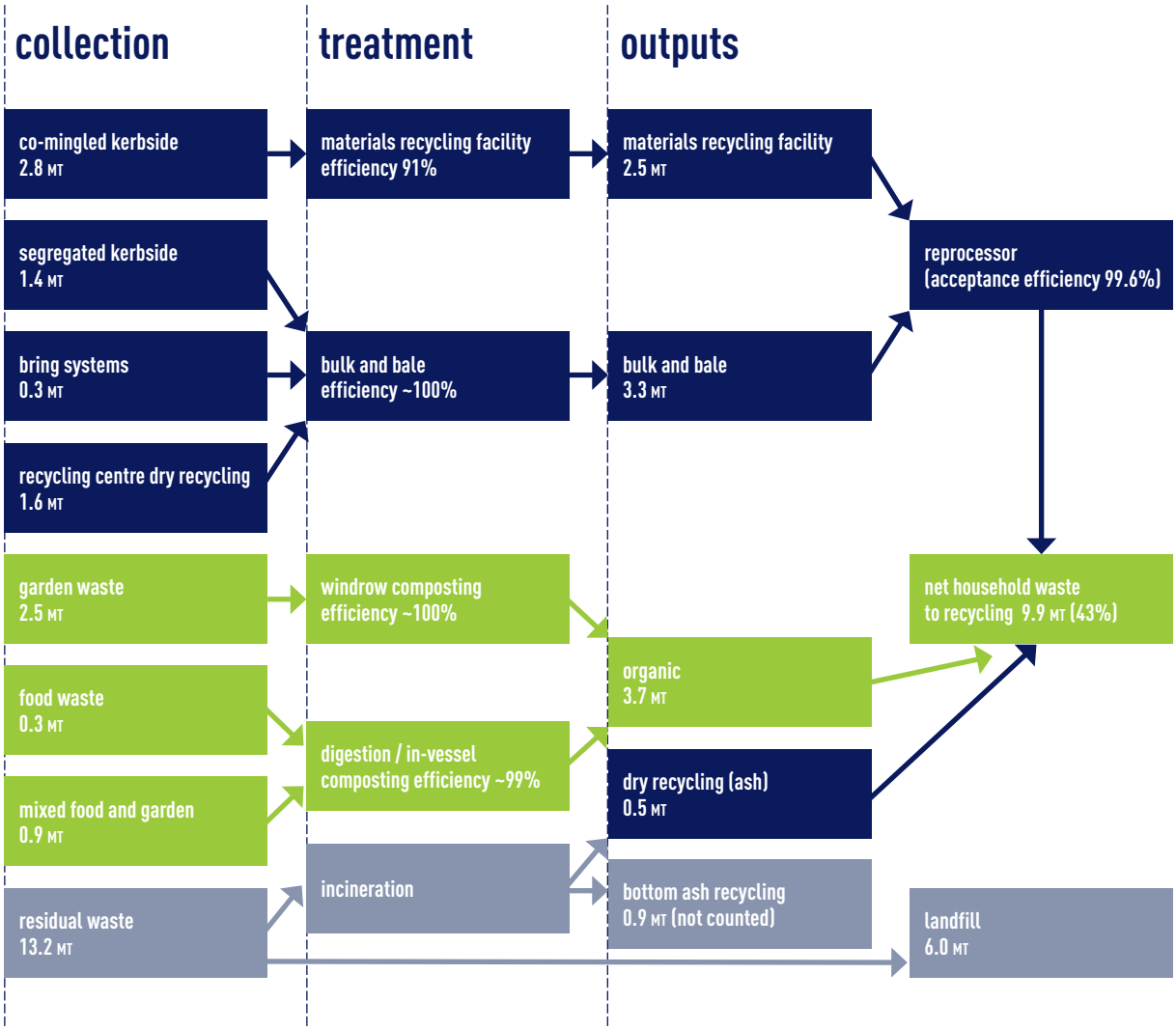


These efficiencies have been estimated across England's recycling supply chain by utilising information from WasteDataFlow. The results are summarised in figure four, which shows the flow of waste from households through to the final net tonnage of material considered as recycled. All tonnages are expressed in millions of tonnes per annum.

The main findings from this supply chain summary are as follows:

- The vast majority of 'losses' of recyclable materials still occur in the home. Only 42 per cent of household waste is segregated at source as recyclables.
- The lowest estimated factor is the efficiency of materials recycling facility sorting, amounting to circa 91 per cent (that is, nine per cent of materials recycling facility inputs are rejected for treatment by energy-from-waste or disposal at landfill).
- Other efficiencies are typically high. For example, anaerobic digestion and in-vessel composting efficiencies exceed 99 per cent, and reprocessor acceptance of dry recyclables is at 99.6 per cent.
- Dry recyclables recovered from residual waste by treatment processes amount to 500,000 tonnes per year, making a small but significant contribution to the overall household waste recycling rate.
- Household waste recycled as incinerator bottom ash is estimated at 0.9 million tonnes per year. If this material were to count towards the overall recycling performance (as opposed to its current classification as a recovery activity), the net household waste recycling rate would increase to 47 per cent.

Figure four · Overview of the existing recyclables supply chain for English household waste in 2013/14 (million tonnes, MT *)

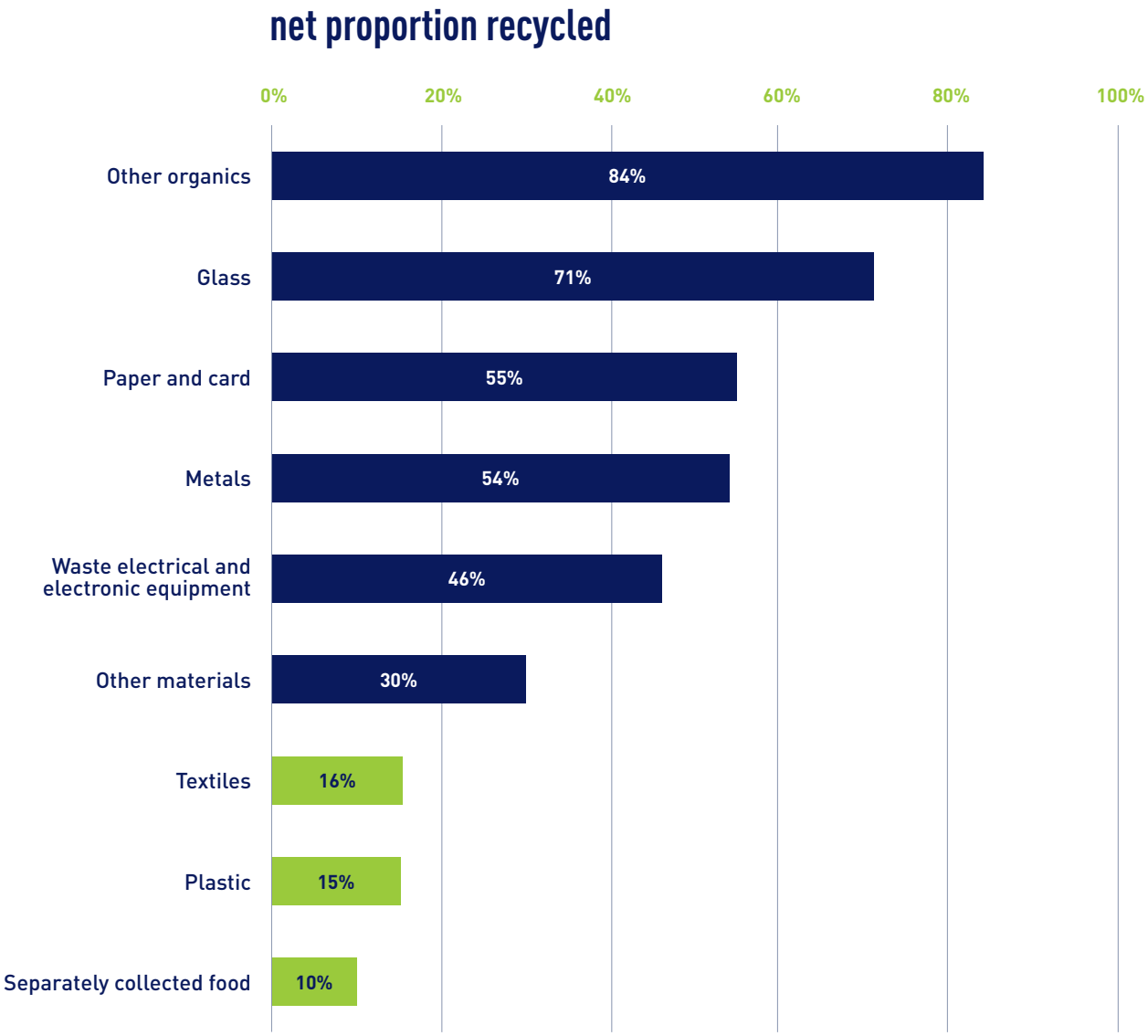


* Developed from WasteDataFlow information for 2013/14

Figure four gives an overview of household waste recycling in England and focuses on the flow of materials after segregation at the household. The efficiencies are a reflection of the country's overall recycling performance.

It is also necessary to consider the efficiencies achieved on an individual material basis to fully comprehend England's current lost recycling opportunities. Tables analysing England's recycling performance by material type are presented in annex two.

Figure five · Estimated proportion of England's household waste material arising recycled



Summarising the data in annex two, the net proportion of each material recycled is illustrated in figure five. The three material types with lowest net capture rates are:

- Food (about 10 per cent recycled)
- Plastics (about 15 per cent recycled)
- Textiles (about 16 per cent recycled)

While a range of measures may be put in place to enable recycling, the scope for improvement in performance is ultimately constrained by the amount of recyclables available within the household waste stream. Factors which influence the prevalence of specific materials have been examined in annex one, though, as previously noted, it is difficult to factor into our calculations meaningful predictions of future waste composition.

2.3 · best practice review

The supply chain analysis presented in section 2.2 shows some of the materials capture deficiencies which constrain England's current recycling performance. It is helpful to look to overseas examples set by higher performing countries when exploring ways to overcome these barriers. While waste management contexts and approaches to reporting in these countries may differ significantly from England, lessons can be learned from European best practice.

In respect of recycling performance, Germany, Sweden and Belgium (Flanders) are the three highest performing EU member states. There is insufficient data to duplicate the detailed supply chain approach presented in section 2.2, but a review of literature and published data for these countries sheds light on the operational efficiencies and policy measures which underpin their performance.

Data for Wales is also reviewed in figure six. Recycling arrangements in Scotland were not reviewed for this study because its household waste recycling rate (42 per cent) is lower than England's recycling rate.

Figure six · Operational efficiencies and policy measures in England, Wales, Germany, Sweden and Belgium

Factors considered	Summary of findings			
Participation and capture rates		**Dry recyclables recycled**	**Organic waste recycled**	**Total household waste recycled**
	England (2013/14)	26%	18%	43%
	Wales (2013/14)	36%	19%	55%
	Flanders, Belgium (2012)	48%	22%	70%
	Germany (2012)	32%	25%	57%
	Sweden (2013)	35%	14%	49%
Contamination rates	**Dry recyclables** ▶ Flanders (Belgium), Germany, Sweden and Wales – this information is not available. **Organics** ▶ Flanders (Belgium): 2% - 3%[6] ▶ Germany: 4% - 20%[7] ▶ Sweden: 1% - 2%[8] ▶ Wales: typically 3% to 5%			
Reject rates	**Materials recycling facilities / Sorting plants[9]** ▶ Flanders (Belgium) – this information is not available. ▶ Germany: up to 30% (but material dependent)[10] ▶ Austria: typically 15% ▶ Wales: 11% to 16%[11] **Composting / Anaerobic digestion facilities** ▶ Information obtained for Germany suggests reject rates less than 0.5% of the input. However, this is a lot lower than the contamination rate reported for Germany (see the above row) and therefore the data should be approached with caution. ▶ Comparable information was not available for Flanders or Sweden. ▶ Wales: typically up to 10% dependent on output quality requirements.			

6 Irish EPA. 2008. Organic waste management in apartments.
7 Turning contaminated waste into clean renewable energy and PAS110 compost – an overview of the Monsal biowaste process.
8 IEA Bioenergy. 2013. Source separation of MSW.
9 Impact Assessment on Options Reviewing Targets in the Waste Framework Directive, Landfill Directive and Packaging and Packaging Waste Directive. Appendix 9 – Definitions, Data and Statistics. Report for the European Commission DG Environment. February 2014.
10 www.destatis.de
11 WRAP. November 2011. The Impact of Rejects on the Recycling Rates of Local Authorities in Wales

Factors considered	Summary of findings
Policy and regulatory measures	**Flanders (Belgium)** ▶ Targets for source segregated collection of recyclables ▶ Targets for residual waste arisings ▶ Pay-as-you-throw schemes ▶ Landfill and incineration ban of unsorted household waste ▶ Landfill and incineration levy ▶ Promotion of home composting **Germany** ▶ Landfill ban of untreated municipal solid waste ▶ Strict implementation and enforcement of producer responsibility schemes ▶ Focus on separate collection of materials ▶ Pay-as-you-throw schemes for waste collection and disposal **Sweden** ▶ Landfill tax ▶ Landfill bans for organic and combustible wastes **Wales** ▶ Recycling targets ▶ Landfill tax ▶ Landfill Allowances Scheme ▶ Government level direction and support in implementing improved waste collection services and treatment infrastructure ▶ Incinerator bottom ash can count towards recycling where proper accreditation can be achieved

Complementing the best practice summary, figure seven compares the performance of England's recycling supply chain against data for the selected countries. These findings suggest that the level of materials segregated by households is the critical factor limiting England's recycling rate relative to higher performance.

Other supply chain efficiencies, including contamination and reject rates, appear to be largely comparable for England and the higher recyclers.

Figure seven · How does England compare with other nations?

Factors considered	Summary of findings
Participation and capture rates	**Dry recyclables** England has a lower capture rate for dry recyclables from household waste compared to other best performing nations. **Organic waste** England's capture rate for organic waste is better than that reported for Sweden and comparable to that for Wales. However, Flanders and Germany have better capture rates. The comparability of the data is limited due to potentially differing arrangements for garden waste management in these nations. *Note: It should be noted that the capture rates are dependent on the underlying household waste composition, which could differ for the nations that have been compared in this study.*
Contamination rates	Reliable information has not been available to enable comparison.
Reject rates	**Materials recycling facilities / Sorting plants** Overall reject rates reported for England appears to be lower than that reported for other nations. However, comparability of data reported for other nations is probably limited. **Composting / Anaerobic digestion facilities** Reject rate reported for England is similar to that reported for other nations.
Policy and regulatory measures	The key policy or legislative measures implemented by England to achieve the current recycling rate include: ▶ National (and local) recycling targets ▶ Landfill Allowance Trading Scheme ▶ Landfill tax England, through its private finance initiative funding schemes, also assisted in delivering residual waste treatment infrastructure to divert residual waste from landfills. England could consider the following to boost its recycling performance: ▶ Implementation of pay-as-you-throw scheme for the collection and treatment of residual waste ▶ Implementation of some form of landfill ban or incineration ban ▶ Support (including funding) to invest in food waste collection schemes and treatment infrastructure ▶ Include incinerator bottom ash, where accreditation is achieved, in overall recycling performance

It is apparent that England lacks strong policy drivers to increase recycling when compared with its high performing European neighbours. The abandonment of the Landfill Allowance Trading Scheme and local authority recycling targets (as previously administered under Best Practice Performance Indicators) has reduced impetus for developing new recycling services.

A caveat to this finding is that one fiscal measure – landfill tax – has significantly tipped the economics of waste management in favour of recycling.

2.4 · England at its best

The context in which England's waste industry operates is notably different to higher performing countries. Economic, demographic and social factors present national and local government with a specific set of challenges when it comes to improving performance.

Significant disparities in waste management performance, and recycling rates in particular, exist across local authorities in England. Consequently, when thinking about the level of recycling that is ultimately achievable, it is important to assess whether these differences can be rationalised in relation to economic, demographic and social characteristics. To test this, a correlation model has been developed to explore the possible determinants of recycling success. Summarised in annex three, this model brings together data from a range of sources including Defra, WasteDataFlow, the Office for National Statistics and the Department for Communities and Local Government.

The analysis reveals that a local authority's economic, demographic and social status are generally poor predictors of its recycling performance. One exception to the findings is the recycling of garden waste; composting rates fall significantly where there is a rise in population density, deprivation and an increase in multi-occupancy dwellings.

This finding is not surprising. Higher population density implies smaller gardens and therefore reduced generation of garden waste. However, as noted in section 2.1, local authority recycling league tables can be distorted when garden waste is included in measuring performance, giving authorities with higher rates of garden waste generation and collections in place an advantage when tonnage-based recycling rates are calculated.

An alternative approach to identifying determinants of waste performance is to group authorities by economic, demographic and social subcategories, and examine whether these factors (for example, deprivation index) influence recycling performance. This approach was used to compile waste performance data to identify the best recycling performance by subcategory for the following variables:

- Office for National Statistics urban classification categories
- Social deprivation levels
- Education levels
- Percentage of multi-occupancy housing stock

Key findings from this analysis are as follows:

Office for National Statistics urban classification categories

Local authorities' ability to achieve high recycling rates was not limited by their Office for National Statistics urban classification. In other words, an urban setting per se did not constrain recycling performance relative to a rural setting.

social deprivation levels

The highest recycling rate reported for local authorities with higher deprivation levels was lower than that reported for local authorities with lower deprivation levels. However, if garden waste was excluded from the arisings, the highest recycling rate for local authorities with higher deprivation levels was comparable to that reported for local authorities with lower deprivation levels.

education levels

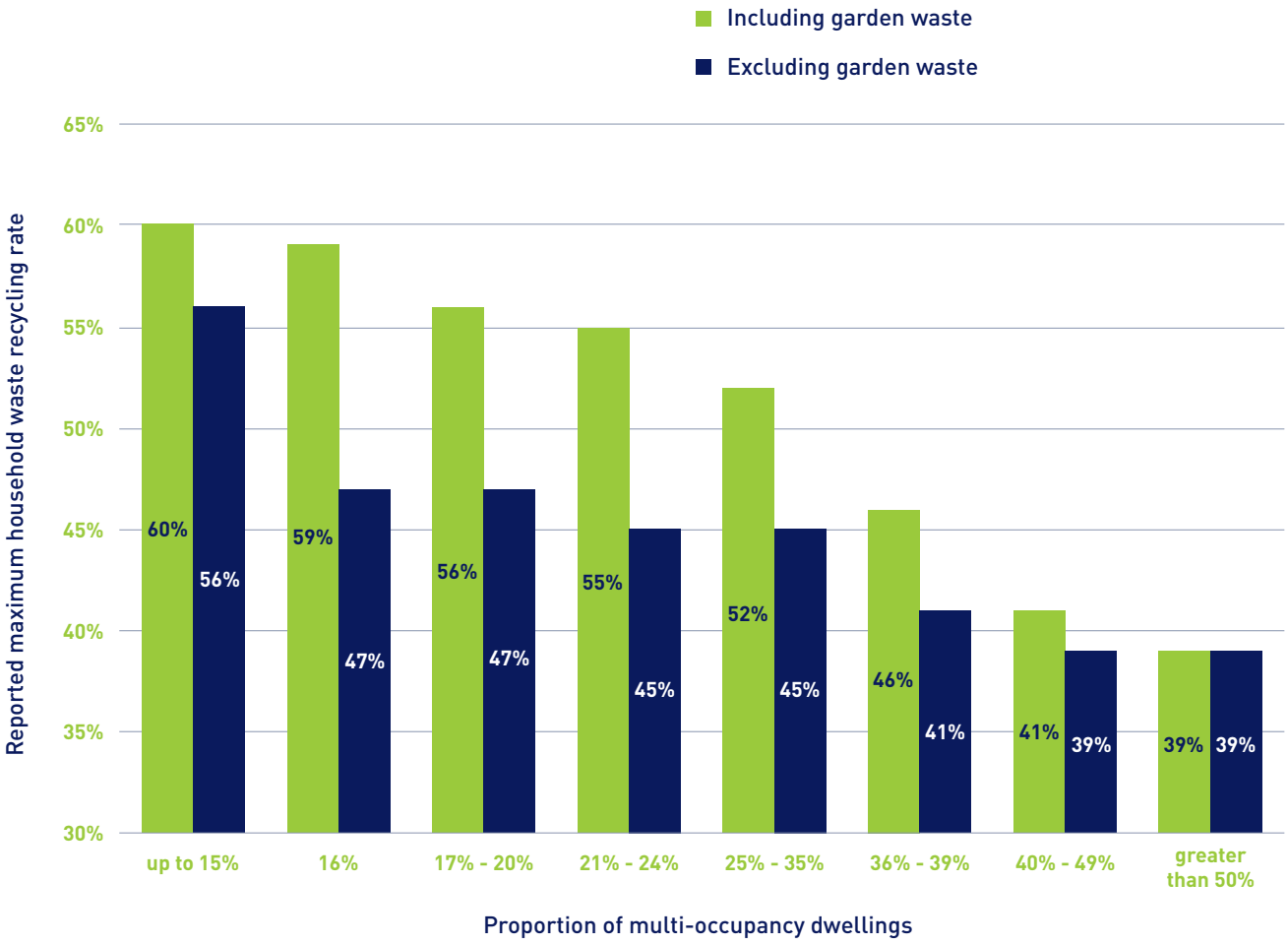
Findings from the analysis suggest that education levels do not limit a local authority's ability to achieve higher recycling rates.

proportion of multi-occupancy dwellings

The proportion of multi-occupancy dwellings within a local authority constrains the maximum achievable recycling rate.

A comparison of the highest recycling rates reported by local authorities within various bandings of proportion of multi-occupancy dwellings is provided in figure eight, which compares scenarios with and without inclusion of garden waste arisings.

Figure eight · Proportion of multi-occupancy dwellings and the corresponding highest reported recycling rates



In summary, while factors such as population density, house ownership (in particular, stability in location), language (a consideration when designing communication strategies) and level of deprivation have some explanatory power in determining recycling rates, the main factor that seems to limit a local authority's ability to achieve high recycling rates is the proportion of multi-occupancy dwellings within a local authority jurisdiction.

An overview of collection schemes implemented by local authorities with high recycling performance, within some of the sub-groupings of the categories mentioned here, is provided in figure nine.

Figure nine · Overview of typical collection schemes implemented by high performing local authorities

Waste stream	Overview	
Dry recyclables	Materials collected by all of the best performing local authorities: ▶ glass ▶ paper and card ▶ plastic bottles ▶ mixed cans	Materials collected by some of the best performing local authorities: ▶ aerosols ▶ foil ▶ mixed plastics ▶ batteries ▶ textiles ▶ composites
	The collection arrangements implemented by local authorities varied and showed no clear pattern or preference regarding single stream or multi-stream collection. There was also no pattern regarding the frequency of collection.	
Garden waste	Most of the best performers collect garden waste separately in wheeled bins. Typical frequency of collection is fortnightly. The service is provided free to residents.	
Food waste	Best performing local authorities typically collected food waste separately and on a weekly basis. Kitchen waste caddies were provided, but some (e.g. Bromley and North Somerset Council) achieved high recycling rates without providing free caddy liners. Some of the local authorities with high capture rate of food waste recycling (e.g. Kingston-upon-Thames, Bromley and Southend-on-Sea councils) provide food waste collection service for flats as well.	
Residual waste	Mostly residual waste is collected in bins on a fortnightly basis. London Borough of Bromley, the unitary authority with the highest food waste recycling rate, offers a fortnightly sack-based collection for residual waste. This approach might have assisted the Council in achieving high capture rates for food waste. Another of the unitary authorities with a high recycling rate for food waste, Southend-on-Sea Borough Council, also provides a sack-based weekly collection of residual waste.	

A recent study by WRAP[12] has also analysed the UK's recycling performance with respect to the factors affecting the variability in recycling rates. This study differs from WRAP's in the following ways:

- The present study utilised more recent data (2013/14) compared to WRAP (2012/13).
- The present analysis encompassed the entire supply chain, whereas the WRAP study is confined to kerbside collected recycling.
- The present study focused on unitary authorities and waste disposal authorities recycling rates, whereas the WRAP study focuses on waste collection authority and unitary authority kerbside recycling levels.

The WRAP analysis elicited a correlation between deprivation rates and recycling levels. This study also observed a correlation, which disappeared when garden waste was excluded from the recycling calculations. As a result, the present study identifies the proportion of multi-occupancy dwellings as one of the main factors influencing the capture of recyclables from households. The WRAP analysis regards both these factors as contextual and outside what local authorities can do to improve recycling rates.

12 WRAP. Analysis of recycling performance and waste arisings in the UK 2012/13. Project RCY016, July 2015.

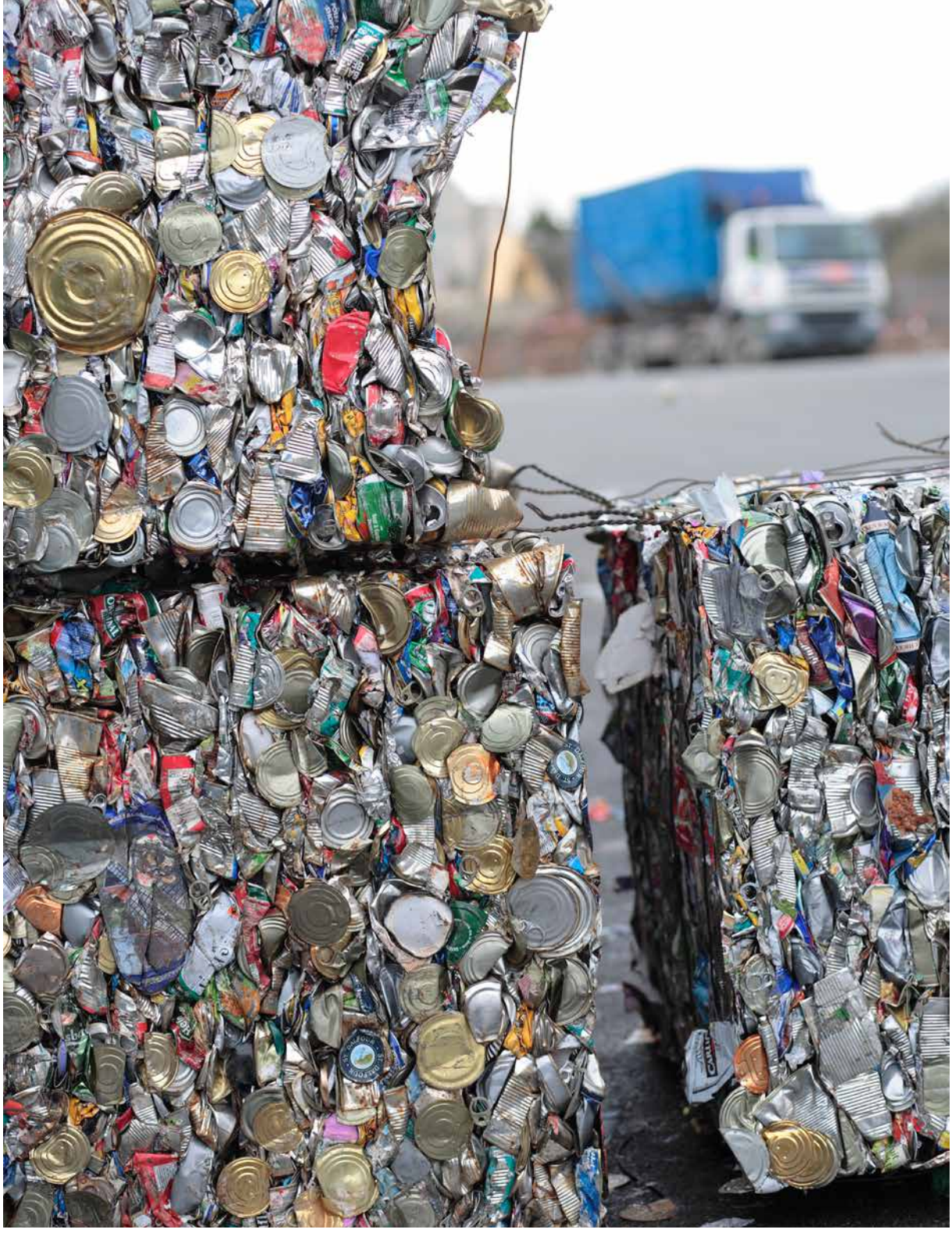
2.5 · England at its optimum

As shown previously, England's local authorities can be grouped by economic, demographic and social subcategories, allowing a comparison of recycling performance. This approach demonstrates that the proportion of multi-occupancy dwellings and other factors in a local authority area may constrain the recycling rate that is achievable.

Using the same data set, it is also possible to estimate the recycling rate which may be achievable in England. The methodology applied is as follows:

- For each sub-category (for example, the proportion of multi-occupancy dwellings in figure eight) the best performer is identified.
- It is then assumed that within each subcategory, all remaining authorities increase their recycling rate to match the best performance.
- Taking a weighted average of the best case local authority level recycling rates provides an estimate of the optimal recycling rate for England as a whole.

Figure 10 · Potential future recycling performance



The maximum recycling rates indicated in figure 10 are averages and allow for variations between individual authorities in response to constraints imposed by the proportion of multi-occupancy dwellings only. For example, individual local authority contributions to the average household recycling rate of 56 per cent (inclusive of garden waste, but excluding incinerator bottom ash) vary between 39 per cent and 60 per cent.

In figure four, the most inefficient supply chain stage of the English household waste recycling supply chain is the household participation and capture rates. Once captured, operational efficiencies of recycling and reprocessing facilities are second to none across Europe.

It is clear that more needs to be done to maximise capture of recyclables within the home. This will require efforts by householders, local authorities (and their contractors) and national government.

section three

a re-focus on targeting value

Section two of this report analysed the current approach to managing England's household waste and identified the barriers, success factors and the main areas for improvement. Throughout, recycling performance has been expressed in terms of the prevailing tonnage-based target-setting and reporting system.

While tonnage-based targets have hitherto driven waste management practices and together with other policy instruments, such as landfill tax, have helped move waste up the waste hierarchy, policymakers are studying their ongoing relevance in the light of other potential ways of target-setting.

In section three, this report addresses the ongoing suitability of tonnage-based accounting of recycling performance. In particular, the following issues are addressed:

- A brief overview of the development of tonnage-based waste performance measures in European legislation to date (section 3.1).
- A review of some alternative approaches to measuring the value delivered by waste management (section 3.2).
- In conclusion, a discussion of the efficacy of increasing tonnage-based recycling targets beyond existing levels (section 3.3).

3.1 · an overview

Europe's approach to waste management has changed significantly over the last two decades. There has been a major shift from a landfill dominated industry to one characterised by increasing levels of recycling and energy recovery. Much of this change has been driven by European legislation. Three EU directives stand out as having the greatest impact on recycling performance:

- The Landfill Directive (1999/31/EC)
- The Waste Framework Directive (WFD – 75/442/EEC and 91/156/EEC)
- The revised Waste Framework Directive (rWFD - 2008/98/EC)

The EU Landfill Directive sets targets to reduce quantities of biodegradable municipal waste sent to landfill to reduce emissions of the powerful greenhouse gas methane.

The Waste Framework Directive, introduced in 1975 and subject to a number of amendments, lays down overarching legislative requirements for managing waste. The revised Waste Framework Directive, adopted in 2008, simplified the existing legislation, further encouraging re-use and recycling, including the requirement for recycling of 50 per cent household waste by weight, by 2020.

The Landfill Directive and the revised Waste Framework Directive have been central to waste policy in England.

3.2 - defining value

The legislation referenced in section 3.1 has focused on challenging tonnage-based targets for diversion of (biodegradable) waste from landfill and materials recycling. As a consequence, European waste management practices have changed dramatically over the last 15 years, with recycling targets, calculated as a proportion of waste arisings, used universally across Western Europe as a primary measure of waste management system performance. These targets have transformed waste practices, resulting in substantial sustainability benefits. Annex four highlights this point, tracing the historical role that recycling targets have played in the evolution of England's waste management sector.

With the concept of the circular economy now driving policymaking in waste management, the emphasis has shifted from legislation designed to avoid harm (such as the Landfill Directive) to legislation designed to extract value from waste with the accompanying realisation of environmental and economic benefits – in other words, treating waste as a secondary resource.

In this context, there is a case for examining alternative metrics and targets for waste management performance to fully recognise and quantify these benefits. Examples include approaches focusing on energy, monetary value and climate change impact (expressed as carbon dioxide equivalent / CO_2e). A number of these alternative approaches to measuring the 'value' of waste management are outlined in figure 11.

Given the range of materials in household waste, the choice of the 'value metric' used may have implications for the materials which are prioritised for recycling. This issue is explored in figure 12, which compares four alternative methods of materials prioritisation:

tonnage-based prioritisation

Accounting for the proportion contribution by weight of each material to the total household waste arising.

avoided energy use

This method considers the energy savings achieved by recycling. For each material, the energy saving associated with the recycling of material present[13] in one tonne of household waste is calculated.

avoided CO_2e

Here, the carbon saving achieved by recycling is estimated[14], again accounting for the quantity of material present in one tonne of household waste.

monetary value

On the basis of current median materials prices, the value of material content of one tonne of household waste is estimated.

Materials can be ranked in order of priority under each of the methods considered (**green highlighted rows** in figure 12).

For individual materials, tonnage-based prioritisation provides a significantly different order of priority when compared to the other approaches. Orders or prioritisation suggested by the three non-tonnage-based value metric approaches have a degree of commonality:

- Consideration of avoided energy use, and avoided CO_2e, leads to the same top three materials (plastics, metals, and textiles as highlighted).
- When prioritising on the basis of monetary value, it is notable that plastics and metals again rank in the top three.

Much of the carbon avoidance achieved by recycling is ultimately due to the reduction in energy use compared to the use of virgin materials in the production or manufacturing process. As such, these two metrics can be expected to be largely correlated. Similarly, because manufacturers use recycled materials partly to achieve energy savings, the price of recyclables correlates with the energy saving.

13 http://epa.gov/climatechange/wycd/waste/downloads/Energy%20Savings.pdf
14 Carbon factors are sourced from the Waste and Resources Assessment Tool for the Environment (WRATE).

Figure 11 · Alternative measurements of the value of waste management

Waste management value metric	Overview
Tonnage-based	The existing dominant approach, exemplified by recycling targets which focus on the proportion of material recycled, measured on a mass balance basis.
Climate change impact	Typically measured in terms of 'carbon' or, more specifically, carbon dioxide equivalent (CO_2e) calculated as a weighted combination of all greenhouse gases. Within England, the Greater London Authority has embraced this approach[15], in the form of an Emissions Performance Standard (EPS – an overall target for CO_2e generated by waste management) and carbon intensity floor (which sets minimum carbon standards for energy from waste). Defra has also published a carbon metric for England as a whole[16] indicating that management of local authority collected waste avoided 4.3 million tonnes CO_2e in 2011/12. Defra has proposed incorporating local authority level carbon metric reporting within WasteDataFlow, though the timescale for implementation is unknown.
Energy	An energy-based metric could account for energy recovery (for example, from residual waste via incineration, or anaerobic digestion) as well as energy use avoided by recycling (substituting virgin materials in manufacturing typically significantly reduces energy requirements – aluminium having the greatest benefit in this regard). Notably, renewable energy generation and avoided energy use is a primary factor in avoiding carbon emissions – as such carbon and energy metrics are closely correlated. Indeed, the Green Investment Bank uses 'green energy' as one of the key considerations when assessing potential investment decisions.
Monetary value	The economic viability of recycling is underpinned by the price of recyclable materials. Given that monetary value is a significant motivator and enabler for recycling, it could be argued this would be the most straightforward metric. The counter to this is price volatility and fluctuation which may render targets based on this metric counter-intuitive from one year to the next.
Employment generation	Policy makers and pressure groups often cite employment generation as a significant benefit of recycling, and re-use in particular. The focus in quantifying these benefits is often 'local' employment at authority or regional level. A true 'net' employment generation metric would have to also consider the loss in employment generation from extraction and processing of virgin materials, as well as other forms of waste management further down the waste hierarchy.
Resource use	Stewardship of resources is often cited as a strong motivator for recycling. Taking the case of solid resource use (including mineral and natural products) as distinct from use of energy resources, it would be possible to quantify resource depletion avoided by recycling. In designing a metric, recyclables containing more scarce materials (for example, waste electrical and electronic equipment with precious and rare earth metal content) could be prioritised.

15 https://www.london.gov.uk/priorities/environment/putting-waste-good-use/making-the-most-of-waste
16 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/142019/Carbon_Metric_-_final_published.xls

Figure 12 · Impact of value metric on materials prioritisation

Prioritisation metric		Paper	Plastics	Glass	Card	Metals	Textiles	Food waste
Tonnage data	Proportion of English household waste arising	16%	10%	7%	5%	4%	3%	18%
	Rank based on composition	2	3	4	5	6	7	1
Avoided energy use	Energy saving per tonne of material recycled (GJ/tonne)	11	63	3	18	67	123	0.001
	Energy saving per tonne of household waste, accounting for material content (GJ)	1.8	6.0	0.2	0.9	2.9	3.6	0.0
	Rank based on energy saving	4	1	6	5	3	2	7
Avoided CO_2e	CO_2e saving per tonne of material recycled (CO_2e/tonne)	0.30	0.92	0.16	0.06	3.44	4.37	0.16
	CO_2 saving per tonne of household waste, accounting for material content (tonnes CO_2e)	0.05	0.09	0.01	0.003	0.15	0.13	0.03
	Rank based on CO_2e saving	4	3	6	7	1	2	5
Monetary value	Price per tonne of material recycled (£/tonne)	74	145	14	64	239	275	-28*
	Revenue per tonne of household waste, accounting for material content (£)	12	14	1	3	10	8	-5
	Rank based on monetary value	2	1	6	5	3	4	7

* Excluding energy and nutrient value

3.3 - beyond 50 per cent recycling

While acknowledging the overall positive impact of tonnage recycling targets, it is important to consider – when setting new waste management targets – whether a higher recycling target would continue to improve resource efficiency and value. Figure 13 shows how choosing carbon / climate change, energy security or monetary value as alternative metrics may lead to significantly different conclusions.

The potential disparity between tonnage-based recycling targets and other value metrics can be explored by looking at data for specific local authorities. Taking the case of a high performing recycler and a lower performer, the scaling between recycling rate and value metric can be tested. Taking an extreme case, the following two authorities can be compared:

Calderdale

The highest performing unitary authority reporting a 60 per cent recycling rate in 2013/14.

Tower Hamlets

One of the lower performing unitary authorities, with a recycling rate of 28 per cent in the same year.

Using information recorded in WasteDataFlow, combined with the latest (January 2015) material prices, it is possible to estimate the value realised by these authorities per tonne of household waste collected. These calculations are summarised in figure 13, which separately considers the value and costs for dry recyclables, organics and remaining residual waste.

The following conclusions can be drawn from these illustrative results:

- Despite achieving double the recycling rate of Tower Hamlets, Calderdale only realises a marginal increase in revenue for dry recyclables (£25/tonne, compared to Tower Hamlets' £21/tonne).
- When the cost of organic waste disposal is taken into account to produce a net income for recyclables, Tower Hamlets actually achieves a greater revenue per tonne (£21/tonne, compared to Calderdale's £20/tonne).
- However, after deducting the cost of residual waste disposal (indicatively set at £80/tonne, assuming a competitive energy-from-waste facility), Calderdale ultimately still achieves a lower net cost (-£14/tonne compared to Tower Hamlets' -£36/tonne).

In annex five, this approach is generalised to a comparison of recycling rate and materials value for all 91 unitary authorities in England. As might be expected, when accounting for this full dataset, there is a general correlation of monetary value with percentage of material recycling. However, the relationship is far from straightforward. At a given recycling rate, the monetary value of materials collected by local authorities can vary dramatically.

While the findings include a significant element of estimation[17], they highlight the potential disparities between simple tonnage-based recycling performance and alternative value metrics (in this case, monetary value).

These findings underline the need for policy makers to discuss and agree on the most important value metric required for managing waste. Once this metric is identified, the judgement can be made as to whether tonnage-based targets still provide a valid proxy for recycling performance.

17 For example, the composition of recyclables sent by Tower Hamlets for materials recycling facility sorting uses generic data. For simplicity, the estimates exclude the cost of collection, which will vary significantly by material type.

Figure 13 · Monetary value from household recyclables – local authority comparison[18]

			Calderdale MBC		Tower Hamlets LB	
Material		assumed material price (£/t)	recycled materials as a proportion of household waste	value per tonne of household waste	recycled materials as a proportion of household waste	value per tonne of household waste
Food waste		-28	6%	-2	0%	0
Garden waste		-20	9%	-2	1%	0
Other organic		-20	6%	-1	0%	0
Paper		74	9%	6	10%	7
Card		64	1%	1	3%	2
Glass		14	11%	1	4%	1
Metals		239	5%	12	3%	8
Plastics		145	3%	5	2%	3
Textiles		275	0%	1	1%	2
Wood		-34	5%	-2	3%	-1
Waste electrical and electronic equipment		0	1%	0	0.2%	0
Hazardous		0	0.022%	0	0.004%	0
Sanitary		0	0%	0	0%	0
Furniture		0	0%	0	0%	0
Mattresses		0	0%	0	0%	0
Miscellaneous combustible		0	0.1%	0	0.1%	0
Miscellaneous non-combustible		0	1%	0	0.4%	0
Soil		0	0%	0	0%	0
Other wastes		0	0%	0	0%	0
Fines		0	0%	0	1%	0
Remaining residual waste		-80	42%	-34	71%	-57
Total proportion of household waste recycled			**58%**	—	**29%**	—
Monetary value (or cost, shown as -ve) per tonne of household waste (£)	Organics value		—	-5	—	0
	Dry recyclables value		—	25	—	21
	Net value of dry recyclables / organics		—	**20**		**21**
	Net value, inc. residual		—	**-14**	—	**-36**

18 Materials recycling estimates are based on interpretation of information recorded by local authorities in WasteDataFlow. Estimated overall recycling rates differ marginally from those reported by Defra.

section four

summary

Sections two and three explored a range of issues impacting the rate of recycling and recycling performance definitions in England. This section provides a summary of findings and focuses on critical factors which are essential to the development of England's waste management sector.

losing value in households

Beginning with England's recycling supply chain, the majority of 'losses' of recyclable materials still occur in the home. Only 42 per cent of household waste is segregated at source as recyclables, while other supply chain losses are relatively minimal. This source segregation rate is much lower than levels achieved in the best performing European countries (including Germany, Belgium and Sweden). Recycling rates are particularly low for the following materials:

- food (~10 per cent recycled)
- plastics (~15 per cent recycled)
- textiles (~16 per cent recycled)

poor material capture

For these recyclable materials, England's local authorities still only provide a limited proportion of households with collection systems. This is a large factor in explaining the relatively low recovery rates achieved. However, it is also apparent that for some materials with near-universal collection arrangements – including metals and paper – recycling rates are significantly below optimum levels.

an efficient supply chain

Moving further down the supply chain, losses are much less significant:

- An average of nine per cent of materials recycling facility inputs are rejected.
- Typical anaerobic digestion / in-vessel composting rejects are less than one per cent.
- The rate of rejection of materials by reprocessors is relatively low, with rejects at estimated at 0.4 per cent of dry recyclables.
- Recyclables recovered from residual waste (excluding incinerator bottom ash) currently contribute an estimated two per cent to household recycling.
- While optimisation of materials quality remains a priority, these results confirm that collection service provision and householder behaviour are the main barriers to improving England's recycling performance.

housing mix and multi-occupancy dwellings

A factor strongly influencing local authorities' recycling performance is their mix of housing types. In particular, the proportion of multi-occupancy dwellings appears to limit the recycling rate which councils can achieve. If authorities are grouped into bands having similar proportions of multi-occupancy dwellings, the maximum recycling per group is found to decrease as the multi-occupancy proportion increases.

In contrast, other indicators (including social deprivation, urban classifications and education levels) do not seem to have as strong an influence, especially if garden waste recycling is not considered.

garden waste distorting comparisons

At present, garden waste contributes substantially to local authorities recycling performance. Authorities with low population density (and hence presumably larger gardens) tend to achieve significantly higher recycling rates than more urban authorities. It might be argued that the lack of garden space (and hence of garden waste) place some authorities at an 'unfair' disadvantage, distorting recycling league tables.

England at its optimum

Taking into account the constraint imposed by multi-occupancy dwellings in authorities across England, it is possible to estimate the maximum recycling rate which can be achieved by England as a whole. An optimum English household waste recycling rate of circa 56 per cent may be reached by adopting this approach.

This rate reduces to 49 per cent if garden waste is excluded from the calculation, but rises to about 64 per cent if incinerator bottom ash is included in overall recycling performance. Achieving such optimum rates would require a focused effort on maximising recycling yields from multi-occupancy dwellings.

other best practice

Turning to high performing recyclers in the European Union, a best practice review shows that Belgium, Germany and Sweden have more demanding waste legislation than are currently in place in England. Examples include pay-as-you-throw schemes (where householders are charged for collection of non-recyclable residual waste according to weight or volume), and landfill / incineration bans for some materials.

targeting 'value'

While the above observations include a number of factors currently constraining the proportion of England's household waste tonnage recycled, a broader question is whether this tonnage-based accounting remains the best approach to measuring England's recycling performance.

This report examined a number of alternative approaches to measuring the value of waste management. Possible 'value metrics' considered include carbon impact, avoided energy use, monetary value and resource efficiency.

High level calculations demonstrate that the choice of metric has a significant impact on the materials that are prioritised for recycling. Taking the specific case of monetary value into account, the findings show that local authorities can perform well by focusing on the right mix of materials in spite of achieving relatively low levels of recycling in tonnage terms.

Another alternative to potentially complex indicators would be to implement a landfill and / or incineration restriction on recyclable materials. However, strict enforcement and monitoring will be required for such bans to be effective in maximising recovery of useful resources from waste.

section five

recommendations

The findings summarised in section four demonstrate the challenges involved in increasing England's recycling rate and introduces the possibility of alternative value metrics for recycling performance. Section five draws on these findings and sets out recommendations for optimising England's waste management performances.

Recognising the importance of a whole supply chain approach, these recommendations are collated under headings for each recycling supply chain stage. Actions for national government, local government and the waste sector are then summarised in separate subsections.

While most recommendations apply to a specific supply chain stage, some have relevance to the chain in its entirety. These overarching issues, including the issue of value metrics, are discussed separately in the final part of this section.

5.1 · households / collection systems

national government

Implementation of pay-as-you-throw schemes

European countries with higher recycling performance typically operate pay-as-you-throw schemes, under which households are charged by weight or volume for residual waste collected[19] and recyclable materials are collected without charge. This approach provides a strong financial incentive for householders to recycle.

A mandatory requirement for separate collection of food waste

Only around 10 per cent of food, one of the largest contributors to household waste arisings, is currently segregated for recycling. A similar requirement could be introduced for other materials having low recycling rates. For example, these could include mixed (non-bottle) plastics, and textiles.

local government

Universal access to consistent recycling services

Outside the home, local authority recycling services in general are still fairly limited. Availability of recyclables receptacles on streets, shopping centres and in the workplace would reinforce recycling behaviour.

The rate of rejection of materials by reprocessors is relatively low, with rejects estimated at 0.4 per cent of dry recyclables.

Recyclables recovered from residual waste (excluding incinerator bottom ash) currently contribute an estimated two per cent to household recycling.

While optimisation of materials quality remains a priority, these results confirm that collection service provision and householder behaviour are the main barriers to improving England's recycling performance.

Regular and consistent communications

It is crucial to ensure householders fully understand collection arrangements in order to optimise material yields from recycling services. Frequent, targeted communications on schemes offered will ensure that new residents will be able to use schemes and also maximise segregation by long-term residents.

Focus on improving recovery of recyclables from flats and multi-occupancy dwellings

Despite the challenge posed by recycling collections for these properties, some local authorities with a high proportion of these housing types have achieved relatively high recycling rates. Best practices from these authorities (as well as relevant examples elsewhere in Europe) should be reviewed and considered for implementation. In the case of new-build properties, developers can assist by providing space for the separate storage of recyclable materials, ensuring straightforward access for collection operatives.

Decrease the frequency of residual waste collection

Residual waste can potentially be collected fortnightly or even monthly if a weekly food waste collection service is implemented. While a controversial issue, reductions in the frequency of residual waste collections have the potential to increase participation and capture – particularly for the case of food waste, where segregation rates are generally low.

Free collection of garden waste from households

Local authorities with the highest recycling rates typically provide a kerbside collection service for garden waste. If simple tonnage-based accounting of recycling rates is to remain the main driver, then there is a strong case for all authorities to introduce this service.

19 A caveat to this recommendation is that Wales has recently reported recycling rates comparable to that of the best performing EU member states without a pay-as-you-throw scheme in operation.

Consistency in the type of materials collected from households for recycling

All English local authorities may be encouraged, by legislative or non-legislative means, to extend the recycling collection service from all households to include collection of materials such as mixed plastics, textiles, food waste, aerosol cans, foil, batteries and composites.

Strong partnership working between local authorities and the waste industry, with allowance for flexibility in contractual conditions

Local authorities and their waste management contractors must collaborate to introduce the changes required to increase recycling rates. Where new collection contracts are procured, it is important that contract terms allow for some flexibility in the service provided, including material types and collection methods.

5.2 · sorting and treatment

local government and waste industry

Continuing effort to minimise contamination through communications and enforcement

Waste facility operators should continue to provide local authorities with information on contaminants. Regular, clear communications to householders, combined with enforcement, will help reduce levels of contaminants.

5.3 · residual waste treatment

national government

Accounting for incinerator bottom ash as part of recycling performance definitions

Where incinerator bottom ash has been recycled, with approval from the Environment Agency, Defra may wish to include this as part of recycling performance calculations.

Develop an appropriate measurement and system for re-use

The disparate re-use outlets need to be consolidated around a common reporting system.

local government

Treatment contracts should be structured to incentivise the capture of recyclable materials

As the use of landfill decreases and greater quantities of residual waste are sent to treatment, the potential residual waste treatment contribution to recycling increases. New contracts should look to best practice in capture of recyclables from residual waste.

5.4 · disposal

Restrictions on the disposal of recyclable materials to landfill

While some of the best performing European countries tend to operate landfill (and in some cases incineration) bans and restrictions to promote recycling and investment in recycling facilities, this approach will require significant regulatory and enforcement changes that need to be carefully assessed before such measures are introduced in England.

5.5 · overarching issues

Clear policy framework with long-term certainty

To significantly improve recycling performance, England's waste industry requires a clear policy framework to create long-term certainty. Arguably, waste management targets in Wales and Scotland mean these countries have a much clearer direction of travel than England does.

Central government waste management funding support

In the current climate of austerity, local authorities will struggle to invest in improvements to recycling services without additional financial support. It may be necessary to use targeted national government funding for new schemes to break this impasse.

Focus on product design stage to increase reusability and recyclability of products

The EU may consider implementing legislation that requires manufacturers to improve reusability and recyclability of the products they place on the market, extending measures that currently apply to electronic and electrical items to a wider range of products. One example of this work is the REFLEX project, which seeks to enable recycling of flexible plastic packaging through changes to materials and designs.

Mandatory recycling targets at local authority level

Local authority recycling targets have previously been effective in improving performance and increasing England's overall recycling rate. Reintroducing this approach would create a powerful impetus for further improvement. However, consideration should be given to varied recycling rates for local authorities – potentially to account for distortions created by garden waste arisings and the challenge presented by multi-occupancy dwellings.

Consistent EU-wide approach in calculating and reporting recycling performance

Currently, member states are allowed to choose from four methodologies to calculate and report recycling rate. Dependent on the methodology chosen, the calculated recycling rate can vary significantly. The government should encourage the EU to develop a single, consistent approach to create a level playing field.

Debate on the most appropriate future metrics for waste management performance

While tonnage-based recycling rate targets have played a pivotal role to date, this report highlights the need to consider alternative value metrics.

When compared to simple tonnage-based recycling rates, other value metrics may lead to substantially different conclusions on recycling system performance. The choice of metric will therefore strongly influence the direction of development of England's waste management system.

Given England's existing waste policy gap and absence of EU targets beyond 2020, there is an urgent need for discussions on this issue at national and EU level.

conclusion

The immediate priority for England is to ensure we achieve the European Union target of 50 per cent re-use and recycling of household waste by 2020. For this reason, England must accelerate its year-on-year performance, which has slowed to increments of about 0.1 per cent per year for the past three years, culminating in a re-use and recycling rate of 45 per cent for 2013/14.

We have selected the 'top five' actions that we believe can make the greatest impact in the period leading up to 2020.

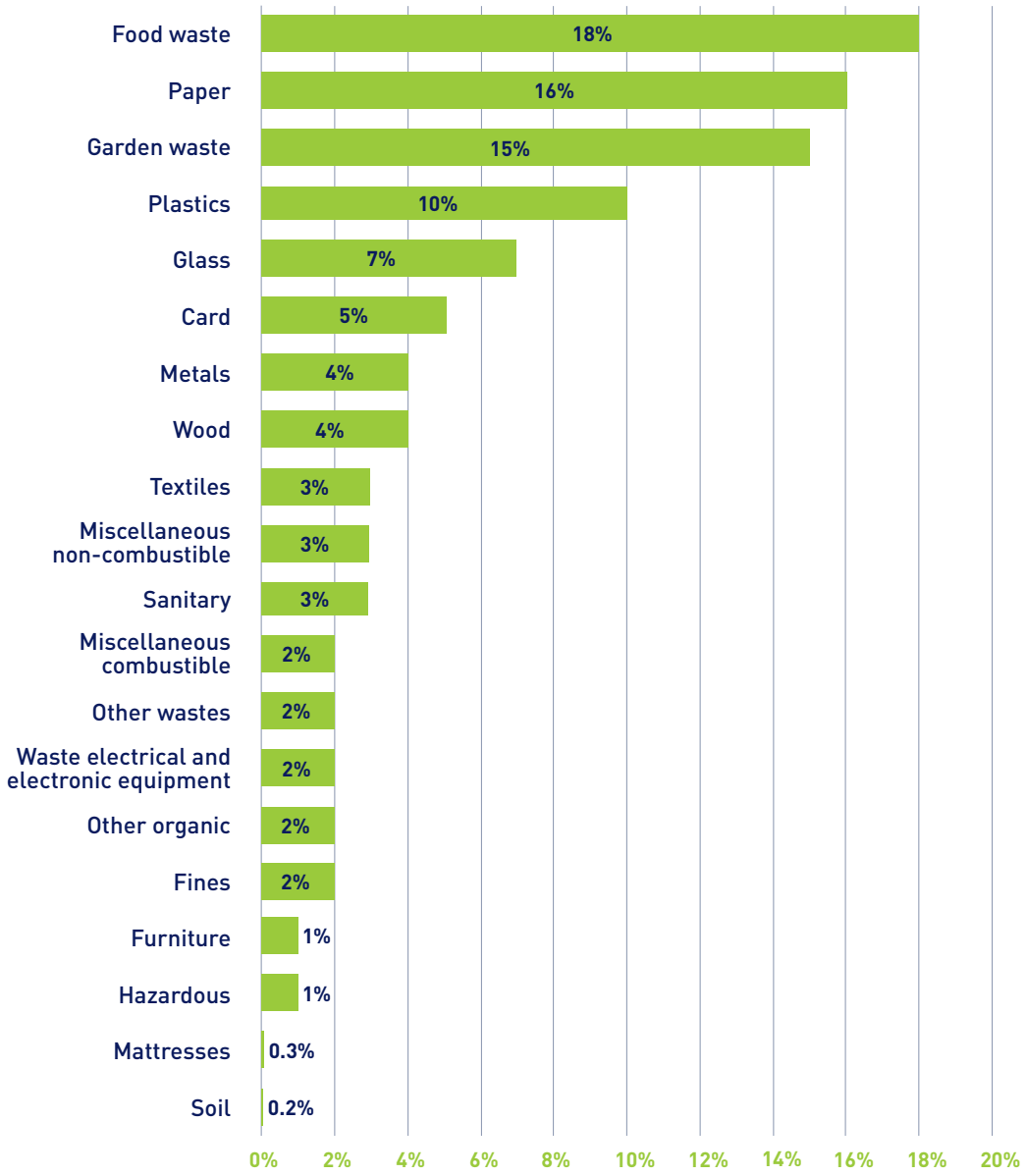
Action	indicative uplift in recycling for authority adopting scheme	proportion of English authorities assumed to be impacted	net impact on England's household waste recycling rate	Approach to estimation
1 Make separate collection of food waste a mandatory universal service with a weekly collection frequency. Reduce the collection frequency of dry recyclables and residual waste to two-weekly or longer intervals.	6%	50%	3%	Uplift in recycling for authorities introducing schemes is estimated on the basis of WRAP data. An estimated ~50 per cent of authorities have food schemes – mandatory food collection would mean schemes for remaining authorities.
2 Reintroduce re-use and recycling targets at local government level, but with a properly costed and funded ring-fenced settlement from central government.	—	—	—	No reliable evidence basis to estimate the impact of this intervention.
3 Introduce pay-as-you-throw as a means of encouraging more sustainable waste management practices on the part of householders.	12%	25%	3%	An estimated 12 per cent from data for Ghent and Destelbergen, Belgium. Political factors could constrain take-up to 25 per cent of authorities.
4 Maintain strong communication programmes with householders, especially in challenging service situations (rental accommodation, student and itinerant populations, etc).	3%	75%	2%	Communications campaigns may increase participation by five per cent. Assumed 60 per cent of material capture by households would provide a three per cent overall increase in recycling. Then assumed 25 per cent of authorities already have communications in place, such that improvements to communications then applies to remaining 75 per cent.
5 Task Defra and the Environment Agency with developing a protocol to identify acceptable uses of incinerator bottom ash that can legitimately be counted towards England's recycling performance.	—	—	4%	Based on total incinerator bottom ash recycling reported for England in WasteDataFlow for 2013/14.

annex one

changing waste composition

Annex one considers the range of factors which may influence the composition of household waste generated in England. The latest comprehensive household waste composition data for England is for financial year 2006/07, summarised in figure 14. Materials are listed in descending order of their proportional contribution to the total household waste arisings. Food waste makes the greatest contribution to household waste arisings, followed by paper and garden waste.

Figure 14 · Household waste composition



Proportion of English household waste (Defra data for 2006/07)

The composition of household waste is likely to have changed since 2006/07 and will continue to evolve over the next 15 to 20 years. Potential factors influencing composition are explored in figure 15. For each material, upward and downward pressures on material arisings are itemised.

Figure 15 · Review of potential factors influencing future household waste composition change in England

Category	Current proportion in household waste	Influencing factors Pressure towards increase?
Food waste	18%	▶ Increase in households cooking meals from raw ingredients.
Paper	16%	—
Garden waste	15%	—
Plastics	10%	—
Glass	7%	▶ Further shift towards consumption of alcohol at home.
Card	5%	▶ Further expansion in online shopping. ▶ Use of mini Tetra Paks instead of food tins.
Metals	4%	—
Wood	4%	—
Textiles	3%	▶ Textiles currently sold to local merchants re-enter household waste stream if textile values decline.
Miscellaneous non-combustibles	3%	▶ Dependent on individual components.
Sanitary	3%	▶ Increase in the number of elderly people being looked after at home.
Miscellaneous combustibles	2%	▶ Dependent on individual components.
Other wastes	2%	▶ Dependent on individual components.
Waste electrical and electronic equipment	2%	▶ Continuing increase in use of electronic devices. ▶ Less durable products.
Other organic	2%	▶ Dependent on individual components.
Fines	2%	▶ Dependent on individual components.
Furniture	1%	▶ Potential economic growth resulting in more households replacing furniture more frequently.
Hazardous	1%	▶ Dependent on individual components.
Mattresses	0.3%	—
Soil	0.2%	—

Pressure towards decrease?
Food waste minimisation efforts.
Increasing use of electronic media. Potential decline in direct mail advertising, free newspapers, paper bills and personal mails.
Possible removal of some local authority free garden waste collection services as a cost saving measure. Newer properties being built with smaller gardens.
Reduction in film use due to plastic bag charges. Possible shift towards greater use of bio plastics. Light-weighting of plastic packaging. Increased uptake of refill systems (e.g. milk bags instead of milk bottles).
Increased uptake of refill systems (e.g. coffee refill packs instead of coffee jars). Potential decline in household alcohol use following health awareness campaigns comparable to that of smoking. Increased use of plastic instead of glass for product packaging.
—
Use of mini Tetra Paks instead of food tins. Households sell metals to local merchants.
Local authorities discouraging acceptance of wood waste at household waste recycling centres. Reduction in the number of households with larger gardens.
Households sell textiles to local merchants if values increase. Waste minimisation efforts at household and retailer levels (e.g. M&S 'shopping' scheme).
Dependent on individual components. Local authorities discouraging acceptance of inert materials at household waste recycling centres.
Decline in the number of babies born.
Dependent on individual components.
Dependent on individual components.
Retailers and other licensed facilities may offer convenient take-back schemes for waste electrical and electronic equipment. Some may even choose to offer price reductions on new electronic equipment in return for older equipment. 'Lease instead of own' schemes may become popular. More durable products.
Dependent on individual components.
Dependent on individual components.
Further expansion of community re-use initiatives.
Dependent on individual components.
Weight reduction due to use of 100% mattresses in preference to sprung. Third sector organisations expanding collection of mattresses from households.
Local authorities discouraging acceptance of soil at household waste recycling centres.

There is significant uncertainty regarding the proportion of the currently dominant materials in the future household waste composition. Other factors adding to such uncertainties and generally applicable to all waste streams include:

- Replacement of materials in their current applications due to obsoleteness of the application or invention of new materials (e.g. graphene, bio-plastics).
- Legislative and product design changes.
- Economic growth and impacts on real household disposable income.
- Demographic changes (e.g. changes in household size).
- England's (and European Union's) relative influence at a global level to influence product design and resource security.
- Commodity prices.
- Energy demand and price.
- Waste technology development.
- Increased urbanisation and high density living.

As household waste composition is dependent on several parameters with significant uncertainty and several interdependencies, it is not possible to project future composition with any useful level of confidence.

The ability to achieve a specific recycling target (e.g. 50 per cent or higher) is clearly dependent on the continued availability of recyclables within the household waste stream. On this basis, it may be argued that beyond a 50 per cent recycling target, additional recycling levels should be a function of the recyclable content of household waste and therefore may vary from country to country and even region to region.

annex two

recyclables supply chain – detailed material analysis

Annex two summarises estimated English household waste recycling by materials category and recycling scheme type.

Figure 16 shows the flow of household waste tonnages (expressed in thousands of tonnes per year). Starting with the total arising of household waste in 2013/14 (on the left hand side), figure 16 demonstrates the recycling of each material by scheme type (for example, segregated kerbside dry recyclables, commingled, bring, etc) and also recyclables rejects.

The proportion of materials managed by each scheme type is then illustrated in figure 17. Accounting for all types of recycling, the final two columns of the table show the net proportion of material recycled, and the consequent proportion remaining in the residual waste stream. The lowest net recycling rates achieved are for food, plastics and textiles.

These low recycling rates can be rationalised as follows:

food

Coverage of English households by food waste collection services is still relatively low. WasteDataFlow records indicate that in 2014, 22 per cent of households in England were served by a food waste collection (notably up from an estimated 15 per cent in 2011).

plastics

WRAP recycling scheme data suggests that 97 per cent of English households are served by a recycling collection for plastic bottles. However, the proportion of households served by mixed plastic collections (i.e. including non-bottle rigid plastic packaging, such as pots, tubs and trays) is lower, at 57 per cent. Plastic film collections do not exist on any notable scale (though the tonnage of film is in any case likely to be small). The absence of collections of non-bottle plastics is likely to be a significant factor in the low recycling rate for this material.

textiles

It is estimated that only 31 per cent of English households receive a kerbside collection service for textiles.

A further feature of these findings is that for paper and metals (two of the most long-established recyclables), recycling rates still appear to remain relatively low (55 per cent for paper / card and 54 per cent for metals). This is despite almost universal provision of collection schemes for these materials – WRAP scheme data indicates household coverage rates close to 100 per cent for paper and plastics, and 95 per cent for card. There is a strong role for communication campaigns to encourage householders to segregate these materials[20].

20 A caveat to this finding for paper / card is that potentially, the proportional contribution of these materials to the households waste stream may have reduced since 2006/07 (the most recent England composition dataset). Were this the case, it could lead to artificially low estimated capture rates for these materials.

Figure 16 · Recycling of England's household waste by material type and management route – tonnages (ktpa)

		Recycled household waste									
	household waste arising	kerbside household material collected for re-use	kerbside household material collected for recycling	commingled	kerbside food	kerbside garden	kerbside mixed garden and food	bring	household waste recycling centre dry recycling	household waste recycling centre garden	recovered from residual
Glass	1,511	0	313	594	0	0	0	166	37	0	17
Paper and card	4,839	0	724	1,810	0	0	0	71	193	0	19
Metals	991	0	39	113	0	0	0	4	237	0	155
Plastic	2,221	0	52	255	0	0	0	6	31	0	17
Textiles	670	1	5	28	0	0	0	20	52	0	1
Waste electrical and electronic equipment	538	0	9	0	0	0	0	1	238	0	0
Separately collected food	4,164	0	0	0	286	0	133	0	2	0	0
Other organics	3,896	0	0	0	0	1,568	781	4	9	907	17
Other materials	4,138	2	257	0	0	0	0	1	779	0	224
Total	**22,967**	**3**	**1,399**	**2,800**	**286**	**1,568**	**914**	**272**	**1,579**	**907**	**450**

Figure 17 · Recycling of England's household waste by material type and management route – material proportions

	Recycled household waste									
	kerbside household material collected for re-use	kerbside household material collected for recycling	commingled	kerbside food	kerbside garden	kerbside mixed garden and food	bring	household waste recycling centre dry recycling	household waste recycling centre garden	recovered from residual
Glass	0%	21%	39%	0%	0%	0%	11%	2%	0%	1%
Paper and card	0.001%	15%	37%	0%	0%	0%	1%	4%	0%	0.4%
Metals	0.001%	4%	11%	0%	0%	0%	0.4%	24%	0%	16%
Plastic	0.001%	2%	11%	0%	0%	0%	0.3%	1%	0%	1%
Textiles	0.1%	1%	4%	0%	0%	0%	3%	8%	0%	0.1%
Waste electrical and electronic equipment	0.1%	2%	0%	0%	0%	0%	0.2%	44%	0%	0.05%
Separately collected food	0%	0%	0%	7%	0%	3%	0%	0.04%	0%	0.001%
Other organics	0%	0%	0%	0%	40%	20%	0.1%	0.2%	23%	0.4%
Other materials	0.05%	6%	0%	0%	0%	0%	0.03%	19%	0%	5%
Total	**0.01%**	**6%**	**12%**	**1%**	**7%**	**4%**	**1%**	**7%**	**4%**	**2%**

Recycling rejects

materials recycling facility rejects	anaerobic digestion / in-vessel composting rejects	reprocessor rejects
51	0	0
155	0	0
10	0	1
22	0	0
2	0	1
0	0	1
0	1	1
0	5	5
0	0	20
240	**6**	**29**

Recycling rejects

materials recycling facility rejects	anaerobic digestion / in-vessel composting rejects	reprocessor rejects	net recycling
3%	0%	0.01%	**71%**
3%	0%	0.01%	**55%**
1%	0%	0.1%	**54%**
1%	0%	0.01%	**15%**
0.4%	0%	0.1%	**16%**
0%	0%	0.2%	**46%**
0%	0.03%	0.01%	**10%**
0%	0.1%	0.1%	**84%**
0%	0%	0.5%	**30%**
1%	**0.03%**	**0.1%**	**43%**

The findings presented in figure 16 and figure 17 include a number of assumptions, in particular:

- The overall household waste composition (left hand side of figure 16) is based on Defra estimates for 2006/07[21], which are reproduced in annex one.
- The composition of commingled waste is not reported by local authorities in WasteDataFlow; this is therefore based on a generic estimate.
- Findings exclude materials collected by the charity / informal sectors, as these are typically not captured by local authority waste reporting.

21 This is the most recent known national composition estimate for England, published at http://randd.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=15133

annex three

recycling performance correlations

To explore factors impacting on local authorities' waste performance, a correlation model has been developed. For each local authority, economic, demographic, social and waste management performance data are compiled and compared.

The model tests 24 demographic / economic / social datasets as correlates of eight performance indicators for waste management. The resultant 192 correlation tests are summarised in figure 18.

The correlation coefficient in figure 18 indicates the degree to which waste management performance is 'explained' by the economic / demographic / social data.

A correlation coefficient of zero would indicate no correlation, while a coefficient of 1 (or -1, the sign determining the direction of the relationship) corresponds to a perfect linear relationship. Within the table, coefficients with an absolute value greater than 0.5 (considered a moderate correlation) are **highlighted in green**. Particularly weak correlations, with an absolute value of less than 0.3, **are shown in grey**.

Figure 18 is sorted to show the strongest correlations at the top left. Overall, these findings indicate that social, economic and demographic indicators are typically weak predictors of levels of recycling.

Where strong correlations do occur, these are generally associated with the generation and management of green waste. As an example, the strongest correlation seen (-0.63) is between population density and green waste arising per person. Figure 19 illustrates the correlation between these two variables. The likely explanation of this correlation is the decrease in the size of householder's gardens with increasing population density.

While the impact of green waste is particularly clear in this case, the management of green waste may also be a contributory factor in the other correlations seen. The total proportion of local authority collected waste recycled / composted correlates well with population density and index of deprivation. However, when green waste is removed to give the proportion of household waste as dry recycling, this correlation disappears.

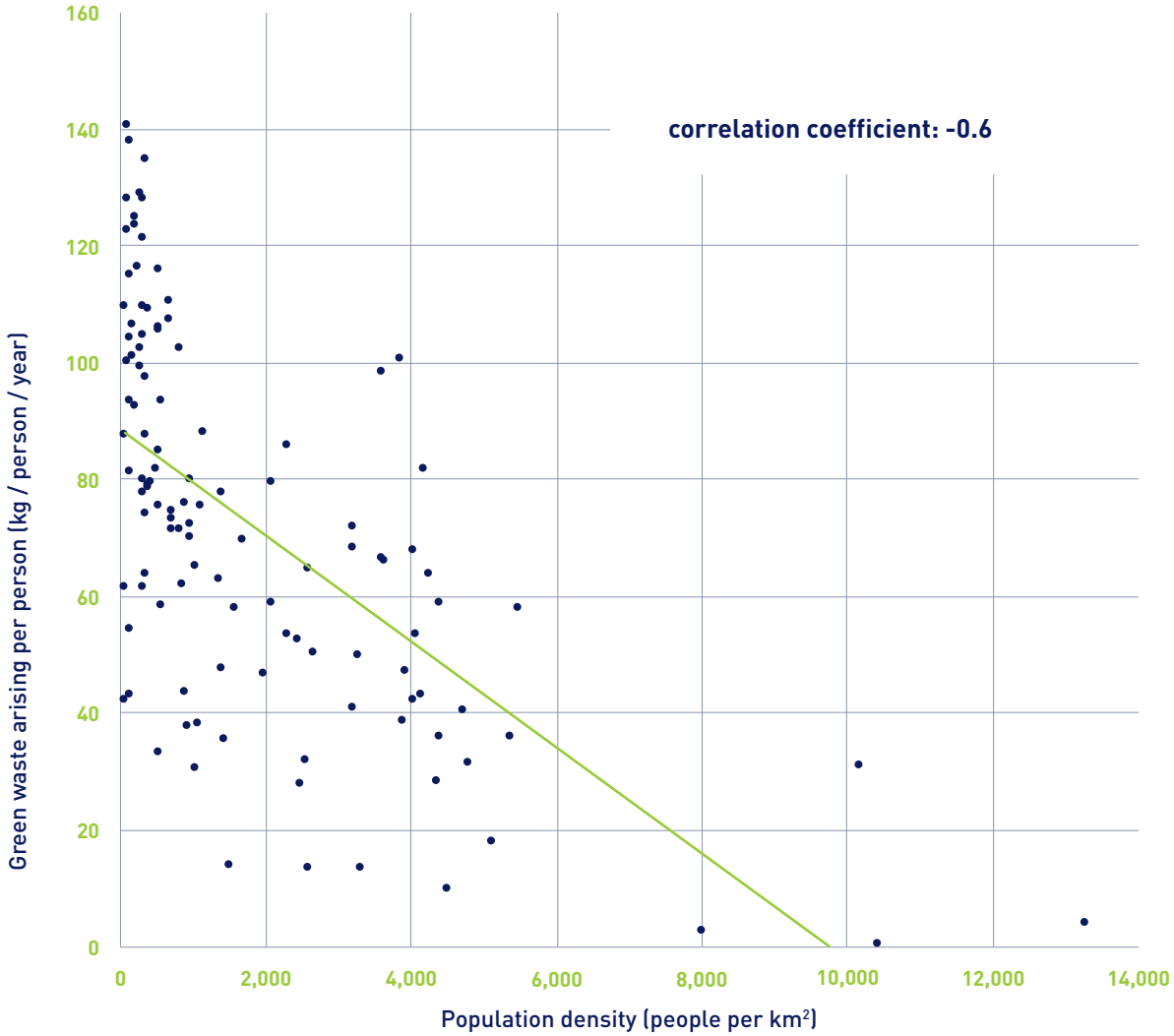
The absence of correlations is in some cases instructive. For example, there appears to be no significant correlation between total waste service cost (expressed in £/person) and any indicator of recycling performance (all correlations having an absolute value less than 0.3). The implication of these findings is that increasing recycling performance may often not be a net service cost. As an average across all materials, the increased costs of recyclables collections is potentially offset by a combination of materials revenues and reduced residual waste disposal costs.


WARNING

Figure 18 · Waste management performance correlation coefficients

Demographic / economic variable	Waste managment performance variable: green waste arising per person (kg/person/year)	proportion of local authority collected waste recycled/composted	proportion of household waste as green waste composting	household waste arising per person (kg/person/year)	household waste arising per person, less green waste (kg/person/year)	proportion recycled ex. garden waste (but inc. food)	proportion of household waste as dry recycling	household recycling rejects
Population density (people per km^2)	**-0.6**	**-0.6**	**-0.6**	**-0.6**	-0.3	-0.2	-0.2	0.0
Proportion of population in owned property	**0.6**	**0.6**	**0.6**	0.3	0.0	0.3	0.3	0.0
Index of deprivation average - rank	**0.6**	**0.5**	**0.5**	**0.5**	0.2	0.3	0.3	0.1
% of multi-occupancy housing stock	**-0.6**	**-0.5**	**-0.6**	-0.3	0.0	-0.1	-0.1	0.0
Index of deprivation average	**-0.5**	**-0.5**	**-0.5**	**-0.5**	-0.2	-0.3	-0.3	-0.2
lindex of deprivation - extent	**-0.5**	-0.5	-0.5	-0.5	-0.2	-0.3	-0.2	-0.1
Index of deprivation - extent rank	**0.5**	0.5	0.5	0.5	0.2	0.3	0.2	0.1
Proportion never worked / long-term unemployed	**-0.5**	-0.4	-0.5	**-0.5**	-0.3	-0.2	-0.1	-0.1
Proportion in full-time education	-0.4	-0.4	-0.4	**-0.5**	-0.3	-0.2	-0.2	0.0
Urban classification	-0.4	-0.3	-0.3	**-0.5**	-0.4	0.1	0.0	0.0
Waste collection cost per person (£/person)	0.3	0.3	0.2	0.2	0.0	0.3	0.3	0.1
Waste minimisation cost per person (£/person)	0.1	0.2	0.2	0.0	0.0	0.2	0.2	-0.1
Population, 2014	0.3	0.2	0.3	0.0	-0.1	0.1	0.0	-0.1
Total waste service cost (£/person)	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2
Collection / disposal / recycling cost (£/person)	0.2	0.1	0.1	0.3	0.2	0.3	0.2	0.2
Proportion in professional employment	0.2	0.1	0.2	0.1	0.0	0.2	0.1	0.2
Recycling cost per person (£/person)	0.0	-0.1	0.0	0.2	0.2	0.1	0.1	0.0
Index of deprivation - income	0.0	-0.1	0.1	-0.1	-0.2	-0.1	-0.1	-0.1
Waste disposal cost per person (£/person)	0.1	0.0	0.0	0.4	0.4	0.0	0.0	0.1
Index of deprivation - employment rank	-0.1	0.0	-0.1	0.0	0.1	0.0	0.0	0.1
lindex of deprivation - income rank	-0.1	0.0	-0.1	0.1	0.2	0.0	0.0	0.1
Trade waste cost per person (£/person)	0.2	0.0	0.1	0.3	0.3	-0.2	-0.3	-0.1
Index of deprivation - employment	0.1	0.0	0.1	0.0	-0.1	0.0	0.0	-0.1
Proportion with no qualifications	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.1	-0.1

Figure 19 · Plot of green waste arising per person versus population density



annex four

history of English recycling performance

The radical change in England's waste management practices over the last 20 years is demonstrated by the rapid rise in the country's recycling rate. England's historical household waste recycling rate is shown in figure 20, using Defra data for 1995/96 to 2013/14. Starting at 6.3 per cent in 1995/96, the rate has increased continuously to reach 43.5 per cent in 2014/15. A particular rapid increase occurred between 2001/02 (12.5 per cent) and 2008/09 (37.6 per cent).

In figure 21, the historical curve is annotated to show the following major drivers for this increase:

Landfill tax

When introduced in September 1996, landfill tax was hailed by some as a revolutionary 'eco tax'. Originally set at £7 per tonne, landfill tax has been continually escalated to reach the current rate of £80 per tonne. While at its original level the tax may have had limited influence, increases have led to a significant shift in the waste management playing field, favouring recycling (as well as energy recovery) over land disposal.

April 1999 – EU Landfill Directive 1999/31/EC

To reduce fugitive emissions of the powerful greenhouse gas methane from landfills, the Landfill Directive requires member states to reduce landfill of biodegradable municipal waste to 35 per cent of 1995 levels by 2016. For the UK, a four-year derogation was applied, pushing this target back to 2020.

May 2000 – Publication of Waste Strategy 2000 (England and Wales)

Of the instruments put forward by this strategy, foremost was the requirement for 30 per cent of household waste to be recycled by 2010, to be achieved by the imposition of statutory performance standards on local authorities.

April 2005 – Implementation of the Landfill Allowance Trading Scheme

Introduced in England (with variants in Wales, Scotland and Northern Ireland) in response to targets set by the EU Landfill Directive, the Landfill Allowance Trading Scheme was a market-based system designed to reduce quantities of biodegradable municipal waste landfilled. Achievement of Landfill Allowance Trading Scheme requirements was a central theme in the majority of local authority waste strategies and waste procurement processes. As such, it ranks as a significant driver for recycling increases – despite being abolished by Defra in 2011.

October 2008 – the revised EU Waste Framework Directive (rWFD – 2008/98/EC)

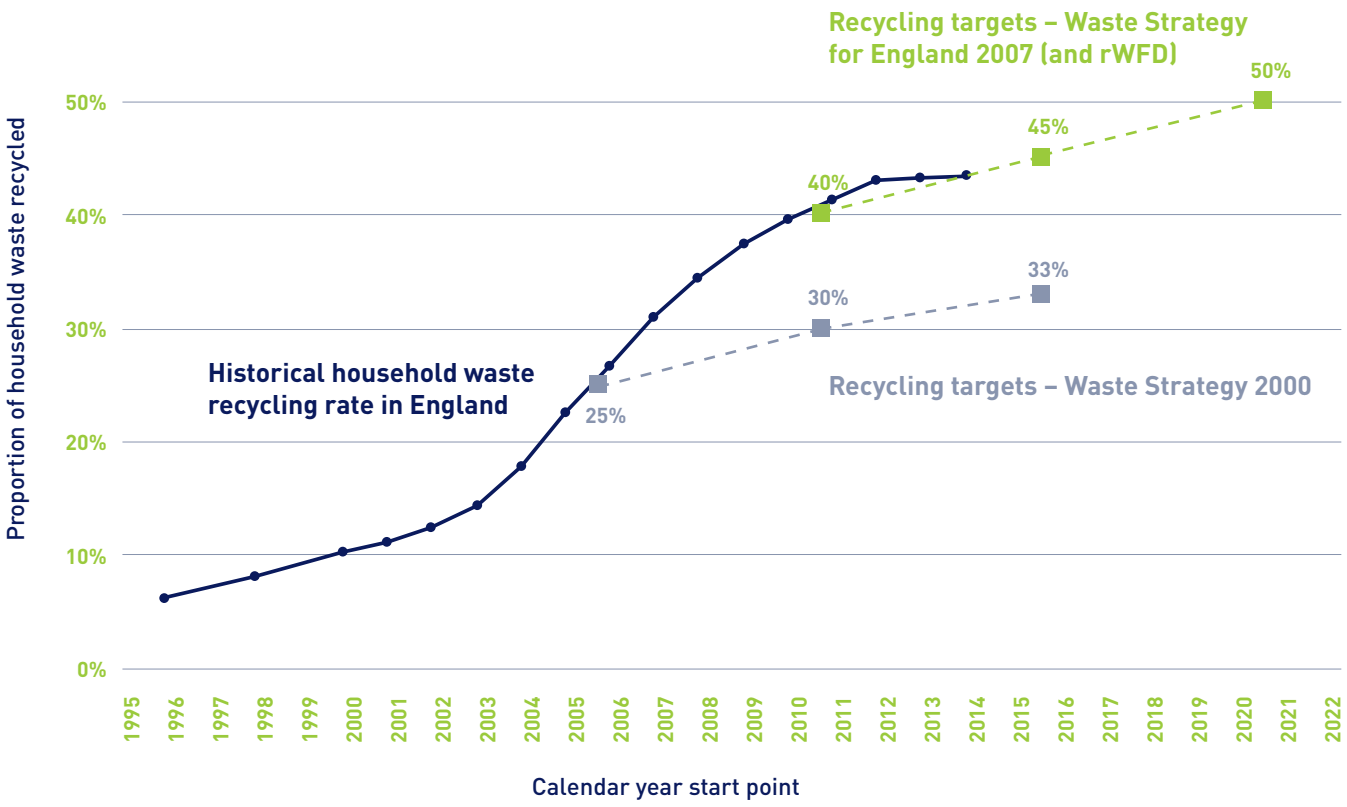
The revised EU Waste Framework Directive firmly entrenches the waste hierarchy in European wide policy, and set a household waste re-use and recycling target of 50 per cent by 2020.

May 2007 – Waste Strategy for England 2007

Confirming recycling targets set by the revised EU Waste Framework Directive, the 2007 Strategy also demands 75 per cent overall recovery of municipal solid waste. The 2007 Strategy includes an assessment of the greenhouse gas impacts of waste management in England prefiguring more recent consideration of carbon-related value metrics.

The current recession has been an important consideration in waste management decision making in recent years. Budgetary constraints have potentially limited the introduction of new recycling services, contributing a potential plateau in the English household waste recycling rate.

Figure 20 · English recycling – targets and performance



Recycling targets have played an important role in influencing the sector's recycling performance. Waste Strategy 2000 (which applied to both England and Wales) required 25 per cent recycling by 2005, rising to 30 per cent in 2010 and 33 per cent in 2015. Whilst seeming relatively modest with hindsight, these targets demanded a dramatic increase from the 10 per cent recycling rate achieved in 1999/2000. These targets applied to individual local authorities and were enforced by the now defunct Best Value Performance Indicators.

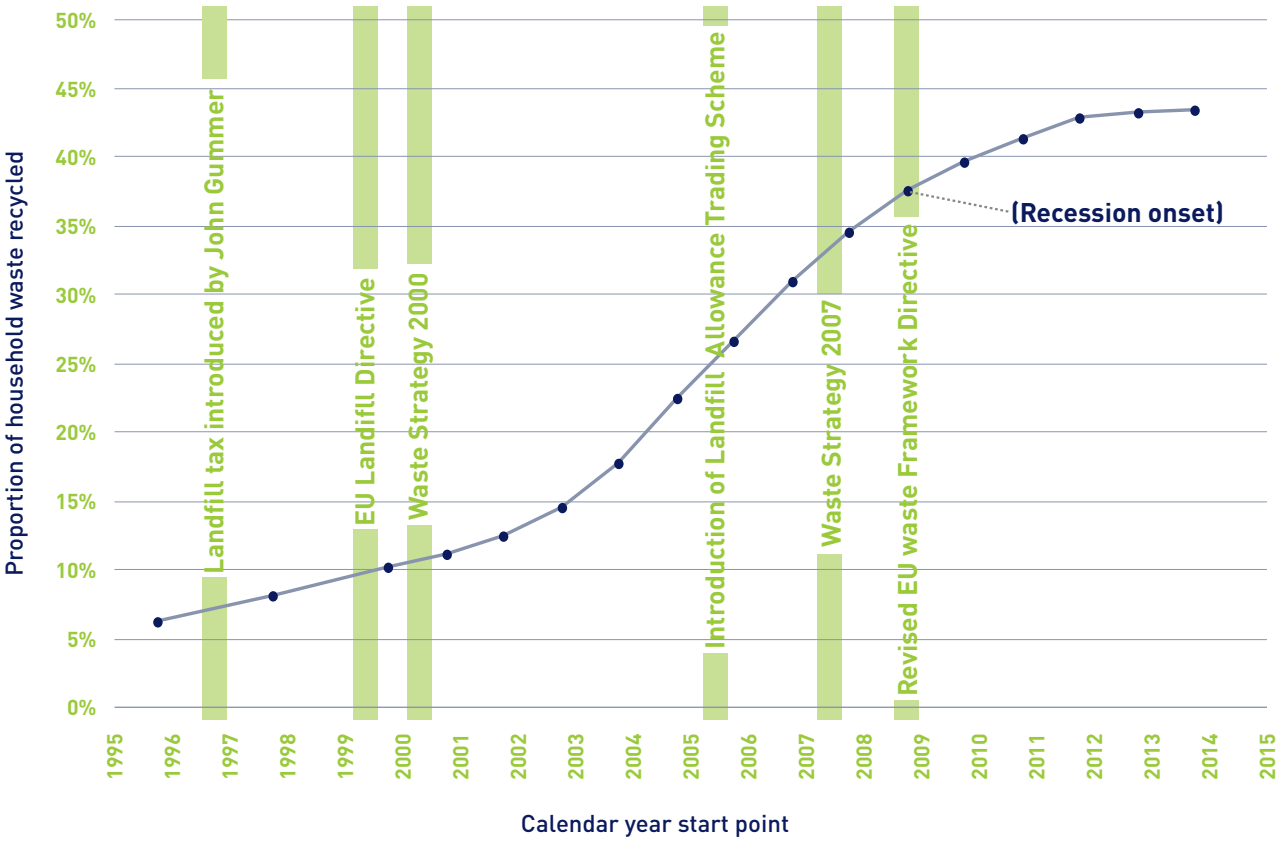
Waste Strategy 2007 adopted more challenging household waste recycling targets: 40 per cent recycling by 2010, 45 per cent by 2015 and 50 per cent by 2020. The 50 per cent recycling target mirrors that stipulated by the revised Waste Framework Directive. In contrast to targets set in Waste Strategy 2000, the 2007 strategy's targets are not translated to local authority level statutory targets.

The overall English recycling rate has continued to rise despite this lack of statutory local authority targets. This can be explained to some extend by the array of other factors increasing recycling (most notably landfill tax). Furthermore, while national targets are not enforced for local authorities, they continue to set the overall policy context for local authority decision making.

Targets from Waste Strategy 2007 and the revised EU Waste Framework Directive feature strongly in local authority waste strategies. These targets are also routinely used in monitoring performance – for example, in Waste Officer's service updates for elected members.

Despite continuing improvements in recycling at local authority level, it is possible that more challenging future targets (above 50 per cent) may struggle to gain traction without statutory local enforcement. This is particularly the case given the increasing constraints on local authority spending, and perceived competition between increasing waste performance, and investment in other local authority services.

Figure 21 · England's historical recycling rate, and waste sector drivers[22]



22 Data points (blue circles) are based on Defra data for financial years (http://webarchive.nationalarchives.gov.uk/20130123162956, http://www.defra.gov.uk/statistics/files/20110617-waste-data-overview.pdf and https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables)

annex five

tonnage recycling versus value metrics

In section 3.2 of this report, figure 11 explored the relationship between weight-based recycling accounting and 'value' as measured by the price of recyclable materials.

Taking the same approach, figure 22 and figure 23 compare tonnage recycling rates, and monetary value, for all 91 unitary authorities in England. In figure 22, the monetary value of dry recyclables per tonne of total household waste collected is plotted as a function of the dry recycling rate (each blue circle ● corresponding to a local authority).

As expected, the revenue from dry recyclables does scale with the (tonnage-based) dry recycling rate (correlation coefficient 0.7). However, there are a number of notable exceptions to this scaling. For example, Westminster achieves a dry recycling rate of 26 per cent, compared to Shropshire's 25 per cent; despite this similar performance, revenue from Westminster's recyclables is over double that of Shropshire's (£25/tonne, compared to £11/tonne).

For completeness, figure 23 considers the case of net value, accounting for costs incurred for treatment of organic waste and residual waste (the latter again assuming a nominal £80/tonne gate fee). Following this approach, the net value per tonne of household waste is calculated and plotted as a function of the overall recycling rate (including dry recyclables and organics).

On the basis of these illustrative findings, a strong relationship between recycling rate and net value emerges (correlation coefficient 0.9). Accounting for the net monetary value (i.e. revenues, less disposal costs), tonnage-based recycling targets may therefore give a similar end result to a monetary value metric.

Figure 22 · Dry recyclables revenue versus dry recycling rate

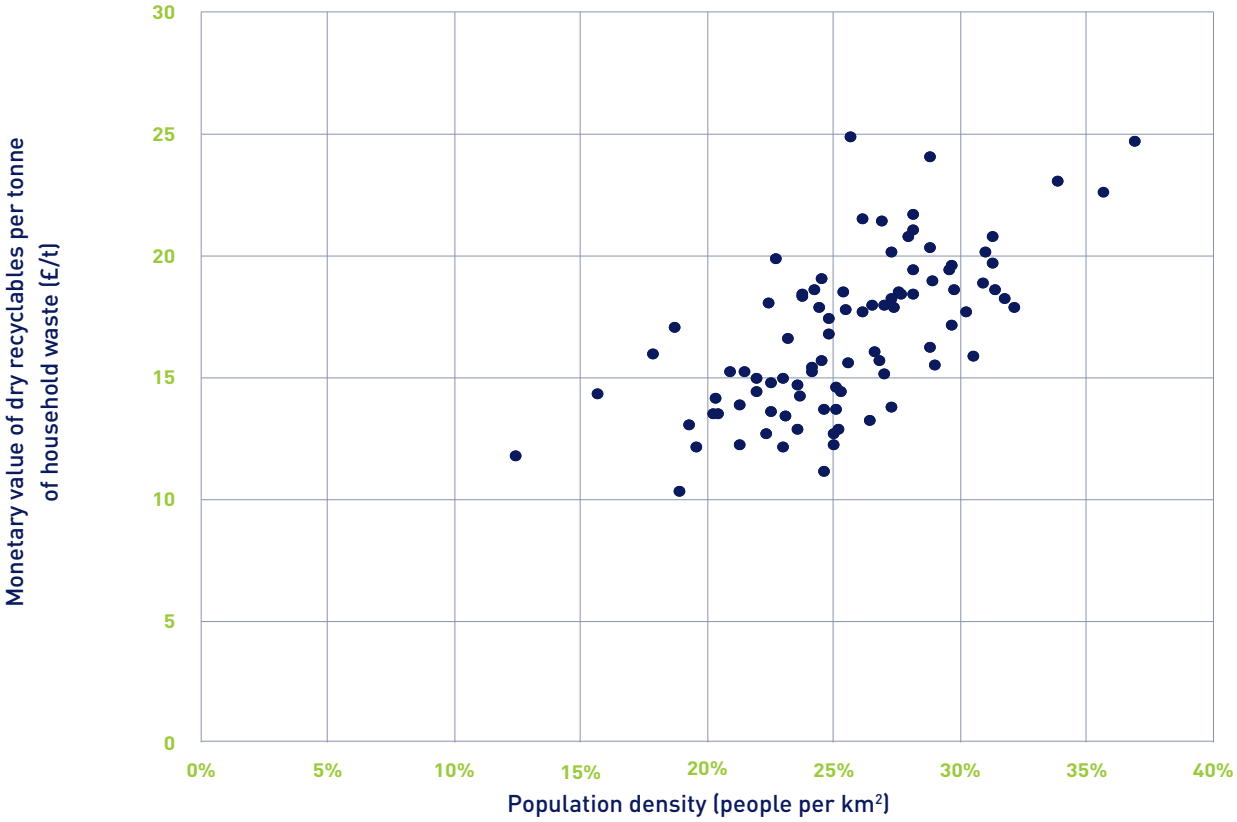
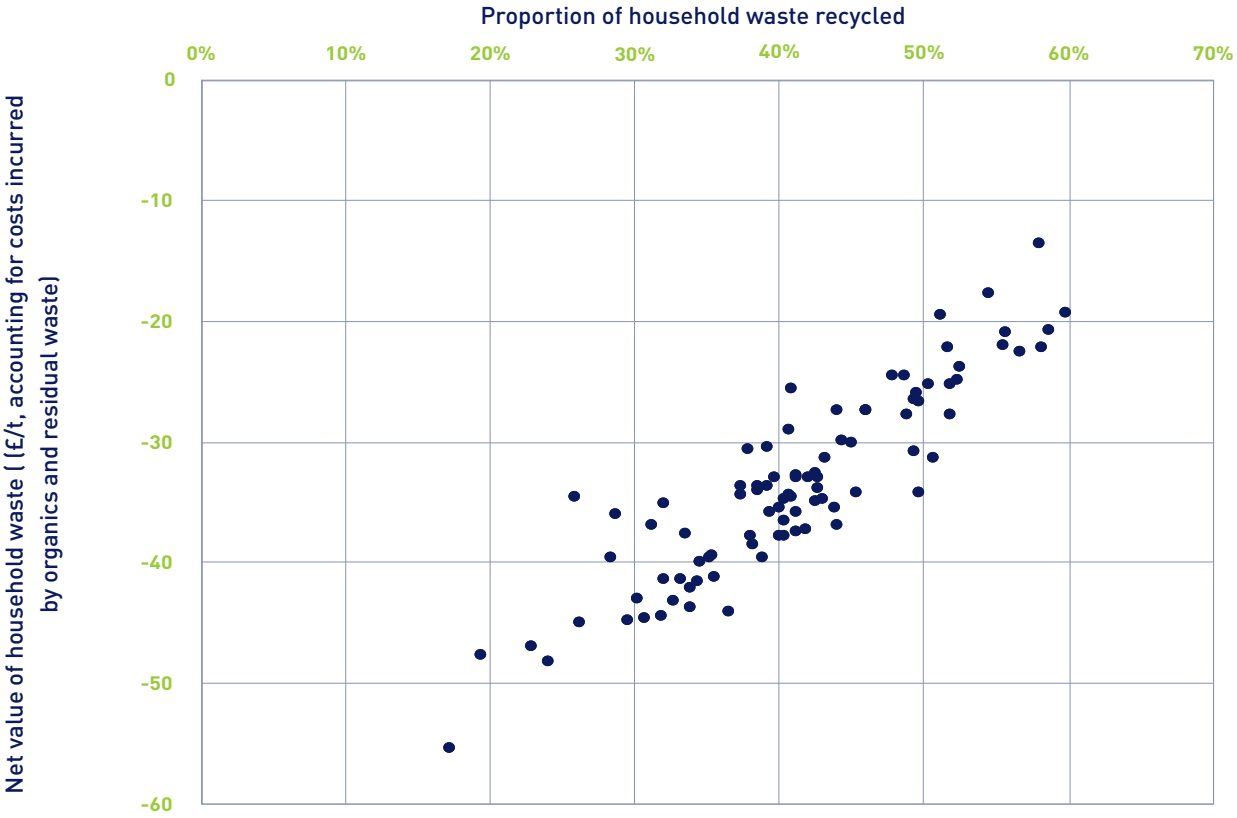


Figure 23 · Net monetary value versus overall recycling rate (including organics)



Glossary

Anaerobic digestion (AD)

The process by which organic matter is broken down by bacteria in the absence of oxygen to generate methane, leaving behind a sanitised soil improver.

Biodegradable municipal waste (BMW)

Components of municipal waste that degrade in the natural environment (such as wood and food waste).

Department for Communities and Local Government (DCLG)

Responsible for waste planning and for some aspects of local government waste management services in England and Wales.

Department for Environment, Food and Rural Affairs (Defra)

The lead Department for waste policy in England and Wales.

European Commission (EC)

The administrative arm of the European Union, responsible for bringing forward policies and legislation which are then scrutinised and passed by the European Parliament.

European Union (EU)

Currently composed of 28 Member States, including the UK.

Household waste recycling centre (HWRC)

Also called civic amenity sites, household waste recycling centres are sites run by local authorities to which the public and small businesses bring their discarded materials.

Incinerator bottom ash (IBA)

Material that is left over when waste is combusted in an energy-from waste facility.

In-vessel composting (IVC)

Covers a wide range of composting systems from enclosed halls through to tunnels and containers, allowing a higher degree of environmental protection and process control.

Local authority (LA)

The second tier of government comprising county councils and unitary authorities.

Landfill Allowances Scheme (LAS)

See Landfill Allowance Trading Scheme.

Landfill Allowance Trading Scheme (LATS)

A UK trading scheme tied to local authority landfill diversion targets for biodegradable municipal waste, which ran from 2004 to 2013 in England. In Wales, Scotland and Northern Ireland, the scheme was known as the Landfill Allowances Scheme.

Metropolitan Borough Council (MBC)

A unit of local government created to cover the six largest urban areas in England outside Greater London, where they are known as London Boroughs (LB). They are responsible for running most local services, such as schools, social services and waste collection.

Metropolitan District Council (MDC)

See Metropolitan Borough Council.

Materials recycling facility (MRF)

A facility where recyclable waste is sorted into material streams before being transported to reprocessing plants.

Municipal solid waste (MSW)

Waste that comes from households, but also including some industrial and commercial waste that is similar in nature or composition to household waste.

Office for National Statistics (ONS)

The executive office of the UK Statistics Authority, a non-ministerial department which reports directly to the UK Parliament. Responsible for collecting, interpreting and publishing statistics related to the economy, population and society of the UK.

Revised Waste Framework Directive (rWDA)

The main legal framework for waste management that EU Member States have to follow, first enacted in 1975. The latest revision of the Waste Framework Directive was in 2008, and is referred to as the revised Waste Framework Directive.

Unitary authority (UA)

A single tier local authority responsible for all local government functions within its area. Unitary authorities typically cover towns or cities which are large enough to function independently of county or other regional administration.

Waste disposal authority (WDA)

Administrative units responsible for developing and implementing plans to manage municipal waste collected by local councils. In unitary authorities, waste disposal authorities are the same as the waste collection authority.

Waste electrical and electronic equipment (WEEE)

The legal basis for managing this waste type is the Waste Electrical and Electronic Equipment Directive, last revised in 2009.

Waste Framework Directive (WFD)

See revised Waste Framework Directive.

Waste and Resources Action Programme (WRAP)

Created as part of the UK Government's waste strategy, WRAP helps businesses and local authorities reduce their waste and get the most value out of unavoidable waste. WRAP registered as a charity in December 2014.

SUEZ
SITA House, Grenfell Road,
Maidenhead, Berkshire SL6 1ES

www.sita.co.uk