

An economic assessment and feasibility study of how the UK could meet the Circular Economy Package recycling targets

Report for the Environmental Services Association



Ricardo
Energy & Environment



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Foreword

The UK is struggling to meet the EU's existing targets for 50% household recycling. This is largely due to a historic lack of funding and policy support in England – particularly on end-markets for recyclates – essential to driving recycling rates higher.

Current policy delivers current outcomes. If we want higher recycling rates then we will need fresh interventions and additional funding. This report investigates what additional costs and interventions would be required to meet the higher weight-based recycling targets contained in the forthcoming EU Circular Economy Package. Moving from our current municipal recycling rate of around 50% to the target figure of 65% would of course necessitate performance to jump by one third. Both household and commercial recycling would need to be radically improved.

Local Authorities could in theory reduce their residual waste collection frequencies to free up cash to be reinvested in the introduction of new services to boost collection rates, such as separate food waste collections where these are not already in place. Ricardo's research finds that this might push up the blended municipal recycling rate by a few percentage points, but nowhere near enough to get close to the much higher targets envisaged by the EU.

To do that would require both the addition of more costly services to household collections, and a large boost to commercial recycling rates. The former requirement opens up the obvious question: where will the money come from? Under chronic financial pressure, Councils are already doing everything they can to save money and are ill-placed to bear additional costs. Instead, we could ask producers to pay more into the system, and indeed ESA hopes the government's forthcoming Resources & Waste Strategy will include precisely these measures. The second requirement of higher commercial recycling rates will simply not happen without much stronger intervention on end-markets to 'pull' recycled materials through the system.

Brexit opens up the opportunity for the UK to do something different and move away from the EU's target regime. ESA believes that this should be seriously explored as part of Defra's strategy and has commissioned Ricardo to complete a follow-up report investigating what alternatives to blunt weight-based instruments the UK could adopt in a post-Brexit world.

The current weight-based approach doesn't accurately reflect environmental outcomes and distorts behaviour in the sector by incentivising the collection of heavy, low value materials. Higher weight-based targets would distort behaviour even more. There must be a smarter way, which targets value and is more closely aligned with environmental objectives, including the UK's carbon budgets. ESA would support a bold and radical approach.



Jacob Hayler
Executive Director

Executive summary

Following the publication of the Environmental Services Association (ESA) commissioned UK Residual Waste: 2030 Market Review¹ report in January a number of waste policy related issues were brought into focus that warranted further investigation, these included two key questions:

- *What policies would be required to deliver different recycling scenarios and at what cost?*
- *What could replace weight based targets in a post-Brexit world*

The focus on policy is very timely. Work is being undertaken to influence and develop policies that will potentially impact on the arisings, composition, management, recycling and disposal of waste in England. At the same time, the European Union (EU), including the British Government, have recently finished debating the implementation of the EU's Circular Economy Package. This could result in significant new policy impacts on fundamental aspects of waste management including new recycling and recovery targets for municipal and similar commercial and industrial (C&I) wastes – these need to be fully understood.

A healthy, productive resource economy requires action across the supply chain including:

- products that are placed onto the market that are ultimately easy to recycle
- a supportive policy and regulatory framework that makes it easy for residents and businesses to display the right behaviours and, that can address the wrong behaviours
- available and economically viable end markets so that quality materials can be recycled and the materials produced used again, maximising material productivity.

Without a coherent strategy across all elements which both pushes and pulls materials through the supply chain recycling levels can stagnate and end markets collapse.

Weight based targets for recycling have been in place for a number of years and have been successful in driving recycling rates - to a point. Weight has been used as a proxy for recycling performance but it does have limitations. Our current weight based system can distort behaviour, incentivising the collection of heavy, low-value materials such as garden waste and not prioritising the best environmental outcome for individual material streams.

The recycling targets required under the Circular Economy Package are weight based and this report looks at what England would need to do to meet the 60% recycling target by 2030 including what changes in operations would be required for our Local Authorities and Businesses to increase recycling and how much it might cost. It focusses on the areas that ESA members can control – end of life and end of use.

The second report in this series considers whether alternative measures or metrics to our current weight based system might be better in terms of driving environmental performance and value recovered from our resources.

England needs a balanced approach which delivers increased recycling and greater levels of recovery. Taking a step back to review the whole system will allow better metrics to be developed, which in turn will support better decisions.

¹ http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

Modelled Results

From our modelled results, reaching the recycling targets required under the Circular Economy proposals will be **challenging** and **costly** both for Local Authorities and the commercial sector. This is especially true given the current difficulties within secondary material markets, with all future modelled scenarios requiring stimulation of end markets to ensure the value of recycled material can be recognised and recovered. Simply put, higher recycling rates are completely contingent on stronger demand for materials and sustainable end markets. It is also this commercial viability that will help incentivise greater investment in material collection and recycling infrastructure, as greater confidence in end markets allows both local authorities and the commercial sector to push for greater performance, rather than the status quo or minimum standards on contractual obligations

Collecting more material for recycling means more costs. Local Authorities could, however, offset some of these cost increases by reducing the frequency of residual waste collections (or other interventions for flats) that will allow them to drive change at a cost that isn't excessive. We have termed this 'cost neutral' from a system change approach, as although some authorities will face additional cost, there are those that could also see savings from changing services.

For all of the scenarios modelled increases to the commercial recycling rate result in a marked difference in overall performance. With current industry estimates for commercial recycling in the mid-50-60% it will take a lot of focus and investment to further increase recycling rates. Encouraging SMEs in particular to recycle may need a different cost structure proposed for recycling collections to make them financially attractive or government intervention.

The approach that has been taken in this report to model results at an England level is optimistic in approach – we've assumed every service change is possible (both operationally and in terms of political palatability) and that improvements in average yield per household achieved will be consistent. It doesn't take into consideration the sheer volume of flats for some inner-city authorities for example or the desire for SMEs to recycle. Where scheme changes have been suggested that would not be possible to implement e.g. fortnightly residual waste collection for a high-rise block of flats, we have assumed that other interventions would be conducted including communications, focus on contamination, 'bring to' sites for food waste etc. These may not yield the same percentage improvement and would cost more, but will help to contribute to the recycling rate.

Results Summary

Approximately 80 – 85% of material in household waste is technically recyclable. To achieve some 60% recycling rate residents would need to capture at least 70% of their recyclables, consistently every week, particularly the heavier material streams such as food and garden waste. Contamination, inconsistencies within materials collected across authorities, and current levels of participation by residents would make this recycling rate almost impossible without increased investment and significant behaviour change.

Overall the results provided are at the top end of expected performance and other interventions and policy levers such as encouraging waste prevention, increasing reuse and doing more communications on recycling (locally and nationally) may be required to reach these levels.

Potential Government Policy revisions could also be considered to improve recycling rates in particular Extended Producer Responsibility (EPR) and review of the Producer Responsibility Obligations (Packaging Waste) Regulations 2007, and consideration of a Deposit Return Scheme and/or alternatives. These policy revisions cannot be guaranteed and the associated performance or challenges for many of them will need to be explored further. Some may even have a detrimental effect on recycling rate if designed or incorporated poorly.

Modelling Results Summary Table

Scenario Modelled	Collection System changes	Whole system cost	Recycling Rate (2030)
Business As Usual	Changes to accommodate housing/population growth for Local Authorities Changes to accommodate new businesses recycling	Whole system cost won't change at a unit price level but Local Authorities will spend more to add new households to existing schemes and businesses will spend more to start recycling	43% Household 60% Commercial = 52% Overall Recycling Rate
Cost Neutral	Local Authorities will move from weekly to alternate weekly or three weekly residual waste collections with food waste depending on their starting position. Additional communications support will be provided by those Authorities that can't change residual frequency	Savings 55% of authorities can make a change that is broadly cost neutral. <ul style="list-style-type: none"> Those with food waste changing from weekly to fortnightly residual waste collection could collectively save = £34.5M Those that change from a weekly to a fortnightly residual waste collection and add a source segregated food waste collection could collectively save = £27M Those with food waste changing from a fortnightly to three weekly residual waste collection could collectively save = £31M Investment 45% of authorities will need to invest in services <ul style="list-style-type: none"> Those moving from a fortnightly residual waste collection without food to a three weekly residual waste collection with food could collectively cost = £91M 	53% Household 60% Commercial = 56% Overall Recycling Rate
Circular Economy Package	As per the cost neutral scenario but with the ability to recycle additional materials for households	Local Authorities could pay an additional £6 to £15/HH which equates to between £105 - £315 million per annum (excluding any additional household growth between now and 2030) For business the cost per tonne of additional recycling could be in the region of £40 - £50. This could cost the industry in the region of £160 million/yr in additional cost by 2030.	55% Household 70% Commercial = 65% Overall Recycling Rate

In summary – by 2030

- A business as usual scenario will allow England to achieve an overall recycling rate of 52%, increasing levels of commercial recycling will be needed to move to higher rates
- If Local Authorities move towards reduced frequency of residual waste collections with food waste and if commercial recycling reaches 60% we are likely to achieve an overall recycling rate of 56%
 - This will be broadly cost neutral for the majority of authorities. Political (residents may not want reduced frequencies) and practical (Local Authorities need all savings and therefore don't reinvest in separate food collections) constraints may however reduce the likelihood of some authorities adopting the required changes, which would result in a lower recycling rate.
- With additional measures we could get to an overall recycling rate of 65% but it will be difficult and could cost significantly more to deliver
 - Additional cost to Local Authorities = £105 – 315M per annum
 - Additional cost to commercial sector = £160m p.a.
- All scenarios are only possible in the event that the Government introduces policy to strengthen end markets for the use of recycled materials. One such solution could be reform of EPR
- Alternative metrics to weight should be considered as part of the forthcoming Defra strategy to help identify the optimal balance between recycling and recovery to enable England to maximise the value from its resources. The forthcoming second report will identify options for aligning recycling metrics with environmental outcomes and value.

Factors influencing increased recycling rates

This report should enable sensible policy suggestions to be framed that will balance aspiration and environmental performance with reasonable cost to deliver. **Services will need investment to just standstill in the future and the adoption of high recycling targets should be fully evaluated to understand both the cost and environmental performance for the whole value chain.** The next steps will be to consider alternative metrics so that our industries performance can be framed beyond simple weight based recycling targets.

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1 Introduction

Following the publication of the Environmental Services Association (ESA) commissioned UK Residual Waste: 2030 Market Review² report in January a number of waste policy related issues were brought into focus that warranted further investigation, these included two key questions:

- What policies would be required to deliver different recycling scenarios and at what cost?
- What could replace weight based targets in a post-Brexit world?

The focus on policy is very timely. Following a long period of stagnation, work is being undertaken to influence and develop policies that will potentially impact on the arisings, composition, management, recycling and disposal of waste in England. At the same time, the European Union (EU), including the British Government, have recently finished debating the implementation of the EU's Circular Economy Package. This could result in significant new policy impacts on fundamental aspects of waste management including new recycling and recovery targets for municipal and similar commercial and industrial (C&I) wastes.

The alignment of the 25 Year Environment Plan, BEIS's Clean Growth Strategy and Industrial Strategy, the National Infrastructure Commission's Waste Infrastructure analysis for 2020-2050 and Defra's Resources & Waste Strategy offers the potential for a clear framework and substantial opportunity for our sector.

A healthy resource economy requires action across the value chain including:

- products that are placed onto the market that are ultimately easy to recycle
- a supportive policy and regulatory framework that makes it easy for residents and businesses to display the right behaviours and can address the wrong behaviours
- available and economically viable end markets so that quality materials can be recycled and the materials produced used again.

Without a coherent strategy across all elements which both pushes and pulls materials through the respective supply chains failure is likely and recycling levels will stagnate and end markets will collapse. The value and supply chains must work together to achieve a sustainable resource economy which in turn stimulates higher recycling rates (Figure 1)

This makes it critical for the ESA to review policy options for the sector and identify the positions that would most benefit its members, the sector and the environment. Without policy certainly, there is a risk that the UK could continue to feel the impact of a loss of confidence by investors and that ultimately, the infrastructure required to address current and future waste management is not delivered.

This report addresses the first question – what policies would be required to deliver different recycling scenarios and at what cost (and therefore will there continue to be a capacity gap in the future)?

² http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

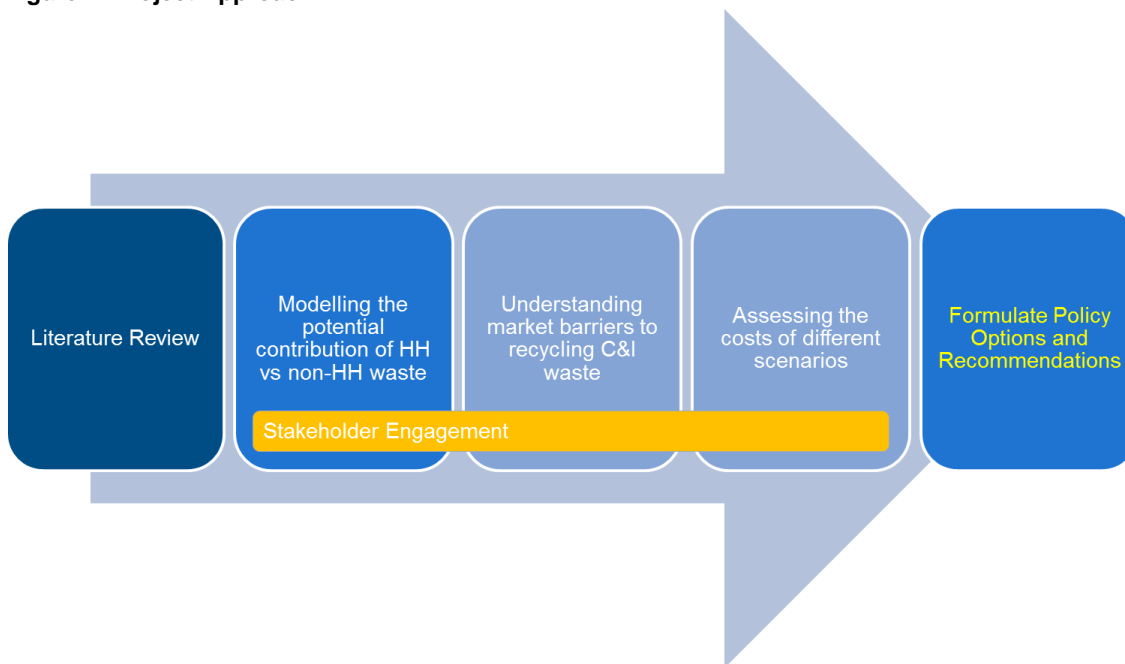
Figure 1: Factors required for increased recycling rates

1.1 Project Methodology

The ESA works to transform waste and resource management in the UK, supporting its members to turn Britain's waste into valuable resources whilst protecting the environment. This study focusses on the areas in which its members have most influence in the supply chain – end of use and end of life. The approach taken has been to

- Conduct a Literature Review
 - Reviewing recent policy, plans, strategies and any modelling conducted around reaching target recycling rates
- Model the potential contribution of Household vs non-Household waste
 - Using publicly available data such as WasteDataFlow submissions
- Understand market barriers to recycling C&I waste
 - Conducting stakeholder engagement through the form of a workshop and direct discussions with local authority commercial waste officers
- Assessing the costs of different scenarios
 - Using a combination of publicly available ready reckoners and known implementation costs for difference Local Authority collection systems
- Formulate Policy Options and Recommendations
 - With stakeholder feedback

Figure 2: Project Approach



1.2 The Current Policy Context

From the perspective of Local Authorities and the services they provide to their residents (often in partnership with the private sector), waste and recycling services provide a clear illustration of why schemes are not disparate by design, but as a result of a gradual but constant evolution of government policy, legislation, statutory duty and political influence.

In the case of waste and recycling, the impact of financial levers, including: Landfill Tax; fluctuating commodity prices; the development of alternative treatment technologies (such as EfW which can become cheaper during periods of depressed commodity prices); and the reduction of government funding, constrains the options available to Local Authorities to provide services in a consistent (harmonised) manner.

Waste is seen as an important element of 'local' politics, often described as 'the only service every resident receives every week', and methodologies are thus subject to local political agendas. As a result, any change to collection methodologies will require extensive research, consultation and scrutiny. Similarly, the constraints of the Planning system also ensure that the development of any waste facility can often be plagued with uncertainty and layers of bureaucracy.

It must thus be assumed that, unless a comprehensive, effective and enforceable government strategy includes specific requirements for the range of materials collected (which should also cover municipal like commercial waste), the gradual evolution of Local Authority municipal waste collection is unlikely to take place in any more a coherent manner than has been seen in recent years. WRAP's collection consistency framework³ provides a good steer for harmonisation and does make a recommendation for Local Authorities on the collection of a core set of materials, but doesn't extend as far as recommending that these are also collected by businesses:

- Plastic bottles
- Plastic packaging - pots, tubs and trays
- Metal packaging – cans, aerosols and foil
- Glass bottles and jars

³ <http://www.wrap.org.uk/collections-and-reprocessing/consistency>

-
- Paper
 - Card
 - Food and drink cartons
 - Food waste.

The framework is a long-term strategy (to 2025) but has not been widely adopted to date. With almost 60 Local Authorities going to the market for new collection contracts in the next three years it should be at the heart of the requirements but hasn't been for many of the authorities that have gone to OJEU within the last year. There are a number of reasons for its slow adoption, of which cost is the greatest:

- **Austerity** - Local Authorities are still expected to deliver savings. Reducing residual frequency can have the benefit of driving savings. Unfortunately for those 45% of authorities that have taken the savings associated with reducing residual collection frequency (or providing residents with a smaller capacity residual waste bin) without introducing a source segregated food waste collection system at the same time the cost per household will be an additional £6 - £15.
- **Timing** – collection changes often happen in line with vehicle procurement cycles over a 7-10 year basis. Any changes brought in earlier must either result in no significant changes to operational fleet or be an addition to existing fleet such as a dedicated food waste vehicle (this however can be costly)
- **Material requirements** – some authorities are still not collecting the full range of recyclates at the kerbside. This can be because there aren't suitable local outlets for the material (e.g. food waste in central London). For some authorities their local situation dictates that the environmentally best option is to encourage residents to prevent food waste but for any collected to be treated via Energy from Waste with, or for the quality requirements for materials to require separation (glass is collected via bring banks rather than at the kerbside), or there are no local outlets for the materials due to a lack of end markets (pots, tubs and trays, and tetrapaks and other cartons for instance).

This limits the ability of local government to achieve the statutory and financial targets imposed by central government, demonstrating that whilst central government is comfortable to utilise its financial leverage to enforce behavioural change on local government, its unwillingness to utilise its power to require a coherent approach to achieve the necessary outcomes creates a fragmented system.

The same reluctance to take responsibility informs the government's approach to industry. This approach, and its limitations, are clear in the policy direction statements it has released over the last few months.

1.2.1 A Green Future: Our 25 year Plan to Improve the Environment

The Governments recently launched plan for the environment (A Green Future: Our 25 year Plan to Improve the Environment⁴) contains ambitious aims, but refrains from setting targets, preferring to 'plan' to achieve outcomes, which are often ambiguously described.

Pledging to 'eliminate avoidable waste by 2050' and planning to 'eliminate avoidable plastic waste by 2042' hinge on defining 'avoidable', and are sufficiently distant not to impact on current investment decisions.

Similarly, no specific policies are outlined to address the current stalling of recycling rates. Pledging to 'Meeting all existing waste targets – including those on landfill, reuse and recycling – and developing ambitious new future targets and milestones' is a positive ambition, but undermined by the lack of detail regarding how to achieve or even address the performance gap in the short term.

Similarly, ambitions to:

- minimise waste;
- reuse materials as much as we can;

⁴ <https://www.gov.uk/government/publications/25-year-environment-plan>

-
- manage materials at the end of their life to minimise the impact on the environment;
 - work with waste management services and producers to support policies that deliver high-quality and quantity recycling, minimise environmental impact and ensure well-functioning secondary material markets (the use of recycled material in preference to virgin raw materials);
 - encourage producers to take more responsibility for the environmental impacts of their products and rationalise the number of different types of plastic in use;
 - work with industry to rationalise packaging formats and material formats to make sure that more plastics can be easily recycled and the quality of collected recycled plastics is improved;
 - reform our producer responsibility systems (including packaging waste regulations) to incentivise producer to take greater responsibility for the environmental impacts of their products;
 - explore extending producer responsibility requirements to plastic products not currently covered by our existing regimes to create a better market for recycled plastics;
 - work in partnership with industry to explore the possibility of developing additional tools that support businesses to identify sustainable supply chains; and
 - work with partners to consider whether benchmarking of environmental products and supply chain certification schemes could make consumers more aware of them, and drive higher standards are all entirely laudable, but rather light on detail. The industry now awaits Defra's forthcoming Resource and Waste Strategy, which may concern itself more with the details of how these ambitions are to be achieved.

It should be noted, however, that governments since 2010 have chosen to introduce voluntary schemes for labelling and recycled content. This reluctance to use their legislative power has led to a fragmented adoption by business, undermining the potential impact on recycling performance.

This approach also negates any option for the consumer to exercise their buying power, since the lack of coherent information compromises their ability to make informed choices.

The overall result is that consumers/householders are relatively powerless in the hierarchy of the current drive to improve environmental performance.

Supranational (i.e. EU) targets are delegated to national governments, within a governance framework which incorporates financial and reputational penalties for non-performance or non-compliance; substantial EU fines await should the UK fail to achieve the recycling target – unless we have exited the EU before the target date. A reporting system is incorporated which enables levels of compliance to be recorded, audited and reported.

The government has then passported these requirements to local authorities, using a network of legislative requirements, incorporating statutory duties, financial drivers, and again, reporting systems which enable levels of compliance to be recorded, audited and reported.

To achieve the required outcomes, local government thus amends the services provided to householders. The methodologies for the collection, separation and disposal of waste have been redesigned to facilitate the separate collection of recyclables, thus increasing the recycling rate, whilst minimising the volume of residual waste, reducing landfill requirements and thus cost.

This approach ignores the evidence of basic research, which demonstrates that not all recycling is necessarily environmentally efficient. Arguably, the most appropriate single measure of environmental benefit is carbon analysis (although analysing a number of metrics can provide a more holistic view). Carbon analysis looks at the entire lifecycle of products, looking at the carbon generated by all elements of the lifecycle – extraction of raw materials, processing, transport, manufacture, distribution, collection post-use and disposal.

For some materials (aluminium, glass), this type of analysis confidently demonstrates the carbon benefit of recycling. For others, such as paper, the analysis is less absolute, but other environmental impacts are relevant (managed forests for paper production are ecologically limited, and thus less beneficial than natural growth).

For other materials, such as plastic containers (low grade, mixed composition or multi polymer), the situation is more complex. Currently, the carbon used by refuse collection vehicles collecting a material which is difficult to recycle, has limited markets and requires a high degree of processing, may be on the wrong side of the environmental balance.

Householders are provided with information by their local authorities, but this usually focusses on how the materials are recycled, where they go, and the financial benefits of recycling instead of landfilling. But, without sufficient information on the whole product lifecycle or the carbon impact of the material, negligible information from the material producers regarding the recycled content or recyclability of products and limited information from their local authority on the full carbon impact of recycling vs disposal, householders are not sufficiently informed to make an empowered decision on how to deal with their waste.

The new Strategies described above indicate that the government is beginning to appreciate the quandaries implicit in the current approach to wastes management.

However, the re-engineering of a service methodology which has evolved in a piecemeal, reactive manner since 1846, without benefit at any stage of a coherent, evidence-based strategy, will require a degree of change which government, national and local, and their agents, will find challenging.

1.2.2 Clean growth Strategy

It is encouraging that the government's Clean Growth Strategy recognises the role of the waste industry in the transition to a clean growth, low carbon, circular economy approach to increasing the productivity and competitiveness of the UK economy.

It notes the 73% reduction in emissions from the sector (since 1990), the quadrupling of recycling rates since 2001 (albeit a low base), and the expansion of waste-derived renewable energy to a level where this source powers the equivalent of 9% of domestic properties.

However, the strategy's extensive ambitions are hampered by the lack of tangible policies or legislative proposals to facilitate the achievement of the provisional targets described.

1.2.3 Industrial Strategy

Again, an extensive document sets out a range of proposals with a coherent aim of driving change through the development of policies in pursuit of higher investment and productivity. These proposals cover five key areas:

- ideas (R&D and innovation)
- people (education and skills)
- infrastructure
- business environment (finance, business support, inward investment)
- places (regional growth).

For each area, new policies are proposed (although not explicitly described in terms of detail), and potential funding streams are 'committed'.

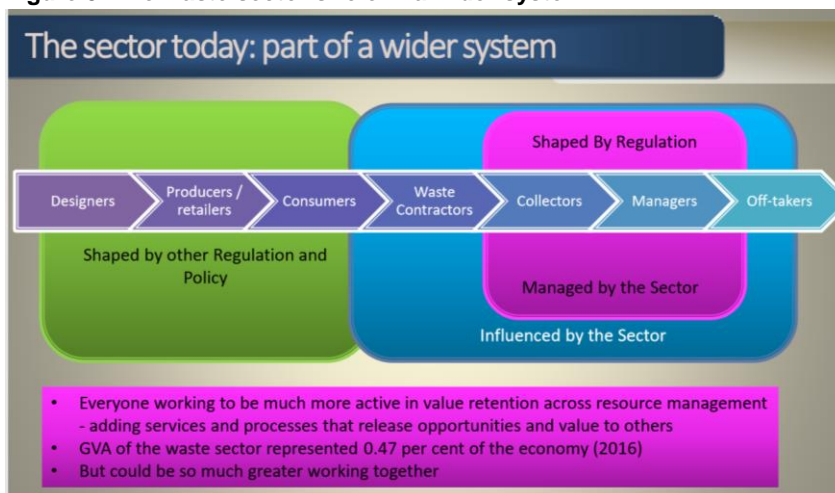
Whilst it is interesting to note the acceptance that the government has a role in steering the country's economic direction, and that the aim of closing Britain's current productivity gap with competitor nations is prominently addressed, the focus is more towards 'co-ordination' than direct action.

For those awaiting tangible drivers to drive investment and reward resource efficiency, further direction remains a requirement.

The development of a Waste Sector Deal does however provide an opportunity for the sector to propose a deal that is both transforming and transformative and that potentially influences other sectors. The ESA are leading the way in developing a deal that sets a clear ambition for the sector reflecting the Clean Growth Plan and Industrial Strategy. The objectives will be to influence the Waste Strategy to:

- Improve and transform how we do our job today while setting clear and ambitious outcomes for the future
- Enable and facilitate others to unlock a cleaner economy to improve resource productivity, and deliver a decarbonized economy
- Identify the barriers to unlocking greater value to the economy
- Build deeper and on-going collaboration with those who produce, sell, consume and re-use resources
- Accelerate investment in resource management and recovery processes

Figure 3: The waste sector's role in a wider system*



*Waste Sector Deal workshop slide

1.2.4 Potential effects of the EU Circular Economy Package

The Circular Economy Package (CEP)⁵ was adopted by the European Commission in December 2015. It includes a range of policy options around waste management but also addresses product lifecycles in terms of intelligent product design, smarter use of raw materials, improved reuse and repair, increased recycling and more resilient markets for secondary raw materials. It also limits the use of landfill to 10% of municipal waste (based on the EU definition of municipal waste) by 2035.

The Circular Economy package was formally agreed on the 18th April 2018 by the European Parliament with only final approval needed by ministers before it becomes law.

The main features of the package are:

- Municipal waste recycling target: 55% by 2025, 60% by 2030 and 65% by 2035
- Changes to the recycling calculation method

⁵ http://ec.europa.eu/environment/circular-economy/index_en.htm

- Broader definition of municipal waste which includes commercial waste that is similar to household waste
- Metals in Incinerator Bottom Ash (IBA) which are recycled could be counted towards recycling targets
- Separate collection requirements for dry recyclables will be extended to:
 - Biowaste by Dec 2023; and
 - Textiles by Jan 2025 subject to TEEP.
 - Household hazardous waste by Jan 2025 with no exception on the grounds of TEEP
- Packaging waste recycling targets: 65% by 2025, 70% by 2030

It is anticipated that the Package will be adopted into formal EU law before the end of the two-year Brexit process, and is thus expected to be among the environmental legislation brought into UK law via the 'European Union (Withdrawal) Bill'.

Whilst Local Authorities will be expected to reflect the principles of the Circular Economy, the primary challenges will be the increased recycling rate target, the further minimisation of allowable waste to landfill, and EPR. The latter, by making producers responsible for the full cost of recycling or disposing of products they bring to the market (including those costs currently incurred by local Authorities) should incentivise them to reduce the overall environmental impact of their products and packaging, reducing overall costs whilst minimising environmental impact. The CEP provides detailed changes aimed at strengthening EPR, with producers having to bear at least 80% of the costs of meeting waste and recycling targets and any new national ones, and at least 50% of the cost of meeting existing national targets.

Proposals on how the EPR would be introduced in contrast to the current PRN methodology are currently the subject of consultation.

1.2.5 Potential impacts from Brexit

The Department for Exiting the European Union (DEXEU)'s White Paper setting out the terms of the government's 'European Union (Withdrawal) Bill' confirms that the 'whole body' of existing environmental laws derived from EU legislation will be safeguarded in UK law prior to Brexit. Thus, all EU legislation which has not already been transposed into UK law will be transferred to UK statute, including current regulations governing waste, packaging, waste electrical and electronic equipment (WEEE) and landfill.

However, DEXEU has also stated that 'Following integration into UK law upon departure, all EU environmental laws will be open to being "amended, repealed or improved'. The UK is thus free to decide the future of its waste policy and laws.

This freedom has given rise to uncertainty over the future of environmental legislation and policy post-Brexit (but also opportunity). This is due to the methodology which will be utilised to "amend, repeal or improve" the current Regulations, with Ministers, utilising secondary legislation to amend or repeal primary legislation without parliamentary scrutiny. This may limit the ability of the wider waste sector to influence policy decisions, and may also lead to politically motivated policies being introduced which impact on local authorities' municipal waste activities.

A further concern is that at present, the UK is reliant on enforcement from both the European Commission and the European Court of Justice (through the threat of heavy fines) to ensure that environmental standards and targets are met.

The Government will thus need to consider the means by which environmental commitments are given effect in domestic law, and the scope and scale of the regulatory and accountability systems by which

the UK is held to adhere to the standards set. Will this involve an enhanced role for the EA, or will a new regulatory department be created?

Environment Secretary Michael Gove has recently announced plans to consult on a new, independent body for environmental standards. The proposed consultation regarding this suggest this will be a new, independent body that will hold Government to account for upholding environmental standards post-Brexit. Further details have not yet been announced.

A further key impact of Brexit is the issue of exporting waste and recycle to foreign markets. Currently, the adverse impact on the value of the pound has increased the cost of exporting Refuse Derived Fuel (RDF), whilst reducing the income received for recycle.

Although the 'unknown' elements of Brexit do present concerns for the sector it should also be considered an opportunity to revisit the status quo and reflect on what England wants to achieve in the future in terms of environmental performance.

1.3 Current progress towards the recycling targets

The setting of recycling targets is currently the key way in which the waste management sector is guided and held to account in relation to its environmental credentials. In order to meet these targets, the sector must continuously evolve and innovate to ensure that steady progression can be sustained, with the understanding that targets will continue to be extended to ensure the sustainability of the sector and that its contribution to wider circular economy ambitions are met.

In the UK this began with Best value performance indicators for each local authority allocated between 2001 and 2008 setting mandatory weight based targets for household recycling. This and the subsequent introduction of the waste framework directive in 2008 maintained pressure on the industry to take account for their activity and role in the vision of a circular economy, with maximisation of recovery, recycling and reuse activities, with minimisation of waste generation and disposal. This clear centrally driven message focusing on the concept of moving material away from waste and up the waste hierarchy has since led to significant changes in local authority service delivery and subsequently a significant increase the recycling rates.

In the UK waste data reporting via waste data flow from 2001 to 2014 has demonstrated that since the introduction of weight based measures, household recycling has risen from 12% in 2001 to 44% in 2014. What this illustrates is the effectiveness of central leadership in driving recycling rates to a point, but also that in recent years, most notably from 2011 onwards this target led approach not just in the UK, but now shared by all EU member states has varied in its effectiveness with differing economic, political and social and demographic challenges including:

- Central leadership and statutory targets;
- The pressure to reduce public sector spending following the global economic recession (austerity agenda); and
- The demographics of the population which play a role in the amount of recycling (and contamination) that can occur.

Figure 4: UK household recycling rate 2000 to 2014

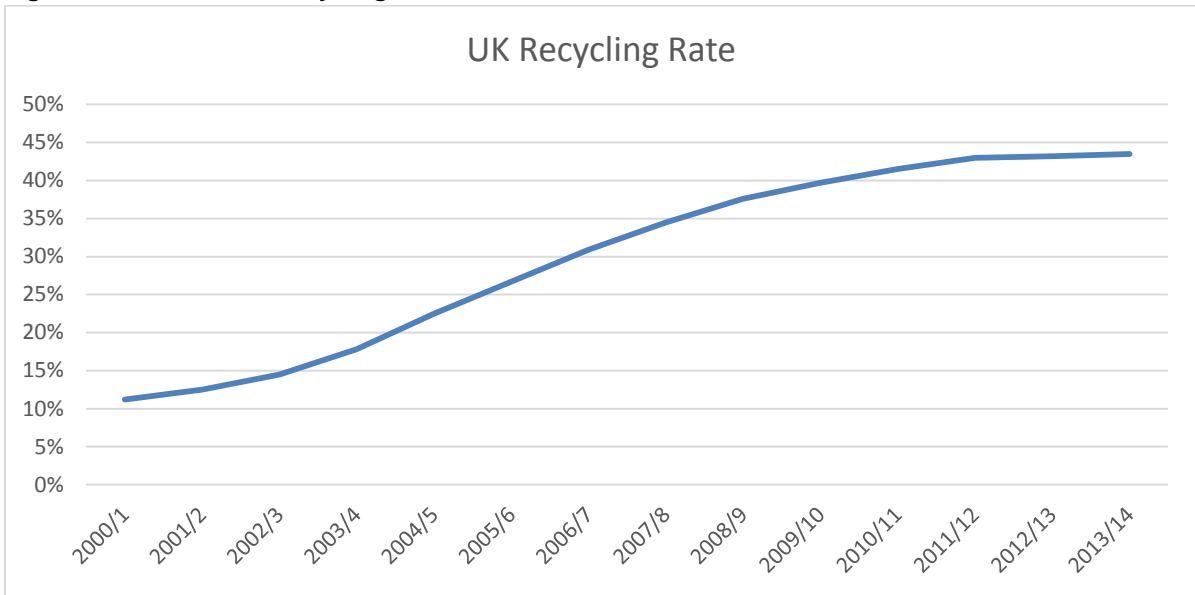
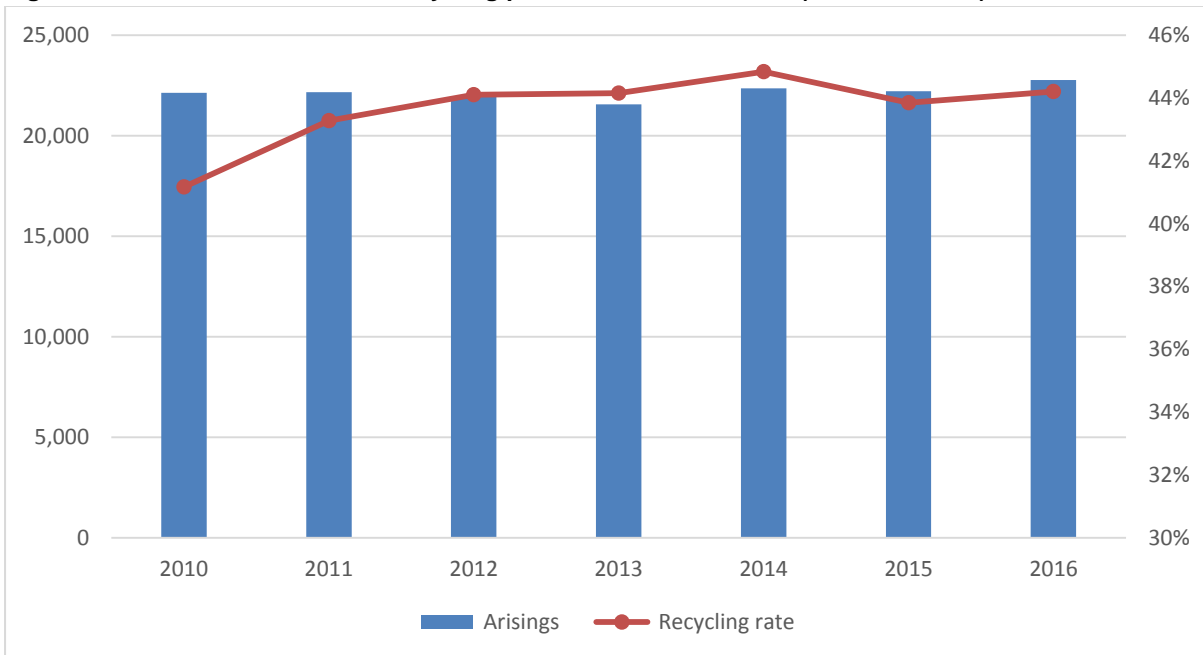


Figure 5: Waste from Households recycling performance 2010 – 2016 (Defra statistics)⁶



More importantly for this study when reviewed in isolation, it is England’s household recycling rate that has plateaued most notably with change of just 2% between 2010 and 2017. This highlights the scale of the challenge facing the industry in meeting both the 50% household recycling target for 2020 and the municipal target of 60% for 2030. With performance stagnating, what steps can be taken to reach higher targets, and at what cost and at who’s feet will this burden fall?

⁶<https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management>

2 Our Modelling Approach

The first step of the project has been to model different scenarios for reaching the municipal waste targets that we need to achieve in the (very) near future. Utilising publicly available data a 'stepwise' approach has been used to build on the existing performance baseline (business as usual). We have modelled Local Authority Collected Waste (LACW) and the commercial element of Commercial and Industrial Waste (C&I) collections separately to understand both the different challenges that apply to the two waste streams, but also the interplay between them and how the burden of improvement split between them.

Importantly, in doing this modelling we have made some assumptions around policy requirements which are considered integral to overcoming current weaknesses in the market place, particularly around the material quality and strength and depth of material markets. This has been brought into to stark reality with the onset of China's national sword policy and the significant turbulence felt as a result in all key recycle markets. Therefore, albeit there are changes that can be made to help support greater collection of recyclable materials, the strength of end markets is what will define to what extent these materials are commercially viable to recycle. It is also this commercial viability that will help incentivise greater investment in material collection and recycling infrastructure, as greater confidence in end markets allows both local authorities and service providers to push for greater performance, rather than the status quo or minimum standards on contractual obligations.

2.1 Policy context for modelled outcomes

In modelling the various scenarios for improvement of recycling performance for both local authority and commercial we have consulted the ESA members on which policy / drivers the modelling will need to integrate with, but also what additional is required to enable the scenario's to be achievable.

2.1.1 Integrations with existing drivers in the market

WRAP's consistency of collections - The 'Harmonisation' agenda⁷ stems from a political assumption that if collection services across the country become more consistent, the public would have a clearer idea about what can and can't be recycled, and as a result, improve the quantity and quality of the recycle they present for collection. It would become far easier to promote and communicate recycling services on a national scale, and the collection of a standard set of materials would increase the confidence of the major corporations and brands. It is also assumed that by standardising the methodology and frequency of collections, economies of scale may be achievable, certainly in terms of containers but also for vehicles, should a common collection methodology be adopted.

The 'vision for greater consistency in collections' includes a consistent set of materials for recycling; Glass, cans, plastic containers, paper/card, food & drink cartons and food waste, collected through one of three collection methodologies (Figure 6): either multi-stream, two-stream (with fibres separate) or fully co-mingled, all with food waste collected separately.

WRAP is currently conducting (and funding via DEFRA) a programme of work with local authorities to examine the business case for greater consistency in household recycling in England. This should ensure that the political imperative is balanced by comprehensive data modelling, operational practicality, financial realism, the concerns of reprocessors regarding the quality of materials collected and the need for local authorities to reduce costs wherever possible.

Figure 6: The framework for greater consistency⁸

⁷ <http://www.wrap.org.uk/collections-and-reprocessing/consistency>

⁸ http://static.wrap.org.uk/consistency/Read_more_about_the_framework.pdf

Each system varies in its performance against the key factors considered as outlined in the underpinning evidence and analysis.

Multi-stream with separate food:

Household plastic packaging, metals (cans, aerosols and foil) and cartons

Glass containers and card*

Paper

Food waste separate

Two-stream (fibres separate) with separate food:

Household plastic packaging, metals, glass and cartons collected as one stream

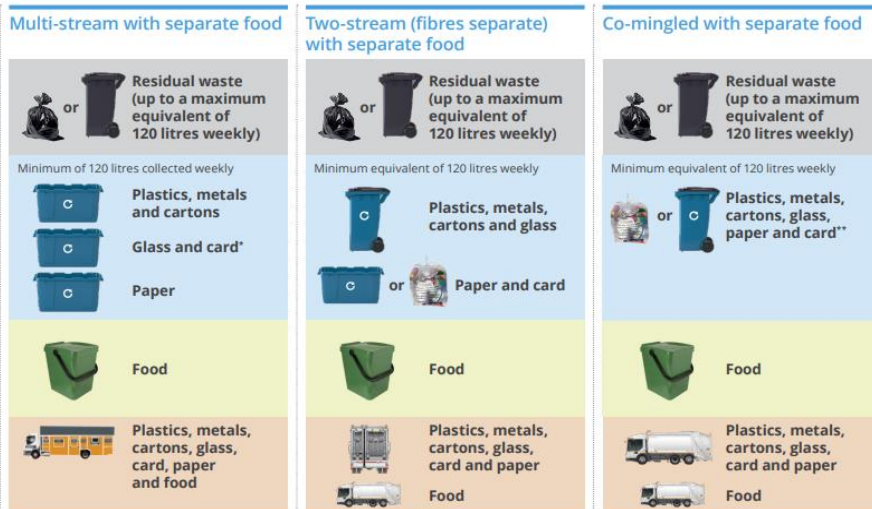
Paper and card collected as one stream

Food waste separate

Co-mingled with separate food:

All dry mixed recyclables collected as one stream (co-mingled)**

Food waste separate



*Glass and card would be presented in the same box but separated into different compartments on the vehicle. In flattened properties card and paper could be collected together. Glass would be collected as a separate stream.
 ** The advice from reprocessors is that glass and paper are collected separately to maintain material quality.

In the modelling we have delivered as part of our assessment of future scenarios we have been consistent with the options included in the WRAP framework. In reviewing the impacts of changes in frequency of residual waste material, as well as the addition of extra material collections (food waste being within WRAPs consistency package) we have built upon the potential widespread implementation of this policy, rather than starting afresh. Flexibility resides within the modelling for local authorities to change recycling service (format of waste collection) whilst changing frequency of residual, and thus the uplifts presented in this report should complement the ongoing shift towards consistency of collections.

Material Quality – The “MRF code of practice”⁹ for England and Wales implemented in 2014 has set the precedent for requirements on sampling and reporting for sorting of materials. This has thus provided a framework for a greater focus on material quality and reduced contamination, but also greater accountability for those performing poorly. This drive for greater material quality has intended indirect impacts on material markets, via its means of reduced contamination providing higher quality, higher value material to secondary markets.

2.1.2 Stimulation of end markets

In addition to integrating the forward-looking scenarios with existing drivers within the market, there are also new problems that will need to be overcome to ensure that even the status quo for recycling can be maintained. Chief amongst these for ESA members is that of the security of end markets for recyclable materials collected. In recent months, with the announcement of China’s National Sword policy the stability of end markets for recyclable materials has been fractured with measures of material values falling significantly. Most prominent within this market changes have been the rapid deterioration of plastics and fibre markets with mixed paper prices falling to a low of £0 to £10/tn and even plastic bottles falling to between £10 and £50/tn. This has raised Materials Recycling Facility (MRF) gate fees to levels at which other options become competitive.

This presents a significant two-fold barrier to baseline recycling performance, let alone any changes to look at capturing and reducing greater tonnages. These barriers include:

- Maintaining recycling as a cost-effective solution requires inherent value in the materials collected, without a flourishing secondary materials market determining this value. This is especially true for lower grade materials, which are currently mostly reliant on export markets

⁹ http://www.legislation.gov.uk/uksi/2014/255/pdfs/uksi_20140255_en.pdf

for recycling. Without these outlets, recycling these materials quickly becomes a less viable solution.

- Having capacity to treat and recycle material without access to the largest market for materials in China will require significant additional investment

As such with consultation with ESA members, it has been considered that in all of the forward-looking scenario's measures will need to be implemented to support secondary material markets. This will require policy decisions, to reduce use of low quality material and increase demand in secondary material markets. In discussion with ESA members it is believed that review and reform of producer responsibility, packaging returns and the possibility of deposit return schemes, could all be potential ways to help support these end markets. In this respect, it is considered these types of policy are a requirement to enable the modelled scenario's rather than be simply complementary. The types of policy levers that should be considered are set out below.

2.1.2.1 EPR and review of PRN

The Producer Responsibility Obligations (Packaging Waste) (Amendment) Regulations (2016), which transpose The EU Packaging Waste Directive (94/62/EC) into UK law, are the latest version of the packaging recovery obligations which were first introduced in 1997 as the first producer responsibility legislation in the UK.

The Regulations work on the principle of Collective Producer Responsibility, requiring obligated producers to pay a proportion of the cost of the recovery and recycling of their packaging. Currently in the UK this obligation is achieved through Packaging Recovery Notes (PRNs) which are issued by accredited reprocessors when they have recovered and recycled a tonne of packaging material. The accredited reprocessor can sell the PRNs to obligated companies or Compliance Schemes who use the Packaging Recovery Note to prove that a tonne of packaging material has been recycled on their behalf. This in turn has led to the development of PRN trading markets.

Local Authorities are unhappy with this system; the utilisation of the PRN income (in their opinion) is not transparent, and the costs of collecting and recycling the waste packaging from households fall on the Local Authorities, not the packaging producers.

The Circular Economy Package proposed by the EU addresses this by proposing the extension of producer responsibility to ensure they are responsible for the full costs of recycling or disposing of their products. By ensuring that producer responsibility encompasses the entire lifecycle of the product, from manufacture to disposal, including the costs currently incurred by Local Authorities, producers will be incentivised to reduce the overall environmental impact of their products, reducing overall costs whilst minimising environmental impact.

Designing products with recycling incorporated into the cost base would incentivise the use of more easily recycled/reused materials, helping create a more stable market for secondary materials.

Local authorities and their private sector contractors come into contact with products at the end of their life. If products can be better designed, to last longer (increased durability), contain less environmentally damaging materials and also be designed for repair, disassembly or reprocessing it would be easier to keep those products and their material constituents circulating within the economy for longer. This reflects the issue that the composition of municipal waste will change over time should CE principles become fully adopted. These impacts can already be seen in the light-weighting of glass, the replacement of glass containers with plastics and reduced paper tonnages due to the impact of digital reading replacing traditional printed media. Conversely, cardboard tonnages are slowly increasing with the increase in internet shopping.

Better design of packaging and light-weighting will impact on both the volume and composition of municipal waste; there may also be a beneficial impact on contamination levels, and a reduction in non-target materials where ‘more easily recycled’ materials are utilised for packaging.

Summary:

Levers	Revision of Government policy in light of CEP targets
Impacts	Unclear without further research, but would support the stimulation of end markets for recyclable material and drive better design of products
Risks	Unclear without further research
Barriers	Government policy
Cost	Unclear without further research

2.1.2.2 DRS and Alternatives

In March 2018 the Government announced that it will be introducing a deposit return scheme in England to increase recycling rates and slash the amount of waste polluting our land and seas subject to consultation.¹⁰ The scheme will cover single use drinks containers, whether plastic, glass or metal. The consultation will look at the details of how such a scheme would work, alongside other measures to increase recycling rates.

The logic of this approach is the perceived failure of current collection schemes. Estimates about the amount of containers being successfully recycled varies¹¹:

- plastic bottles – between 58% and 74%
- Glass containers and bottles – 67% and 70%
- Aluminium and steel drinks cans – 70%

Supporters of DRS schemes point to its success in other countries and that well-designed and well-run deposit return schemes can deliver an estimated increase of around 20% in the reported amount of beverage containers collected for recycling, and deliver a better quality of captured material (i.e., less contamination) than is currently estimated as happening in the UK for beverage packaging. But the potential benefits for the UK are less clear, largely due to the level of infrastructure required, along with the potential for adverse effects on existing LA collection schemes. This could mean that a UK system would be best focused on containers consumed “on-the-go” which do not enter they household stream. A report commissioned by Keep Britain Tidy (KBT)¹², estimated that a DRS for drinks containers could save local authorities up to £35m pa, from reduced collection costs, reduced gate fees for the sorting of mixed recyclables and a reduction in the spend associated with clearing litter. However, LARAC disputed this estimate (claiming it to be based on only four authorities), suggesting that the DRS infrastructure costs would be “better spent on existing collection systems and give a better increase in the overall recycling rate”.

To further add to this confusion, there is no certainty regarding the exact volume of drinks containers in the current residual waste stream; current estimates rely on an assessment of the volume of bottles placed on the market compared to those recorded as successfully recycled. With this degree of uncertainty regarding current and potential volumes, along with the lack of an accurate projection of

¹⁰ <https://www.gov.uk/government/news/deposit-return-scheme-in-fight-against-plastic>

¹¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/694916/voluntary-economic-incentives-working-group-report-drinks-containers-final.pdf

¹² <http://www.keepbritaintidy.org/sites/default/files/resource/11%20October%202017%20-%20New%20DRS%20report%20published.pdf>

public participation in any scheme introduced, focussing on the practicalities may provide a degree of clarity.

From the perspective of Local Authorities and their private sector partners, it is difficult to project any accurate cost savings from the introduction of a DRS. Recently published analysis commissioned by SUEZ¹³ and developed by Oakdene Hollins highlights that DRS could provide new revenue streams for Local Authorities, such as operating redemption points or the operation of local consolidation points.

The following activities are also highlighted as opportunities to compensate any loss of revenue:

- Reduction in residual waste requiring treatment
- Reduction in material recovery facility and collection costs; and
- Reduction in street cleansing costs.

Analysis conducted in 2017 by Eunomia¹⁴ estimates a potential saving of £56M from the introduction of a DRS scheme (with potential savings of between £60K and £500K for the eight authorities analysed as part of the study).

A proportion of qualifying recyclate will move from kerbside schemes to the DRS; the success of any DRS will, however, be dependent on its success in attracting recyclate from householders who currently don't recycle this material at all at present. If the introduction of a DRS is successful in increasing the participation in recycling, it is possible that other recycling activities may also benefit, which may lead to an increase in overall recycling rates; however, this cannot be accurately projected.

The situation is complicated by concerns regarding the level of provision of DRS facilities. From the perspective of small retailers, the Association of Convenience Stores have raised a number of practical concerns¹⁵ regarding the space available in-store for reverse vending machines, the cost of implementation and the impact on staff resources. Their view is that "The UK has a far more developed kerbside recycling infrastructure than some European countries that have introduced DRS, and we believe that the Government should focus its efforts on working with local councils to maximise the effectiveness of kerbside recycling and not place extra burdens on retailers."

LARAC's view is that "LARAC would not want to see deposits introduced for plastic bottles that removed them from the council collection schemes. This would have the effect of making the council schemes less efficient and require a new set of collection infrastructure to be introduced. LARAC believes that the UK is better served by providing more funds for the existing council kerbside collection scheme for plastic bottles".¹⁶

If the introduction of any DRS is limited to major retailers due to the concerns outlined by the ACS, effectively limiting the scheme to an enhanced bring bank scheme (albeit with a cash-back incentive), it is difficult to see how this can be more efficient than an appropriately funded universal kerbside collection service.

Ultimately, this issue reverts to the question of whether 'extended producer responsibility' should require producers to bear the full end of life costs for the collection and management of the waste their activities generate. If the government is to implement this approach, a more coherent view of the benefits of introducing DRS options may emerge.

¹³ <http://www.sita.co.uk/news/tag/drs/>

¹⁴ <http://www.eunomia.co.uk/reports-tools/impacts-of-a-deposit-refund-system-for-one-way-beverage-packaging-on-local-authority-waste-services/>

¹⁵ https://www.acs.org.uk/sites/default/files/lobbying/acs_submission_-_defra_deposit_return_scheme.pdf

¹⁶ <https://www.parliament.uk/business/committees/committees-a-z/commons-select/environmental-audit-committee/news-parliament-2017/disposable-packaging-coffee-cups-and-plastic-bottles-17-19/>

Summary:

Levers	Revision of Government policy
Impacts	Undetermined, but will have a focus on high quality material and stimulating end markets for recyclable materials
Risks	High value materials lost from Local Authority control
Barriers	Government policy
Cost	Infrastructure

2.2 Local Authority modelling

Local Authority Collected Waste has been modelled from the bottom up using the most recent Defra reported data (2016/17) by local authorities at collection, disposal and unitary level. This provides information on the tonnage of waste generated, collected as dry recycling, organic recycling or as residual waste material. This has then been supplemented with more granular information extracted from waste data flow in order to understand the individual material streams, in particular the separation between food and garden materials. The combination of these data sets provides the model with its baseline tonnage data for each authority.

To classify these authorities and provide a greater level of flexibility when overlaying performance assumptions, rurality groupings have been utilised to separate authorities into 6 groupings as set out below. These are adopted based on WRAP’s classification of local authorities combining both the housing density of a given local authority with its characteristics in relation to social-economic conditions¹⁷. The relationship between these factors contributes therefore to both the recycling performance estimated to be possible, but also simply the potential for certain levers to be possible in for example high density urban environments.

Rurality Groupings utilised within the modelling process:

- **Rurality 1** – Predominantly Urban, higher deprivation
- **Rurality 2** – Predominantly urban, lower deprivation
- **Rurality 3** – Mixed Urban/rural, Higher deprivation
- **Rurality 4** – Mixed urban/rural, lower deprivation
- **Rurality 5** – Predominantly Rural, higher deprivation
- **Rurality 6** – predominantly rural, lower deprivation

Classification by these ruralities has meant that overlaying of assumptions has been more granular but also that sensitivities can be analysed to understand realistic and pragmatic impacts on what performance might be when taking Urban (substantial proportion of flatted property) authorities into account.

The final step of classifying local authorities was to identify the range of services currently operated within the baseline year. This includes the frequency of collections for all services including residual, recycling, food waste and garden waste, but also the format of service operated for example twin stream recycling or combined food and garden rounds. This understanding of baseline service is pivotal in then

¹⁷http://www.wrap.org.uk/sites/files/wrap/priv_download/Analysis_of_recycling_performance_and_waste_arisings%20in%20the%20UK%202012%2013.pdf

being able to overlay assumptions of improved performance, but also the potential cost which could be incurred in doing so.

The collation of data above provides a data base which when combined allows a waste flow model of local authority collections to be developed estimating the tonnage profiles for local authority collected waste as either recycling (dry or organic) or residual and the resulting recycling performance.

Looking forward to answering the questions of the potential recycling performance achievable by Local authorities a range of “levers” were then identified which could be “pulled” by local authorities (and their partners) in order to improve recycling performance. These have been framed by those “levers” which are currently readily available to local authorities within the current policy and legal framework, consisting mostly of changes to frontline services to either divert more material, minimise residual waste or both.

Levers currently considered within the analysis include:

- **Business as Usual (BAU)** – No change in current scheme or performance
- **Scenario 1** - Weekly collection systems transfer to Alternate Weekly Collection (AWC)
 - **Scenario 1a** – Scenario 1 with an associated waste minimisation effect leading to a 7% reduction in residual waste
- **Scenario 2** - A dedicated food waste collection is added to any Local Authority without one
- **Scenario 3** – Alternate Weekly Collection (AWC) + source segregated food waste collection
- **Scenario 4** – AWC collection systems transfer to three weekly collections
- **Scenario 4a** – Scenario 4 with a waste minimisation effect of 10% in residual waste
- **Scenario 5** - AWC + food waste collection (high yield) with additional communications
- **Scenario 6** - Three weekly residual waste collection + food waste collection (medium yield)
- **Scenario 6a** – Cumulative impact of shifting to three weekly residual waste collection, adding food waste and associated waste minimisation
- **Scenario 7** - Three weekly residual waste collection + food waste + Absorbent Hygiene Products (AHP)
- **Scenario 8** - Three weekly residual waste collection + food waste + collection of Waste Electrical and Electronic Equipment
- **Scenario 9** - Three weekly residual waste collection + food waste + collection of Textiles
- **Scenario 10** - All authorities go to three weekly residual waste collection + source segregated food waste and a source segregated collection of AHP, WEEE and Textiles

Each of these levers is modelled in isolation as well as in an additive manner to review the impacts of each lever individually, as well as the potential aggregated impact of implementing multiple levers together. We have assumed within our modelling that existing arrangements for collecting dry recyclables remain unchanged. We believe that in the future there will be an increased move towards a separation of the fibre stream (paper and card) to enhance material quality. These changes will take a number of years to appear as a trend given procurement cycles for Local Authorities may mean that recycle contracts may not change for 4+ years and vehicle/collection system changes may not change for 7-10 years.

2.3 Commercial Waste

Commercial Waste arisings pose a significantly different challenge when it comes to developing a modelling approach. This is as a result of the lack of clear and concise reporting on either tonnage of waste collected or its composition. This makes it very difficult to understand even the split of waste between waste from definite industry sources (i.e. metal filings from metal industries) versus that which is “Municipal Solid Waste (MSW) like” waste which is most easily targeted for greater source segregation and recycling. This is a particular problem given the classification of MSW to include this proportion of material as municipal like solid a waste and therefore distinguishing a clearer divide between MSW recycling rates and that which is industrial, construction and demolition.

However, it has been important to include commercial waste arisings within this field of study as it is a significant portion (currently roughly half) of the overall potential recycling target. It is also true to say that commercial waste streams are seen as a significant area to target for improvement in the battle to get to the 55% and 60% recycling targets with the potential to reduce the burden on Local authority improvements. The difficulty in this though is that commercial waste collections are not consistently delivered, a wide range of service providers compete for individual contracts, and very limited regional business groups (Such as Business Improvement Districts) opt into a consistent collection system.

Other challenges to understanding commercial collections and the opportunities for increasing recycling rates include:

- Lack of existing reported data on:
 - Operations
 - Composition
 - Tonnage
- Space required to store an additional bin for some SMEs
- Economic pressures of having to pay for an additional service
- Lack of understanding
- Contamination levels in recycling collected
- Within Local Authorities a loss of the skills required in some areas to operate a commercial waste and recycling service
 - Experienced officers and/or a private sector partner is required

As a result of all of the above a pragmatic approach to C&I has been undertaken. As it has been modelled separately its impact on overall recycling rate can be reviewed as a sensitivity at all of the MSW scenario's individually. As such, the impact of changing C&I recycling rates can be reviewed at any break point for LA's be this after AWC and food waste or three weekly. This gives the analysis the flexibility to understand the potential impact of LA and C&I waste individually but also as a combined approach.

Defra's latest C&I waste estimates published in February 2018¹⁸ (but with estimates for 2016 which we have projected forward) have been utilised as the baseline for the waste flow model with the potential to vary the recycling rate performance on each scenario. This approach has been utilised because on top of a limited understanding of the C&I waste generation rates there is also a limited and varied opinion as to what the proportion of this material is currently recycled. From our understanding (based on stakeholder feedback and ranges published) current estimations of C&I recycling rates range between 50% to 60%.

¹⁸ <https://www.gov.uk/government/statistics/uk-waste-data>

2.4 Recycling Scenarios

Three over-arching scenarios have been modelled as part of this study in order to review both the potential changes required but also the potential impact of those changes on cost of delivery and the treatment capacity gap. These scenarios are defined as:

- **Business as Usual** – No change in either LA services or commercial recycling performance
- **Relatively cost Neutral** – local authority changes which are broadly cost neutral to adopt. Commercial recycling rate is fixed at 60%
- **CE Package** – additional changes in local authority frontline services to get to 55% recycling combined with 70% commercial recycling rate.

These scenarios are outlined in more detail in turn within the sections below.

2.4.1 Timescales

For the 50% by 2020 target we've assumed that this isn't achievable given our current recycling rate and services. In a no-growth scenario we'd need to increase recycling rates by 7% requiring either significant diversion, or residual waste minimisation – something that has not been delivered in recent history. Although services are shifting and the ~60 local authorities going out to procurement in the next three years could help to push through changes that will enhance performance, this won't come soon enough to allow us to hit the required target.

A longer timescale provided by a 2030 target year gives an opportunity to implement some significant service changes to lift recycling rates including the following scenarios for all authorities.

2.4.2 Business as usual

The Business as usual scenario is reflective of a position where no service change happens for local authority collections and there is no coinciding improvement in performance from commercial recycling. As such tonnage profiles for 2030 are representative of current performance with waste growth applied to 2030. Annual growth rates applied are 0.5% for Local Authority waste and 0.7% for commercial waste (Central estimates from the residual waste capacity gap report¹⁹), to account for increases in population, housing stock and economic growth over this time period. According to current projections, the number of households in England will increase by 210,000 every year between 2014 and 2039²⁰.

2.4.2.1 Mix of Household and Non-household

As per the baseline performance, the mix of household and non-household remains at a local authority collected recycling performance of 43% with a commercial recycling rate of 60%.

2.4.2.2 Local Authority requirement

In this baseline scenario the emphasis is on local authorities to maintain their current performance despite the growth of households and in waste arisings applied up to 2030. This means no extensive service changes are assumed, simply extensions of the current service to provide a universal service for all households.

2.4.2.3 Commercial requirement

As is the case for the local authority collected waste the assumption here is that commercial waste recycling performance remains stationary and caters for additional waste growth without striving for greater (recycling) performance. Therefore, no assumptions around greater uptake of commercial collections or source separation of materials by commercial premises are made.

¹⁹ http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

²⁰ <http://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7671>

2.4.2.4 Residual Waste Treatment

Residual waste treatment capacity is defined by the upper, middle and lower treatment capacity estimates as reviewed within the residual waste capacity gap report²¹. These are taken to include both the additional capacity from ongoing development of EFW facilities and potential changes to future RDF capacity.

2.4.3 Relatively cost neutral

The second scenario modelled is that of a relatively cost neutral solution, taking into account a range of Local Authority collection levers alongside an uplift in commercial recycling. This scenario broadly aligns with the 50% Local Authority recycling rate and a 60% commercial recycling rate presented within the UK Residual Waste: 2020 Market review report²². It is assumed to be relatively cost neutral resulting from the additional costly services of source segregated food waste collections being paid for by savings gained from reduced residual frequency (e.g. implementing a food waste collection at the same time as moving to AWC). The important factor in this is that a whole system saving has been assumed, as such would only be cost neutral if savings (Disposal Credits) on treatment and disposal of waste are shared with collection authorities within two tier arrangements.

2.4.3.1 Mix of Household and Non-household

The combination of household and non-household waste for this scenario has been set out as a balanced approach with local authority recycling rates reaching 53% and commercial waste reaching 60% by 2030. The combination of these two provides a scenario where England's recycling performance reaches **56%** just missing the 60% 2030 target under the CE package.

2.4.3.2 Local Authority requirement

In order to get to this 48.4% kerbside collected recycling rate for Local authority collected material (which contributes to the overall rate), it has been assumed that there is a significant combined effort, with all collection authorities making strides towards scheme improvement. This includes shifting either to fortnightly residual waste collections (rurality's 1 and 2) and three weekly residual waste collections for rurality's 3, 4, 5, and 6. In doing so however it is assumed that savings gained from reduced frequency can be re-invested in the addition of source segregated food waste collections resulting in a net cost neutral improvement in recycling rates. In this instance it is clear there will be a difference in the burdens paid by local authorities, with those starting from a weekly position gaining more with potential savings from the combined shift of both reduced residual waste collection and implementation of weekly food waste.

To help address budgetary pressures many authorities have changed from a free to a chargeable garden waste service in the past few years (45% of Local Authorities operated a chargeable service in 2015/16). This can provide revenue for an authority which can be reinvested in services. Not everyone using the free service will be willing to pay for a service and broadly the tonnage collected at the kerbside reduces by 30-35%. Some of this tonnage migrates to HWRCs, some is diverted to the residual waste stream (although this can be limited if there is a capacity restriction) and some to home composting. Depending on the starting point for the local authority this can reduce their individual recycling rate between 1% and 9%. Garden waste is a heavy low value material stream that is better treated in-situ by home composting if possible. Within the modelling we have assumed that although there will be more authorities (particularly rurality 3 and above) moving to a chargeable system that the overall recycling rate will stand still. Any losses in percentage points will be offset by those authorities that have implemented other interventions.

It is also pertinent to note that when "cost neutral" has been considered this is based on a whole system costing approach thus savings from the frontline resourcing are supplemented by additional savings on

²¹ http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

²² http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

treatment and disposal. In order for this to happen new deals and approaches to partnership working and disposal credits will need to be considered to ensure the full incentive of reduced frequency can be brought into account for collection authorities. Without this re-imburement of treatment and disposal savings, it is likely to be a far less palatable service change for collection authorities to consider.

It's recognised that not every Local Authority in England will be able to make a shift towards reduced frequency collections particularly urban authorities with high levels of flats and multi occupancy accommodation such as those in central and east London. Provision of a universal service for all residents, regular communications, a focus on contamination, introduction of bring to food waste sites, the ability to reduce the capacity (e.g. slimming the wheeled bin from a 240l to a 180l bin) of the residual waste bin, and adequate provision for waste and recycling within new builds are part of a portfolio of different interventions that could be utilised. The percentage uplift in recycling that this might provide will not be as great as a shift to AWC but should support the journey to higher overall recycling rates for England.

2.4.3.3 Commercial requirement

In the relatively cost neutral scenario it is assumed that the commercial recycling rate will remain at 60%. Without significant intervention the recycling rate will not increase. An increase in would only be achieved by the commercial sector and local authorities increasing commercial waste collections, and offering an appropriate service which where possible is consistent to that of their household collection service.

2.4.3.4 Residual Treatment

As in the baseline, residual waste treatment capacity is defined by the upper, middle and lower treatment capacity estimates as reviewed within the residual waste capacity gap report²³. These are taken to include both the additional capacity from ongoing development of EFW facilities and uptake of additional RDF capacity.

2.4.4 CE package

The CE package scenario is reflective of the additional measures required to maximise Local authority waste collections, with additional expectations of commercial waste rising to a 70% recycling rate with mandatory source segregation of dry recycling, organics and residual material.

Approximately 80 – 85% of material in household waste is recyclable. To achieve some 60% recycling rate residents would need to capture at least 70% of their recyclables, consistently, every week particularly the heavier material streams such as food and garden waste. Contamination, inconsistencies within materials collected across authorities, and current levels of participation by residents would make this recycling rate almost impossible without increased investment and significant behaviour change.

2.4.4.1 Mix of Household and Non-household

The combination of household and non-household waste for this scenario has been set out as a balanced approach with Local authority recycling rates reaching 55% and commercial waste reaching 70% by 2030. The combination of these two provides a scenario where England's recycling performance reaches 65% exceeding the 60% target for 2030 under the CE package, and almost reaching the 65% target which has now been deferred until 2035 under the legislation.

2.4.4.2 Local Authority requirement

In order to get to a 55% recycling performance, it is assumed that all collection authorities can make transitions to reducing residual collections to three weekly with the addition of source segregated food waste collections. In addition to these core services additional materials are targeted in the form of AHP's, WEEE and textiles. These additional materials are assumed to be kerbside collected at a frequency of between once a month and once per quarter collections capturing 25-30% of the target

²³ http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

materials available, which will contribute approximately 1% to the recycling for AHP and 1% to the recycling rate for WEEE and Textiles combined.

2.4.4.3 Commercial requirement

In a more ambitious CE scenario it is assumed that there will be a significant additional uptake in commercial recycling collections with a coinciding uplift in recycling performance to 70%. This is assumed to be triggered by policy to drive source separation of organics, dry recyclables and residual materials, and thus will come at additional costs for commercial entities to deliver, despite potential savings from reduced disposal costs. For business the cost per tonne of **additional** recycling could be in the region of £40 - £50. This could cost the industry an additional £160 million/yr in cost by 2030.

2.4.4.4 Residual Treatment

As in the baseline, residual waste treatment capacity is defined by the upper, middle and lower treatment capacity estimates as reviewed within the residual waste capacity gap report²⁴. These are taken to include both the additional capacity from ongoing development of EFW facilities and uptake of additional RDF capacity.

3 Methodology and Data Sources

3.1 Data Sources

In order to collate a holistic profile of all the authorities within the scope of England, data was used from Waste Data Flow (WDF), Defra, Wrap, ESA members and our own in-house benchmarking tool (Table 1). The data collated was focused within the time frame of the 2016/17 where possible.

Table 1: Data Sources

Source	Data	Period
Waste Data Flow (WDF)	Question 1, 2, 10, 11, 14, 16, 16c, 17, 18 & 23	2016/17 financial year (April to April)
Defra	Waste household and non-household tonnages	2016/17
WRAP	Indicative Cost and Performance Online tool	Most up to date version of the online tool
WRAP	Food ready reckoner	Most up to date version of the tool
In-house	Benchmarking Tool (based on Wrap)	Waste arisings 2015/16
ESA members	Commercial waste costs	2017/2018

3.2 Business as usual

3.2.1 Mix of Household and Non-household

Household recycling rates for 2016/17 (WDF) have been used with the C&I element taken from the latest Defra C&I update (data from 2016).

3.2.2 Local Authority requirement

3.2.2.1 Baseline Profile

The baseline was created by collating the information from our benchmarking tool, in regard to rurality, the dry recycling and residual schemes, as well as their frequency. The status of each authority's food

²⁴ http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

and garden scheme was also identified. WDF information from question 2 provided the household numbers and both household and non-household tonnage data from Defra's annual report was used to show the 2016/17 residual, dry recycling and green recycling tonnages. Similarly, figures from question 10 of WDF were used to cross reference with the Defra data. The same data for non-household waste was collected using the Defra annual report and question 11 of WDF. In addition to this, the information from the Defra annual report was used to inform the recycling rates for kerbside, non-households, local authority and local authority excluding contamination.

No change in growth rate (0.5%) until 2030 was used.

3.2.3 Commercial requirement

No change in growth rate (0.7%) until 2030 was used, which is the central estimate in the residual waste capacity gap report²⁵

3.2.4 Residual Treatment

As in the baseline residual waste treatment capacity is defined by the upper, middle and lower treatment capacity estimates as reviewed within the residual waste capacity gap report²⁶. These are taken to include both the additional capacity from ongoing development of EFW facilities and uptake of additional RDF capacity.

3.3 Relatively cost neutral

3.3.1 Mix of Household and Non-household

The relatively cost neutral approach to modelling has been modelled based on those authorities that are rurality 1 and 2 reach fortnightly collections of residual waste with a source separate food waste collection and those authorities that are rurality's 3, 4, 5 and 6 reaching a 3-weekly residual collection with source segregated food waste. This entails a Local authority recycling rate shift from 43% up to 50% kerbside recycling rate and 53% Local Authority overall rate - a shift of 7%.

Commercial and Industrial waste is modelled as remaining at 60% but with greater Local authority facilitation of commercial collections. This could include the facilitation with local commerce groups (BIDs) to joint procure standardised service providers for commercial waste collections. Providing this service will ensure the availability of commercial service with those who see the financial benefit of participating in can do so making savings on their existing disposal expenditure resulting in greater participation in commercial recycling. This will be supplemented by the jointly procured providers offering economies of scale for larger contracts, again further incentivising participation in commercial collection schemes.

Overall the provision of the additional changes in Local Authority service the commercial recycling performance offers a 56% overall England recycling rate.

3.3.2 Local Authority requirement

3.3.2.1 Fortnightly residual collections and recycling uplift

The information from the indicative cost and performance tool produced by WRAP, provided a basis of modelled costs and yields for differing recycling schemes based on rurality. The tool was used to inform the standard percentage change expected when shifting from a weekly residual collection service to fortnightly, with variance for each rurality and service type. The outcome of this was a new potential dry recycling tonnage. A new residual tonnage was also calculated based on the dry recycling now captured.

²⁵ http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

²⁶ http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

Table 2 below shows the results of the analysis from the Indicative Costs and Performance tool. The percentages suggest a potential change in total dry recycling from shifting a residual service from weekly to fortnightly. The data provided a variability on the percentage change based on recycling scheme and rurality. It can be observed that in all options moving from a weekly residual to a fortnightly residual collection, results in an uplift in the dry recycling yield.

Table 2 The percentage change in dry recycling yield

Total dry recycling yield (including contamination) kg/hh/yr						
Rurality	Fortnightly residual & Fortnightly co-mingled	Fortnightly residual & Fortnightly Two Stream (fibres: containers) on split vehicle	Fortnightly residual & Fortnightly multi-stream	Fortnightly residual & Weekly multi-stream,	Fortnightly residual waste & fortnightly Two Stream (glass: other dry recycling) on split vehicle,	Fortnightly residual waste & fortnightly Two Stream (glass: other dry recycling) on separate vehicle
1	23%	15%	8%	32%	15%	15%
2	19%	12%	6%	23%	12%	12%
3	22%	14%	8%	29%	14%	14%
4	18%	11%	6%	21%	11%	11%
5	20%	13%	7%	26%	13%	13%
6	17%	11%	5%	20%	11%	11%

3.3.2.2 Waste minimisation

A rate of 7% was deducted from the residual tonnage to account for a potential waste minimisation effect. This was assumed from an observed range of between 5-15% for different authorities.

3.3.2.3 Food

The WRAP food ready reckoner tool²⁷ was used to inform an indicative food waste yield for a separate food collection, with lower, middle and upper tonnage outcomes. While this tool has its critics, it provides a transparent baseline for measuring the performance of food waste collections.

Figure 7: WRAP’s Ready reckoner formulae

These predictions apply only to **separate weekly collections** of food waste where householders are provided with kerbside containers, kitchen caddies and liners (see Section 4).

WRAP has updated the model, which previously used indices of multiple deprivation, to enable it to be used by local authorities across the UK. The model uses the percentage of households in Social Groups D and E in a local authority area (derived from the 2011 Census) as a measure of deprivation and applies it to the following formulas:

- For areas with fortnightly residual waste collection (i.e. alternate weekly collection):
= 2.1614 – (% Social Groups D and E × 2.2009) ± 0.40 kg/hh/week
- For areas with weekly residual waste collections using sacks:
= 1.8121 – (% Social Groups D and E × 1.14385) ± 0.25 kg/hh/week
- For areas with weekly residual waste collections using bins:
= 1.5307 – (% Social Groups D and E × 1.0736) ± 0.25 kg/hh/week

The formulae is based on regression analysis of various factors which influence food waste yields, with social groups D and E correlating most strongly. Based on this relationship the formula uses calculated constants to produce indicative yields with an upper and lower yield per household.

²⁷ <http://laportal.wrap.org.uk/ICPTool.aspx>

The lower tonnage, along with household numbers, formed the basis for an annual household food waste tonnage for each council and was applied to those councils without a food collection service. For those councils with a mixed garden and food waste service an assumed (80%) of this was garden. The lower tonnage food waste yield was added to this proportion of garden waste.

3.3.2.4 3 Weekly residual collections and waste minimisation

A combination of WDF data and desk based research²⁸ was used to inform the potential change in dry recycling tonnages and residual tonnage that could be expected after shifting from a fortnightly residual collection to a three-weekly collection.

The move to 3 and 4 weekly residual waste collections has been trialled in a number of authorities, across England, Scotland and Wales. At present it is believed that in the order of thirteen have rolled out three weekly collections or are in the process of doing so, to all households (Bury MBC, Oldham, Rochdale, East Devon, Falkirk, Blaenau Gwent, Gwynedd, Powys, Argyll & Bute, Clackmannanshire, East Renfrewshire, East Ayrshire and the Isle of Anglesey all have a scheme in place). Daventry Councillors agreed in July 2016 that they will move to three-weekly. The primary aim is to reduce costs, which is achieved by a combination of reduced number of collections, improved recycling and organics collection performance and reduced residual waste. All these authorities provide some form of separate food waste collection.

Ricardo has worked with WRAP on several options assessment project similar to this, where WRAP has provided some initial observations on assumption which can be used when modelling 3 weekly collections. The following information provided is a summary of WRAP's initial observations (which correlates with our research from the Extended Frequency Residual Waste Collection Guide²⁹), as detailed evidence is presently not available on the true impact of extending residual collection frequencies:

- Overall reduction in all household waste arisings of ~4%;
- Reductions in kerbside collected residual waste typically ~10 – 25%;
- Evidence from Wales suggests that the reduction in residual waste has been more important to the increase in recycling % than any actual increase in recycling itself (although dry recycling increases typically 2 – 15%).

3.3.2.5 Food

For the applied increase to food waste, that could be possible from moving to a 3-weekly residual collection, the same method was used as described in section 1.3.2.3. However, the middle tonnage from the WRAP food ready reckoner tool was used to suggest a tonnage that reflects the residual frequency.

3.3.3 Commercial requirement

3.3.3.1 Cost

Adding a recycling service to an existing waste commercial waste collection is a cost for the majority of businesses. To get more businesses to recycle this cost must be reduced. Fundamentally we need stronger action on end markets and producer responsibility to effectively subsidise provision of recycling services at a cost which is attractive to businesses. If this doesn't happen the recycling rate will continue at the 60% level that's been used within the cost neutral scenario.

3.3.3.2 Local procurement arrangements

There is significant scope for businesses in commercial areas to form local procurement groups (particularly where a Business Improvement District (BID) already exists), to secure commercial waste collections at a competitive price. In this case (depending on the arrangement), all businesses in the group would receive the same system of collecting dry mixed recyclables which should increase the

²⁸ <https://ee.ricardo.com/downloads/waste/extended-frequency-residual-waste-collections>

²⁹ <https://ee.ricardo.com/downloads/waste/extended-frequency-residual-waste-collections>

tonnage collected as it becomes more economic for the contractor to collect smaller volumes of recyclables from a greater number of customers in an area and increase quality through greater segregation and a reduction in contamination. This also has the benefit of reducing vehicle movements and consequently air pollution as one service provide visits the area rather than multiple.

3.3.3.3 Greater awareness of social responsibility

As business and individuals become increasingly aware of their social responsibility with regard to waste, it is likely that more will provide facilities to segregate recyclable waste at their premises which will increase the tonnage of material available for collection. This will require a behaviour change element with pressure from staff and customers. There is an increased current focus on the environment and particularly on plastics and single use plastics. For many SMEs the challenge of cost still remains and until collections move away from a volume based system where recycling is an additional cost rather than an overall saving progress will be slow. Regulation (as in Scotland) may help to drive increased recycling but it will still result in an overall cost to business.

3.3.3.4 Increased take up of local authority collections

In the past, many local authorities reduced or ceased their commercial waste collection services as collecting the additional tonnage added to the challenge of meeting Landfill Allowances and competition from the private sector was strong. This trend is reversing (particularly where authorities are supported by the skills and experience of a private sector contractor) and the collection of dry mixed recyclables from commercial and industrial sources (where services don't already exist such as rural areas) is being considered by many as the next growth area to increase recycling rates. This scenario includes an increase in the uptake of local authority collections, based on the consistent collection methods applied to the collection of dry mixed recyclables from households.

One of the potential options that local authorities could adopt to increase the collection of recyclables from C&I sources is to introduce a levy on commercial premises in urban areas. This could be facilitated through a restructure of business rates. This levy would fund the collection of dry mixed recyclates and residual waste from each business in the area. The fact that this service is paid for 'up front' is likely to increase the number of businesses that participate in the collections and this combined with the benefits of consistent collection systems is likely to increase the tonnage and quality of Dry mixed recyclable collections and reduce residual waste.

3.3.4 Residual treatment

As in the baseline residual waste treatment capacity is defined by the upper, middle and lower treatment capacity estimates as reviewed within the residual waste capacity gap report³⁰. These are taken to include both the additional capacity from ongoing development of EFW facilities and uptake of additional RDF capacity.

3.4 CE package

3.4.1 Mix of Household and Non-household

For the CE package an overall recycling rate of 53% LACW and C&I at a 70% recycling rate was modelled.

3.4.2 Local Authority requirement

3.4.2.1 Alternative Materials

As part of the proposed CE package, the addition of AHP, WEEE and Textiles has been considered. The collection of any additional materials should only be introduced if there are suitable end markets for reprocessing. Currently there are no facilities available for AHP within England, there is however interest in this market from organisations such as Proctor and Gamble. In order to calculate what proportion of these materials may currently be available to capture in the residual waste, suggestive

³⁰ http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

figures from the Defra National compositional estimates for England (Resource Futures 2010/11) as shown below Table 3. This data set is the most current national waste composition figures available however it's expected that composition of kerbside residual waste will have changed in the last seven years. General trends for these material streams include:

- **AHP** - gradually increasing quantities will arise as our population ages
- **WEEE** – increasing amounts of electrical and electronic items are being purchased but there is an active resale /reuse and recycling market particularly for small WEEE, outside of kerbside collections which includes online exchange and sale site such as EBay and also charity collections for items such as mobile phones. For large WEEE such as white goods many retailers now offer take back schemes when new appliances are delivered. With the scale and diversity of options available tracking material flows and gathering data is very difficult but it's estimated that the amount of small WEEE disposed of at the kerbside will increase.
- **Textiles** – textiles collections from the kerbside either by Local Authorities or charities / private companies were at a peak a few years ago due to the high prices available for the sale of material. Many retailers are now understanding the value in collecting this material particularly from a brand and CSR perspective and have implemented in-store customer take back schemes. Again, the diversity of options for resale / reuse / recycling means that tracking material flows and gathering data is very difficult. With 'fast fashion' (inexpensive designs that reach the high street quickly and are often poor quality items lacking in durability) the amount of textiles disposed of at the kerbside is expected to increase.

Table 3 Residual waste composition for alternative materials

Alternative material	Composition of kerbside residual waste 2010/11
AHP (sanitary)	6.79 %
WEEE	1.18 %
Textiles	4.08 %

To reflect the capture of these materials through proposed irregular kerbside collections a capture rate was applied for each material (Table 4)

Table 4: Capture rate applied for selected alternative material streams

Alternative material	% Capture rate
AHP (sanitary)	30%
WEEE	25%
Textiles	25%

The composition and capture rates were applied to the fortnightly residual tonnage, this was then taken out of the 3-weekly tonnage and added to the dry recycling.

3.4.3 Commercial requirement

3.4.3.1 Mandatory segregation of food and dry recycling

In order to achieve the increase in recycling rates modelled in this scenario, it is likely that, in addition to the measures described in section 3.3, legislation will be necessary to require commercial businesses to segregate 'municipal like' waste as a minimum. This approach has been implemented in Scotland through *The Waste (Scotland) Regulations 2012*³¹ which require every business operating in Scotland to separate their waste for recycling, including food waste. There is evidence that this is resulting in

³¹ The Waste (Scotland) Regulations 2012. Available at <http://www.legislation.gov.uk/ssi/2012/148/regulation/2/made>

more food waste being presented for recycling, however the picture in relation to recycling of other materials is varied.

Table 5 shows the difference in material tonnages observed for various the commerce sector which produces municipal like waste arisings. The results show an increase of 461% in animal and mixed food waste since the regulations were implemented and some positive results for glass wastes (+121%) but varied results for other core dry recyclable streams.

Table 5: Changes in material yields between 2011-2015 for different economic sectors (SEPA)

Economic sector that produce the waste	Commerce	
	Change between 2011-2015 (Tonnes)	Change between 2011-2015 (%)
Waste type		
Metallic wastes, ferrous	38871	66%
Metallic wastes, non-ferrous	-5238	-41%
Metallic wastes, mixed ferrous and non-ferrous	-49736	-39%
Glass wastes	18887	121%
Paper and cardboard wastes	-28768	-51%
Plastic wastes	1967	33%
Wood wastes	21803	55%
Textile wastes	-111	-16%
Animal and mixed food waste	49527	461%
Vegetal wastes	-15032	-12%
Household and similar wastes	-487402	-47%
Mixed and undifferentiated materials	26611	130%
Total	-428622	-24%

The composition of commercial waste varies, but if we assume it to be household like material being presented for collection then approximately 80-85% of material is recyclable – potentially higher. To achieve a 70% recycling rate then an 80-90% capture rate would be required with equally high levels of participation. Realistically (and taking into consideration contamination) every business in England would need to recycle a full range of materials including food waste.

3.4.4 Residual Treatment

As in the baseline residual waste treatment capacity is defined by the upper, middle and lower treatment capacity estimates as reviewed within the residual waste capacity gap report³². These are taken to include both the additional capacity from ongoing development of EFW facilities and uptake of additional RDF capacity.

³² http://www.esauk.org/esa_reports/UK_Residual_Waste_Capacity_Gap_Analysis.pdf

4 Modelling Results

The section below outlines the summary results from analysing the changes in local authority waste collections alongside changes to Commercial and industrial waste services, as outlined above. For each of the three scenario’s key criteria of impact on recycling rate, cost of change and impact on the residual treatment capacity gap in 2030 have been reviewed, with results set out below.

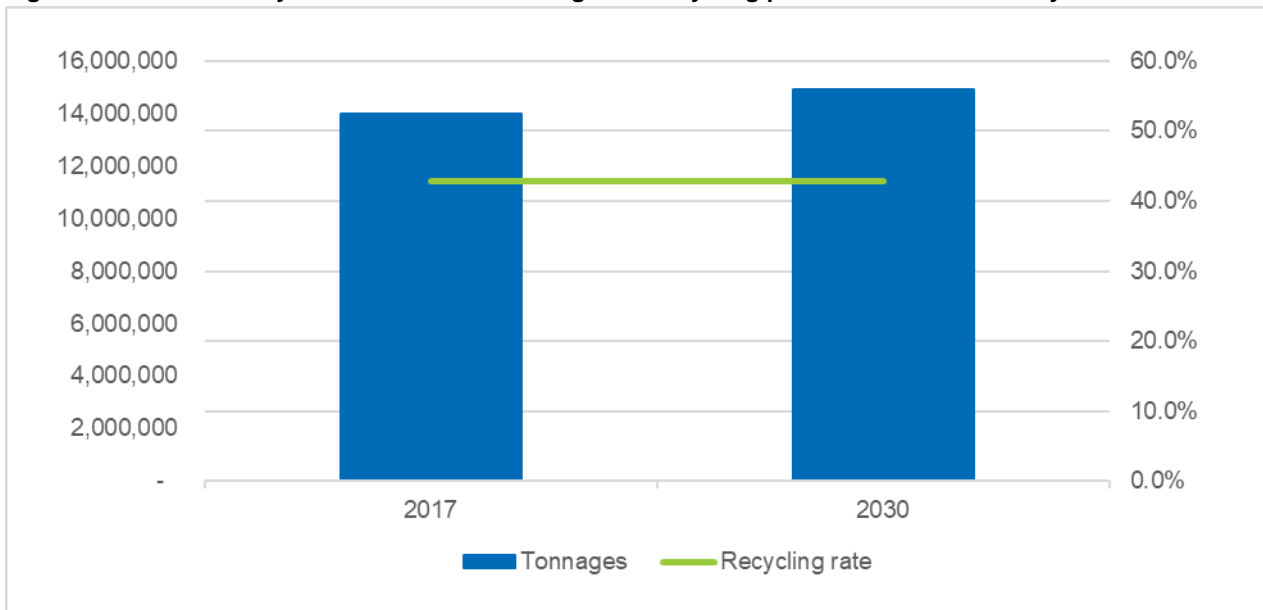
4.1 Business As Usual Scenario

4.1.1 Recycling rate

As set out in previous sections of the report we have taken a very simplistic view of the baseline scenario, with no change in Local authority behaviour or recycling performance. This means that there is no anticipation of increase in recycling performance, but waste growth still applied through till 2030. Therefore, there is still significant requirement for local authorities to change and adapt to household growth, and resulting waste growth, but this is done with no significant change in the baseline performance. Bearing in mind the current challenges of Local Authority service delivery and budgetary constraints, this maintenance of recycling performance which has been stagnating, (and for some authorities fallen) may be difficult enough.

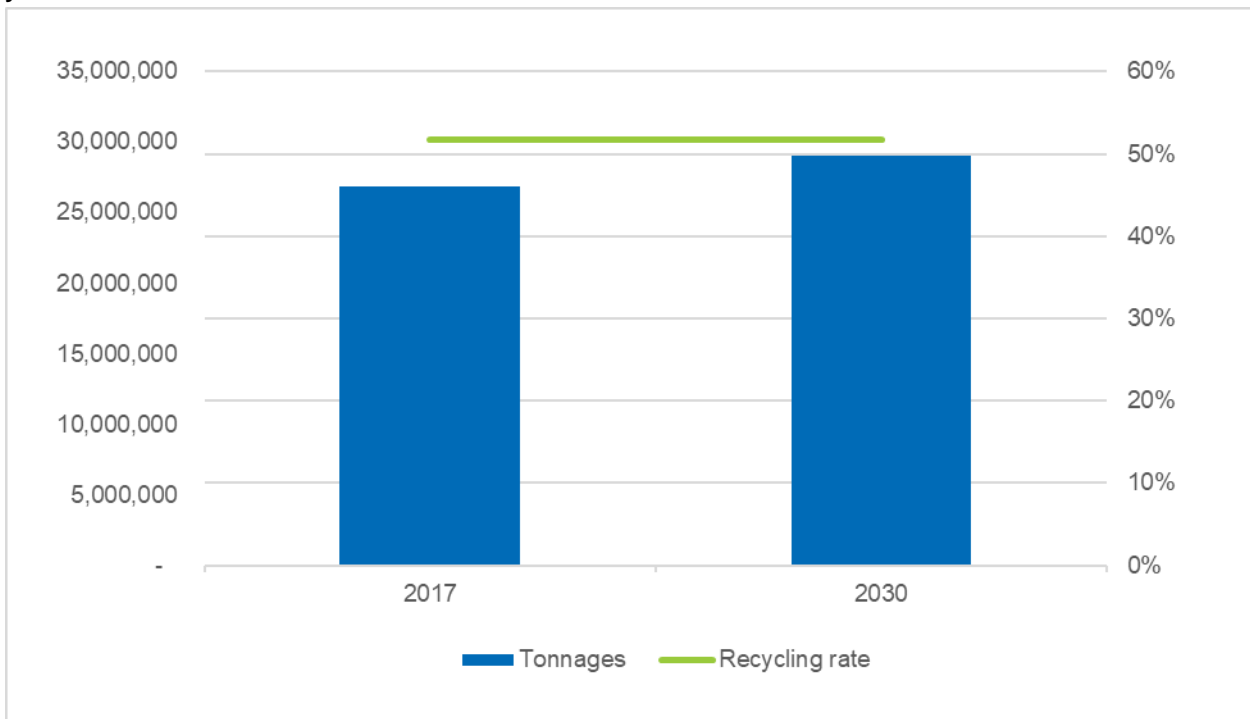
As set out in the figures below this maintenance of current service provision whilst accommodating waste growth and increased tonnages, leads to the Local authority recycling rate of 43% being maintained.

Figure 8: Local Authority collected residual tonnage and recycling performance in baseline year and 2030



When combined with the commercial recycling rate of 60%, this provides an overall recycling rate of 52%. As for Local authority waste however, simply maintaining current performance does not reduce the growing arisings of residual waste requiring treatment and disposal – capacity is still required.

Figure 9: England Local Authority and C&I residual waste tonnage and recycling performance in baseline year and 2030

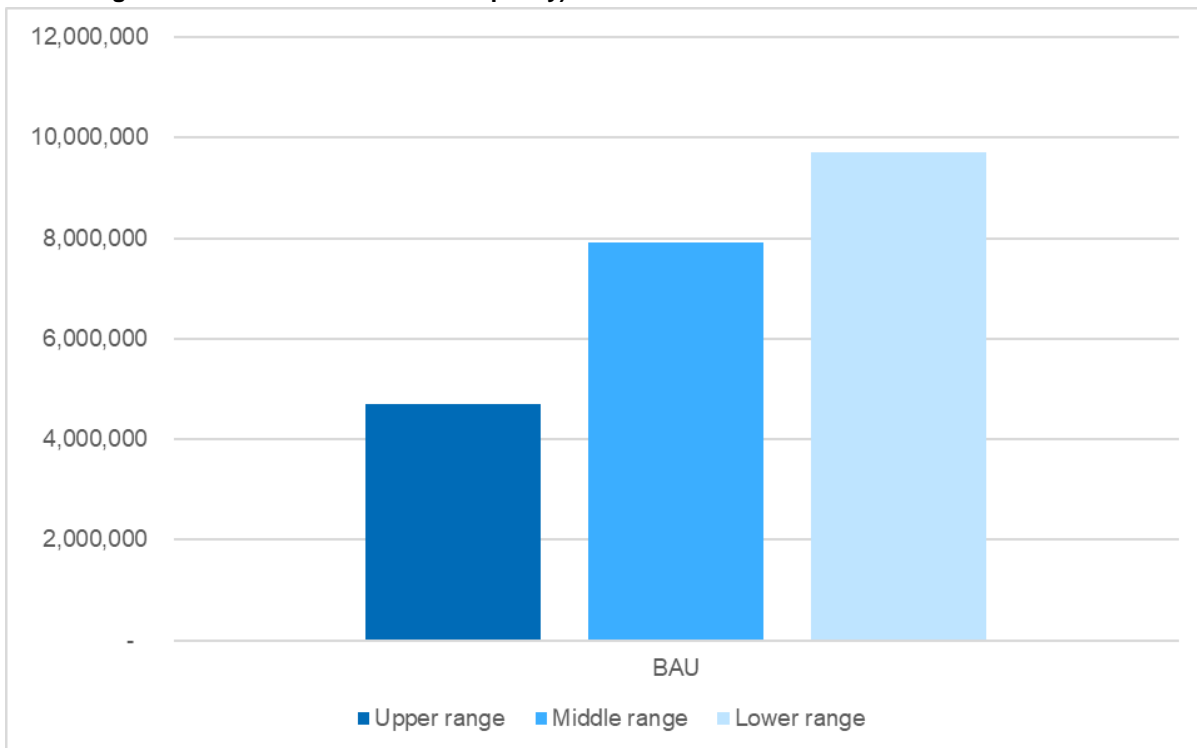


4.1.2 Treatment Capacity gap

In recent years there has been significant debate as to the impact of recycling performance, waste growth, and their combined impacts on the residual waste arisings. The interest in this relationship has become even more significant with investment in the treatment and disposal sector hinging on policy to tackle recycling performance, and thus dictate the level of residual treatment capacity required within the market. Multiple studies have been undertaken to understand both the potential waste arisings, as well as that of the appetite for investment and resulting available treatment capacity. This study has based treatment capacity on the range as set out in the ESA’s residual waste capacity report, which reviewed market studies undertaken. This study therefore compares findings from the waste flow and recycling performance analysis with this range of capacities (upper, middle and low capacity) in order to provide a sense of the capacity gap that would exist in 2030.

As set out in the baseline scenario, with no changes in either local authority recycling performance or that of commercial and industrial waste, it is predicted that after waste growth is applied there could be a residual capacity gap, between, 4.5 to 9.5 million tonnes. This would highlight the need for greater policy direction to either stimulate improved diversion in the market, or at least greater certainty for investors to have confidence in developing infrastructure to meet the needs of the market.

Figure 10: Residual treatment capacity gap in baseline year and 2030 for BAU scenario (upper middle and lower ranges refer to residual treatment capacity)



4.1.3 Cost

In the baseline scenario although there is anticipated to be significant extra cost for local authorities burdened with the need for growing services to accommodate additional household growth, there is anticipated to be no change in cost of service provision as a result of changes to core services. In this respect, although local authorities may not be looking to change services and therefore the cost of services on a per household basis, they will still require expanding budgets to provide the service to a growing householder base. Table 6 below outlines a range of indicative costs for collection regimes, split for rurality groupings. This evidence shows most starkly the scale of the potential issue for local authority service providers. **For example, if a rurality 3 authority with 60,000 properties on a fortnightly collection had housing growth of 1.5% per annum they would be looking at annual uplifts in budget of between £55,000 - £68,000 just to extend the baseline service provision to new properties. When placed in the context of reducing budgets this - even in the baseline business as usual scenario - demonstrates a significant challenge for local authorities and their partners to consider.**

According to current projections, the number of households in England will increase by 210,000 every year between 2014 and 2039³³. This means additional costs of between £18.3M and £25.2M per annum for Local Authorities just to provide a waste and recycling service.

³³ <http://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7671>

Table 6: Indicative range of costs per household for local authority waste collection services

	Weekly no food	Fortnightly no food	Fortnightly with food
Rurality 1 &2	£100.84 - £120.04	£87.21 - £100.18	£93.76 - £114.29
Rurality 3, 4, 5 &6	£110.36 - £134.51	£91.41 - £113.17	£93.29 - £129.46

4.2 Cost Neutral

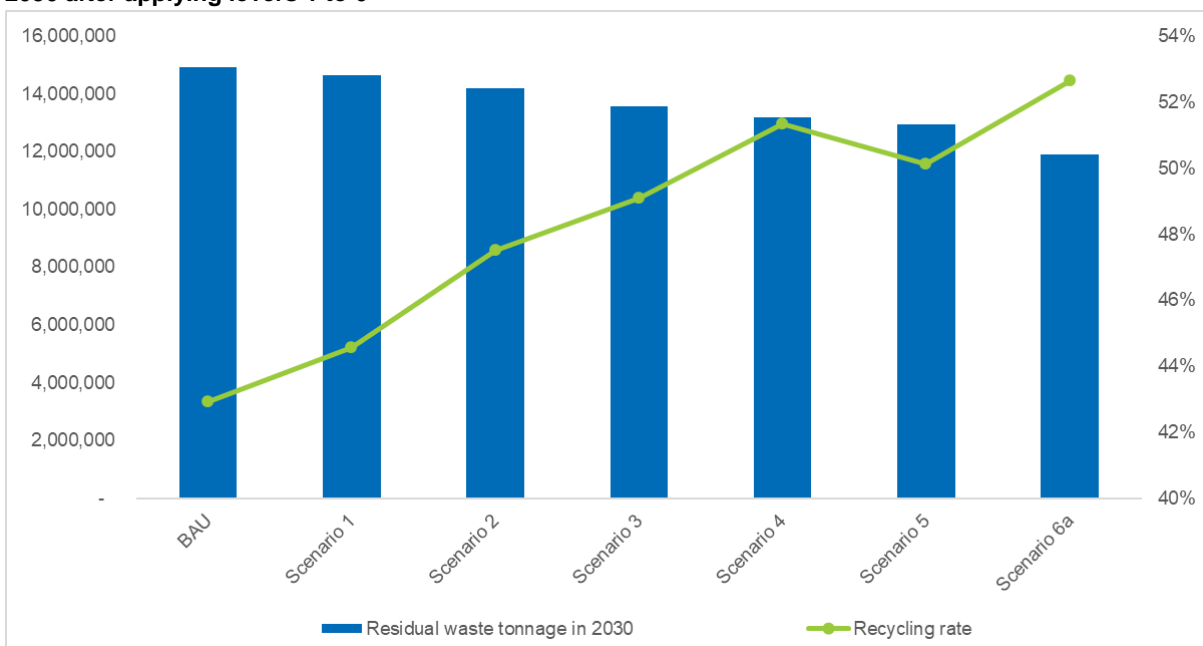
4.2.1 Recycling rate

In the cost neutral scenario, it is assumed that those authorities that are rurality 1 or 2 are able to shift to a fortnightly collection of residual waste, with the addition of a source separate food waste collection. For those authorities that are rurality’s 3-6 it is assumed they can shift service provision to three weekly residual waste collections, again with the addition of source separate food waste collections. The combined impacts of these changes to result in both significant uplift in the tonnage of dry and organic recycling but also reduce overall waste arisings via a waste minimisation effect. As set out below the most significant uplift in recycling performance comes from the addition of source separate food waste collections adding nearly 3% to recycling performance by taking organic material out of the residual bin for the purpose of recycling (in our modelled scenario) via Anaerobic Digestion (AD).

Shifting those authorities from weekly to fortnightly residual waste collections provides the opportunity for a shift of between 1.5 and 2% in recycling performance. If however, all those authorities that are rurality 3-6 can make the shift from fortnightly to three weekly this provides an additional uplift of between 3.5% and 4% of overall Local authority recycling performance.

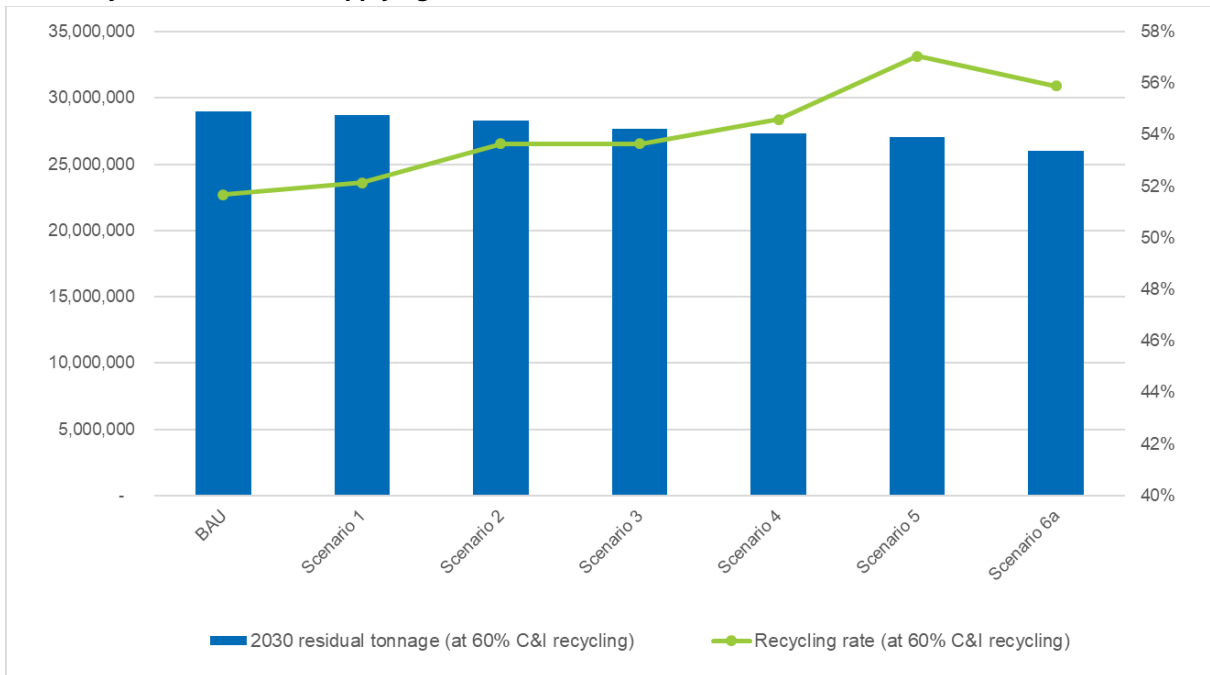
The resulting impact of these combined changes on Local authority performance is a shift in recycling performance from 43% in the baseline to 53% overall, by 2030. This assumes that changes to services can be made through collection contract changes (and in-house) between the baseline year of 2017/18 and 2030.

Figure 11: Local Authority collected residual tonnage and recycling performance in baseline year and 2030 after applying levers 1 to 6



When combined with a commercial recycling rate of 60%, the overall national recycling performance rises to 56% still missing the 60% Circular economy package target. This is also dependent on being able to get commercial entities to adopt the recycling schemes offered on the grounds of cost savings from recycling and reduced disposal. The impact of this is significantly reduced residual waste arisings, alongside significant additional tonnages of both dry recycling and food waste materials.

Figure 12: England Local Authority and C&I residual waste tonnage and recycling performance in baseline year and 2030 after applying levers 1 to 6



4.2.2 Cost

Although labelled as the cost neutral scenario, the cost implications of the range of levers included will have varied impacts on different authorities contributing. The single biggest factor influencing the extent to which local authorities can attain recycling improvement at no significant additional cost, is that of their starting point. Table 7 outlines the starting point of those authorities (WCA and Unitary) offering front line collection services. Based on this analysis 26% of authorities still offer a weekly residual waste collection with 19% offering both a weekly residual waste collection and no source separate food waste collection and of the 74% offering a fortnightly service 45% have no food waste scheme.

Table 7: Breakdown of Local Authority starting points in collection changes

Organics Collection	Collection Frequency	
	Weekly collections	Fortnightly collections
With separate food waste collection	7%	29%
Mixed organic or no food waste	19%	45%

This separation of authorities in relation to their starting point is important as it will directly influence the likely costs incurred in striving for greater recycling performance. A summary is provided overleaf.

Weekly residual waste authorities

- For those authorities with a weekly residual collection and no separate food waste collection (19%), changes in frontline service provision, although requiring investment in new vehicles fleets and communications should be much more palatable with significant cost savings in reducing frequencies available for re-investment in food waste collection.
- For those authorities with a weekly residual collection and a separate food waste collection (7%), reducing the frequency of collections will only result in savings in both frontline service costs and treatment and disposal costs.

Fortnightly residual waste authorities

- Those authorities with fortnightly residual collections and no separate food waste collection (45%) the ability to make significant improvements in recycling performance will be more difficult without greater investment in collection services. Reduced frequency of collections for residual rounds are likely to offer a large portion of the savings required for adding separate food waste rounds, but it is unlikely this will therefore be completely cost neutral.
- Fortnightly authorities with food waste collection (29%) are likely to see savings with reduced frequency of collections, with the ability to re-invest this in communications to further enhance participation and capture of materials.

Overall, of the authorities analysed 55% are likely to be able to make the majority of the service changes required through re-investing savings from reduced frequency of collections, in food waste schemes where required. **The remaining 45% of authorities are likely to have to pay to improve performance**, albeit savings on residual disposal (where passed through in two tier systems) will help compensate for adding additional services such as food waste separate schemes.

To put this into indicative figures as in the baseline scenario, it is estimated that shifting from fortnightly to three weekly residual waste collections could save authorities between 7-10% in whole-system costs. If used in conjunction with the service cost estimates generated in Table 6 the table below provide an estimate of the savings available to local authorities when shifting to either a fortnightly or three-weekly residual service.

Savings

55% of authorities can make a change that is broadly cost neutral.

- Those with food waste changing from weekly to fortnightly residual waste collection will collectively save = **£34.5M**
- Those that change from a weekly to a fortnightly residual waste collection and add a source segregated food waste collection will collectively save = **£27M**
- Those with food waste changing from a fortnightly to three weekly residual waste collection will collectively save = **£31M**

Investment

45% of authorities will need to invest in services

- Those moving from a fortnightly residual waste collection without food to a three weekly residual waste collection with food will collectively cost = **£91M**

Table 8: Indicative savings potential from shifting from weekly to fortnightly residual waste

	Weekly residual waste collection (£ per hhd)	Saving from shift to fortnightly residual waste collection (£ per hhd)	Saving from shift to fortnightly residual waste collection plus food (£ per hhd)
Rurality 1 &2	£101 - £120	£13 - £20	£6 – £7
Rurality 3, 4, 5 &6	£110 - £135	£21 - £19	£5 – £7

Table 9: Indicative savings potential from shifting from fortnightly to three weekly residual waste

	Fortnightly residual waste collection with no food (£ per hhd)	Cost from shift to three weekly residual waste collection plus food (£per hhd)	Fortnightly residual waste collection with food (£per hhd)	Saving from shift to three weekly residual waste collection (£per hhd)
Rurality 1 &2	£87 - £100	£0-£8	£94 - £114	£6 - £8
Rurality 3, 4, 5 &6	£91 - £113	£1-£9	£93 - £129	£6 - £9

Based on this analysis alongside expanding budgets to meet growing householder numbers, changes in service provision to help improve recycling performance can both offer cost savings to authorities starting from a weekly service provision, but additional cost to those having to shift to three weekly (from a two-weekly base).

Using the indicative data above, all authorities that are currently weekly collections, will be looking at savings of between £21 per household (if they are weekly plus food) to £5 per household if they shift to fortnightly plus a dedicated food waste scheme. In all cases the ability to shift residual frequency to fortnightly paying for the additional collection of food waste. Fortnightly authorities however face a more divided start point with those already operating a food waste scheme able to generate savings (£6-£9 per household) from reduced residual collections. If, however they do this combined with adding a food waste scheme, the savings are unlikely to pay for the full cost of the additional food waste scheme which can cost between £6-£15 per household.

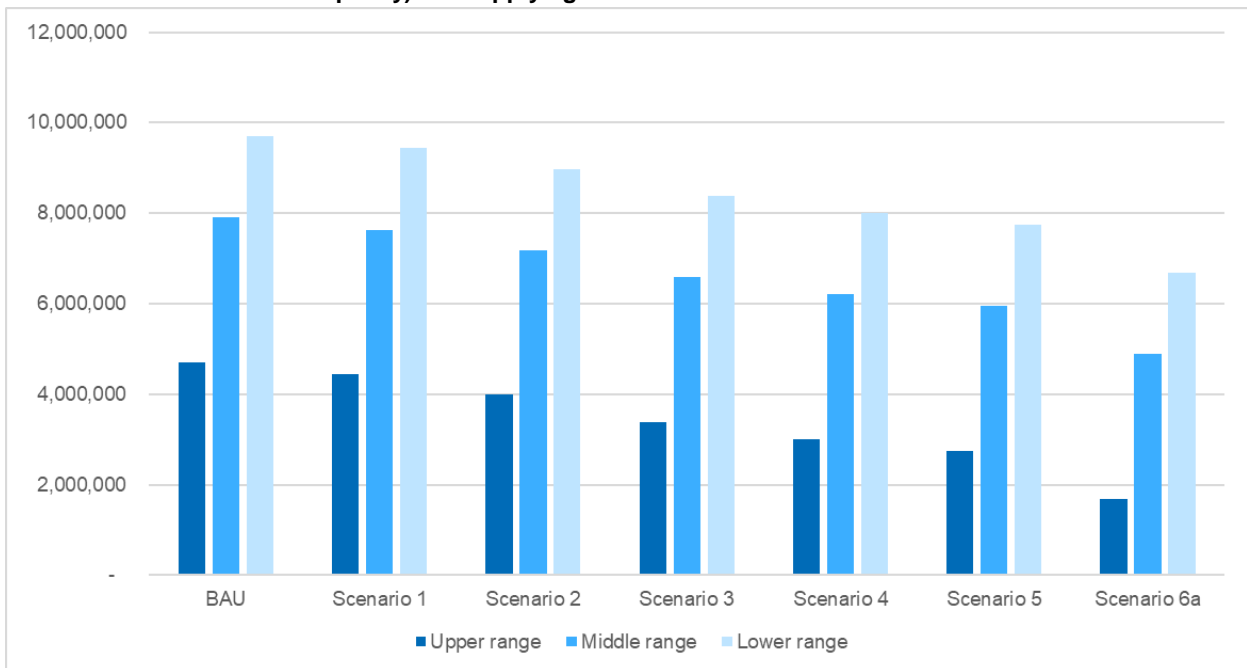
It should be noted also that all of the numbers above are based on whole system costs meaning both frontline services and treatment and disposal costs are considered. Should the savings of changes in frequency be fully re-invested in additional services collection authorities will need to rely on savings generated at treatment and disposal to be shared with them within a two tier structure.

Key in this discussion however is that as authorities shift to more efficient service provision i.e. fortnightly or three weekly, additional improvements in recycling performance are much harder to deliver without the burden of additional costs at the point of collection.

4.2.3 Treatment Capacity gap

Under the cost neutral scenario recycling performance improvement to 56% leads to significant residual waste reduction forecasts for 2030. With all levers pulled in combination, the potential capacity gap for residual waste treatment is reduced to between 1.2 and 6.6 million tonnes. This is a significant reduction in the baseline with a best-case scenario requiring only limited additional investment to treat and manage all residual waste within England after 2030. In discussion with market operators though, **it is perceived that due to the nature of waste being dispersed it is unlikely that the residual capacity gap will reduce as significantly as simply modelled here.** Due to the nature of large contracts for bulk residual, the likelihood of remaining dispersed waste is anticipated to be between 1.5mtpa and 5Mtpa, at which point investors will be less likely to proceed on additional infrastructure.

Figure 13: Residual treatment capacity gap in baseline year and 2030 (upper middle and lower ranges refer to residual treatment capacity) after applying levers 1 to 6

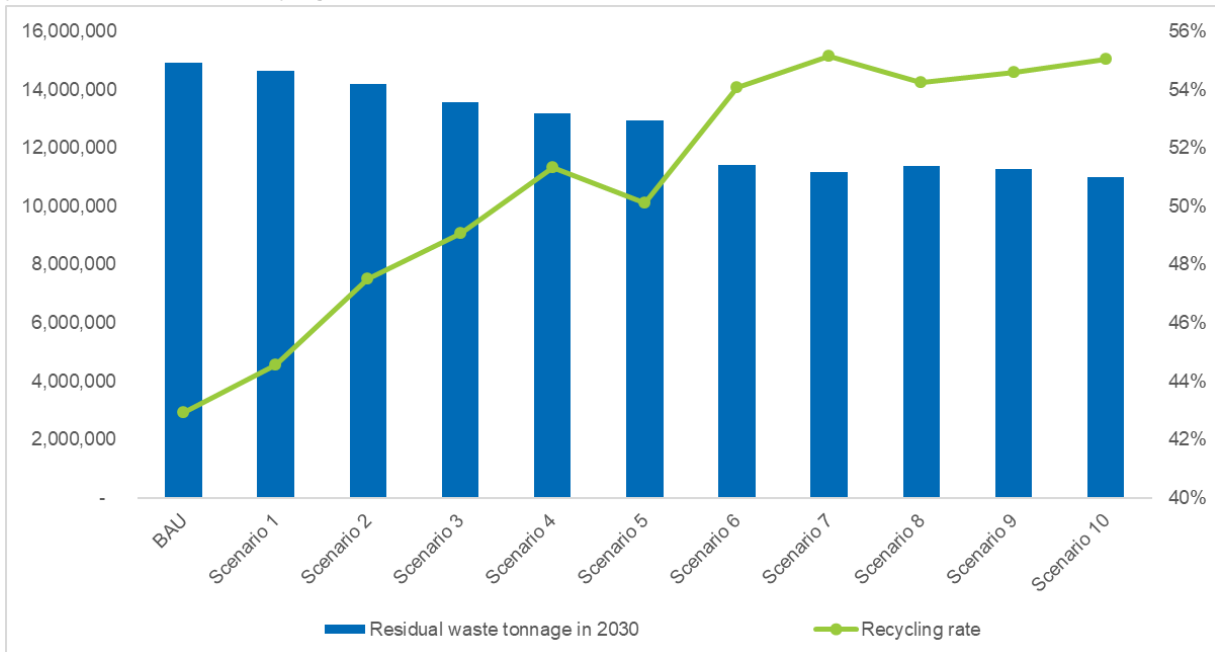


4.3 CE Package

4.3.1 Recycling rate

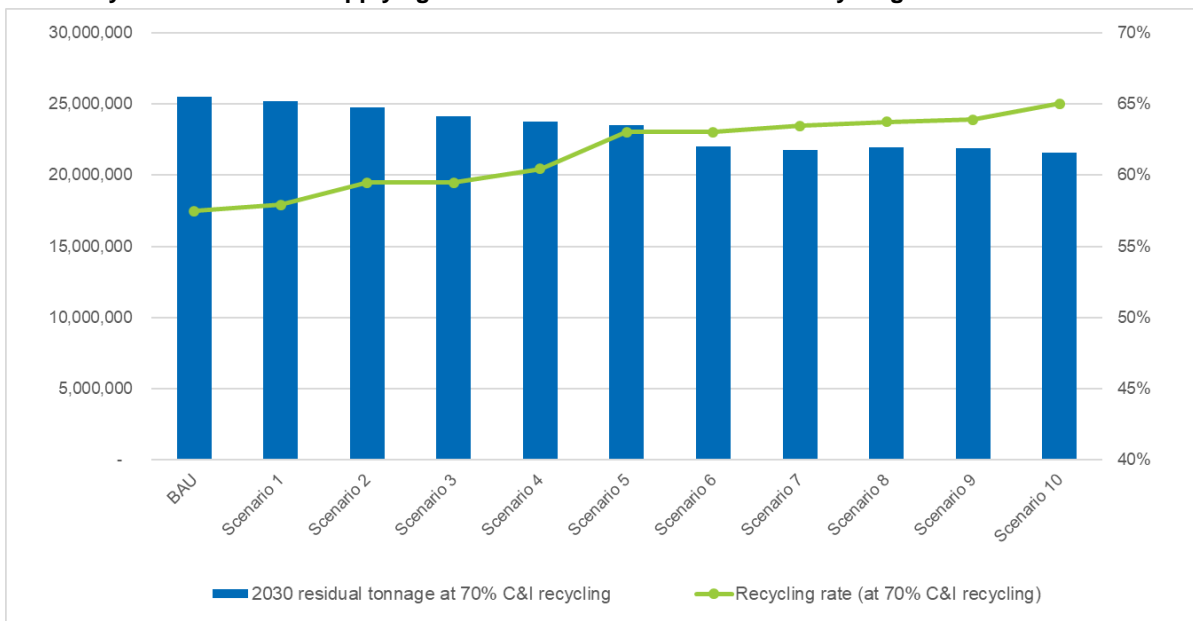
In the Circular economy package scenario, both local authority and commercial waste sectors are expected to stretch their activities beyond which is feasible at relatively low cost. This therefore includes pushing beyond those levers included in the cost neutral scenario, with the collection of additional materials in the form of AHP's, WEEE and textiles from local authorities. Overall the shifting of all local authorities to three weekly with separate food waste collections, plus additional materials, leads to a local authority recycling rate of 55%, a shift of 12%.

Figure 14: Figure 15: Local Authority collected residual tonnage and recycling performance in baseline year and 2030 after applying levers 1 to 6



When this shift in local authority recycling performance is combined with an uplift in commercial recycling of 10% (to 70%), this provides an overall recycling rate of 65%. This surpasses the CE package expectations, **but could not be achieved without significant cost to both local authorities and commercial entities participating in recycling schemes.**

Figure 16: England Local Authority and C&I residual waste tonnage and recycling performance in baseline year and 2030 after applying levers 1 to 6 and additional C&I recycling



4.3.2 Cost

As highlighted in the cost neutral scenario, as authorities shift to more efficient service provision i.e. fortnightly or three weekly, additional improvements in recycling performance are much harder to envisage without the burden of additional costs at the point of collection. Most notably as additional materials are collected, it is highly likely that this will either require additional frontline services, or a reduction of efficiency of the existing fleet and crewing configurations.

In the instance of AHP collections if reasonable uptake is to be achieved a regular service provision will be required either on a weekly or fortnightly basis so that materials are collected and disposed of regularly. We've assumed a 30% capture rate for material but for this particular material stream if the option for collection is available capture rate of those participating in the service is likely to be very high. As a result, it is likely that to provide a universal service to all households, the delivery of dedicated AHP collections is likely to incur similar costs as associated with food waste collections schemes. Given the cost of such service is attributed at between £6 - £15 per household, even at the lowest level this service could come at 10's if not hundreds of thousands of pounds of costs for individual authorities. Current healthcare waste collection provision is varied across authorities but a combined service (where regulation permits) may help to reduce costs initially. This scenario also assumes that there are adequate recycling facilities available to treat this material – which there currently are not. Given the investment by some businesses in this market we would expect to see facilities developed in the UK over the next five to ten years, assuming no change to traditional collection methods.

In the instance of less frequent collections of materials such as WEEE and textiles these materials are likely best collected on a monthly or quarterly basis, or even via bring bank sites (unless the vehicles used for collection allow easy storage of such materials). As such it is anticipated that the costs of such services to be low on a per household basis, but still potentially significant 10s if not 100's of thousands of pounds for individual authorities to implement.

In total, Local Authorities would pay an additional £6 to £15/HH which equates to between **£105 - £315 million per annum** (excluding any additional household growth between now and 2030)

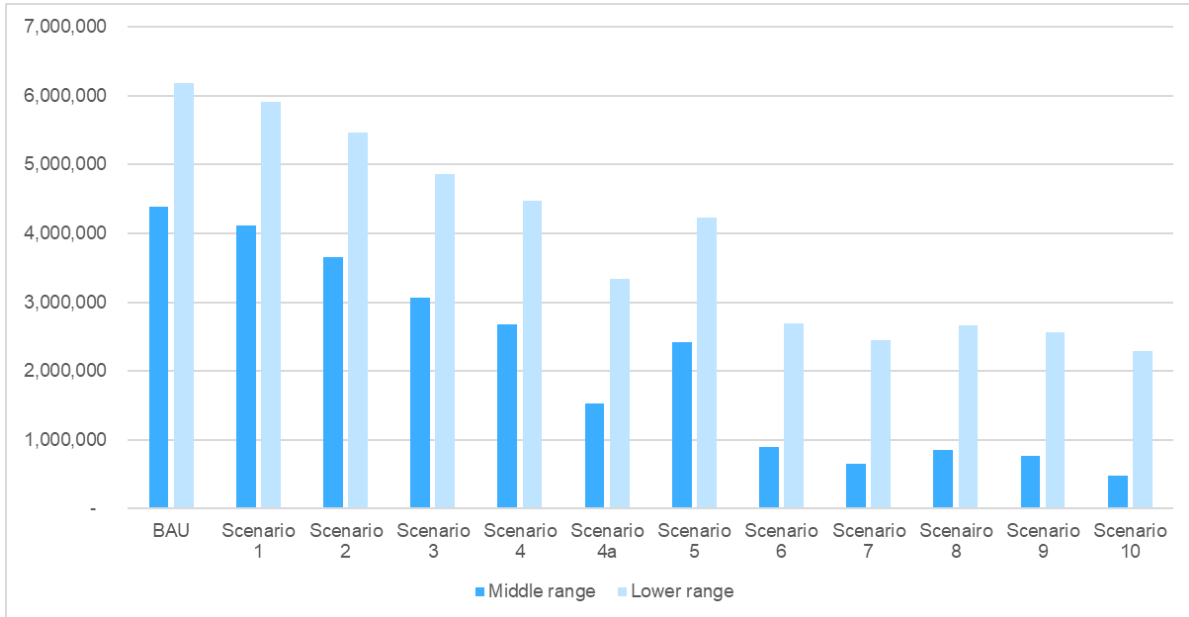
4.3.2.2 Commercial costs

The impact of greater recycling in the commercial sector is a much less understood parameter, with the need for additional collection infrastructure to service a greater proportion of businesses recycling. This uncertainty is added to by the varied ways in which commercial enterprises can pay for their service provision. For example, some businesses will pay per lift of bins (facing additional costs for adding a recycling services in addition to their residual waste service for example) whilst many will pay by weight and thus face lower cost increases or savings through diversion. As such estimating the cost of commercial recycling based on actual commercial waste solely is something that is difficult. However, as commercial recycling becomes wider spread, it is believed that it will increasingly become similar in collection nature to that of standard household or municipal solid waste collections. We have therefore made estimates of the additional costs of commercial waste using these MSW collection and treatment costs. From this analysis and consultation with ESA members, it is estimated that the cost per tonne of additional recycling could be in the region of £40 - £50 per tonne. Using the central estimate from this and the uplifted tonnage of 3.5 million tonnes of material in the CE package, this could cost the industry an **additional £160 million per year in cost**. This may represent a higher estimate of cost with some commercial entities generating savings through the diversion of residual to recycling, but overall with secondary markets in their current state and additional collection infrastructure requirements it is considered that additional recycling for the commercial sector, will not come without significant cost.

4.3.3 Treatment Capacity gap

Under the CE package scenario recycling performance improvements to 64% leads to significant residual waste reduction forecasts for 2030. With all levers pulled combined the potential capacity gap for residual waste treatment is reduced to between 0.5 million tonnes in the medium treatment capacity scenario, to a capacity gap of 2.2 million in the low scenario. This is a significant reduction in the baseline with in the best-case scenario requiring limited additional investment in infrastructure, beyond that which is already planned. However, as a result of the market dynamics in play with waste being increasingly more dispersed in nature it is perceived by the market that the capacity gap is highly unlikely to shrink to this level. **It is anticipated that a more reasonable “market settling” balance will be at a residual capacity gap of around 1.5m - 5 M tonne per annum, at which point investors in infrastructure will be more risk averse to remaining market scale.**

Figure 17: Residual treatment capacity gap in baseline year and 2030 (middle and lower ranges refer to residual treatment capacity) after applying levers 1 to 10 and additional C&I recycling



4.4 Sensitivities

In addition to the scenario modelling, a further two sensitivities were considered. The first sensitivity modelled the outputs whereby no change in residual waste collection frequency was modelled for rurality 1&2, the second sensitivity assumed no change in residual waste collection frequency for all authorities.

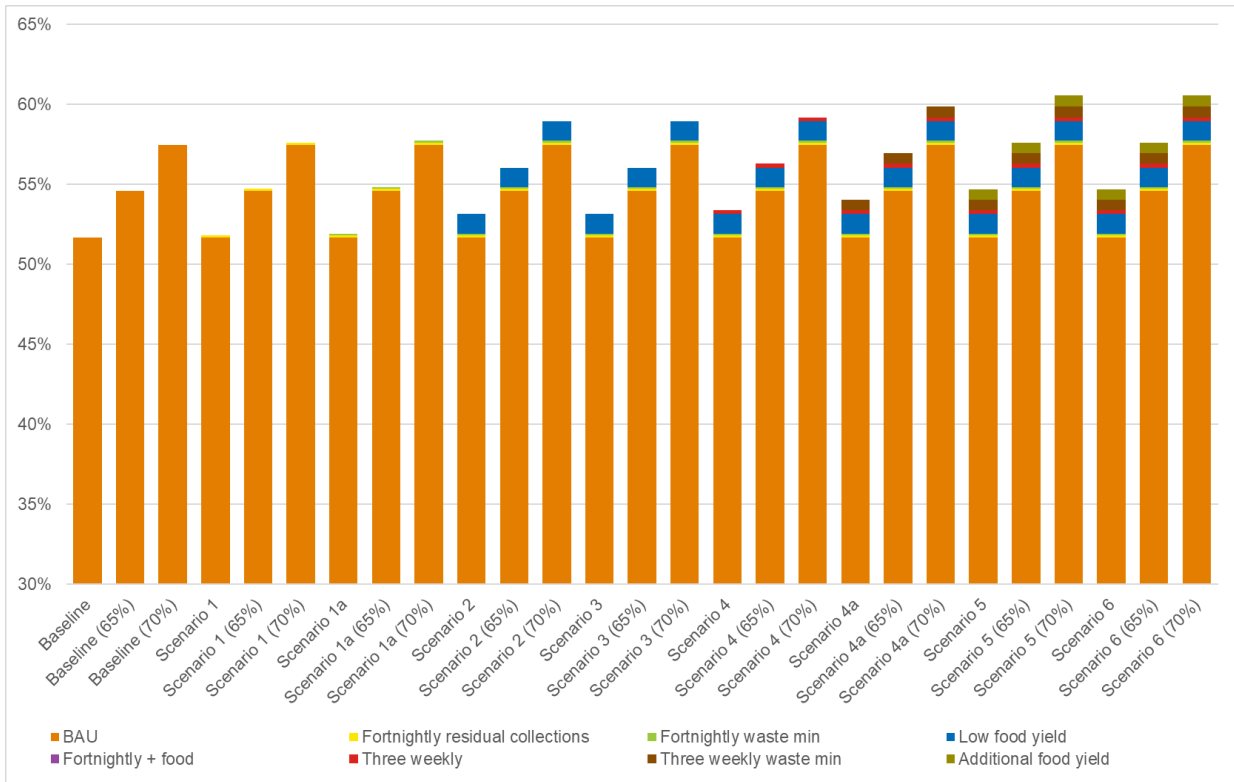
4.4.1 Rurality 1 & 2 authorities - no residual collection frequency change

Figure 18 shows the recycling rates achieved for each of the main levers (1-6), including residual frequency changes and additional food yields. However, for this sensitivity there is no change to the collection frequency for rurality 1&2. The graph also includes the two variants in Commercial rates (60%, 70%). Table 10 shows the possible recycling levels based on the lower, middle and upper tier Commercial levels. At 60% C&I the possible recycling rates range from 52% - 56%, and at the highest Commercial levels recycling ranges from 57% - 62%. The impact of this change with no reductions in residual waste collection for authorities in the rurality’s 1 & 2 group, is the requirement for investment of a further **£78 million per year**, with savings from residual waste capacity restriction no longer offsetting the cost of the addition of a food waste services.

Table 10: Recycling rates possible with no change to residual waste collection frequency for rurality 1 & 2 authorities

Commercial	Business As Usual	Scenario 3 – Alternate Weekly Collection (AWC) + source segregated food waste collection	Scenario 6 - Three weekly residual waste collection + food waste collection (medium yield)	Scenario 10 - All authorities go to three weekly residual waste collections + source segregated food waste and a source segregated collection of AHP, WEEE and Textiles
60%	52%	53%	55%	56%
70%	57%	59%	61%	62%

Figure 18: Recycling rates possible with no change to residual waste collection frequency for rurality 1&2 authorities



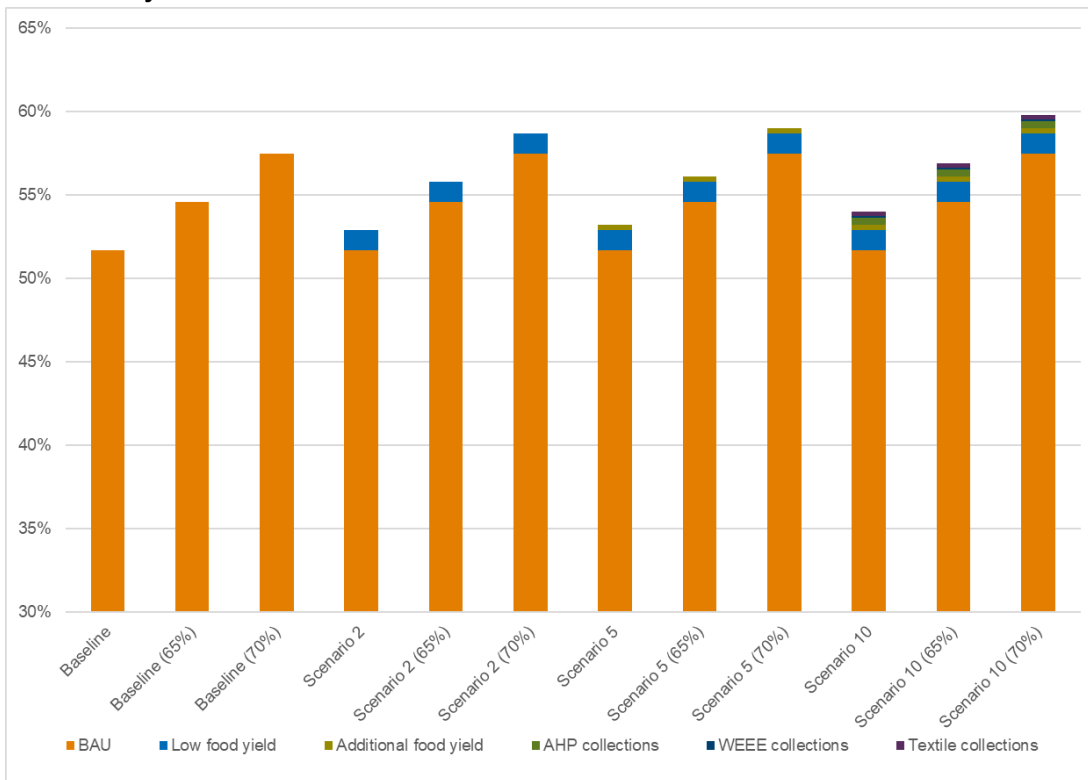
4.4.2 No residual collection frequency change for all authorities

This sensitivity assumes no change to collection frequency for all rurality’s, therefore the main levers are; added food, AHP, textiles and WEEE collections. Figure 19 and Table 11 show the recycling achieved for each of these scenarios dependent on the percentage of C&I recycled. A range of 52%-54% is observed with 60% C&I, increasing to a 57%-60% recycling when the C&I is 70%. The impact of this change with no reductions in residual waste for any authorities is the requirement for an investment of a further **£220 million per year**, with savings from residual restriction no longer offsetting the cost of the addition of a food waste service.

Table 11: Recycling rates possible with no residual waste collection frequency change for authorities of all rurality’s

Commercial	Business As Usual	Scenario 2 - A dedicated food waste collection is added to any Local Authority without one	Scenario 5 - AWC + food waste collection (high yield) with additional communications	Scenario 10 - All authorities go to three weekly residual waste collection + source segregated food waste and a source segregated collection of AHP, WEEE and Textiles
60%	52%	53%	53%	54%
70%	57%	59%	59%	60%

Figure 19: Recycling rate possible with no change to residual waste collection frequency for authorities of all Rurality's



5 Other potential levers

In addition to changes to frontline services within our current legislative framework other potential improvements have been identified including improvements to current operational activities and potential government policy revisions.

As previously mentioned, the most important lever that can be pulled is to stimulate end markets and ensure that there is a strong ‘pull’ through the system for materials. This should take the shape of a reformed Extended Producer Responsibility system where funding is injected into collections and the sorting of packaging. A system that incorporates the whole value chain may also help to reduce future costs to producers through creating potential opportunities for rebates when commodity values are stronger. Producer responsibility could also be targeted to address challenging material streams such as mattresses.

Irrespective of which level is ‘pulled’ waste crime needs to be strongly regulated. There are some risks as you move towards a restricted service (whether this is reduction in capacity or a Pay As You Throw model). Waste crime will become a bigger agenda item for Local Authorities. For many authorities’ austerity has meant cuts to enforcement teams so the investigation of fly tipping and littering is not taking place as frequently as it needs to. There needs to be both staff (and regulatory tools) to enforce this but also a tangible return on investment. The historic split between the Environment Agency and Local Authorities in terms of fly tipping isn’t helpful. An example of where this is being reviewed is in Glasgow through a Zero Waste Scotland funded project where the authority is using Fixed Penalty Notices to maximise repayment rates on litter offences.

5.1 Improvements to current operational activities.

5.1.1 Improvement 1 - Fly-tipped waste

Fly-tipped waste tonnages should be separately recorded, as they do not count as household waste; they are thus not to be included in the total waste arisings denominator.

Where dedicated fly-tipping collections are carried out and are separately recorded, this process can be easily followed. However, for many Local Authorities, small fly-tips (black sacks, carrier bags, household residual presented on the wrong day, small items) are co-collected as part of the Street Cleansing service. If this tonnage isn't separately recorded, it will be included in the denominator and suppress the recycling rate.

Where co-collection makes direct tonnage measurement impractical, trial weighing can be utilised to develop an auditable average tonnage which can be deducted from the Street Cleansing tonnage arisings. The quantification of implementing this approach will vary by authority, but direct experience suggests a 0.5% increase in the recycling rate can be achieved.

Summary:

Lever	Collection methodology
Impacts	Minor increase in recycling rate (0.5%)
Risks	None
Barriers	Revision to tonnage recording methodology
Cost	None (increased staff time)

5.1.2 Improvement 2 – Co-collection of Commercial waste with Bulk collections from HMO's

For efficiency, commercial collections from bulk bins are often co-collected on 'flats' collection rounds, making the most efficient use of bulky collection rounds. The commercial waste tonnages are not household waste, and should thus not be included in the denominator. Where co-collection makes direct tonnage measurement impractical, trial weighing or average bin weights can be utilised to develop an auditable average tonnage which can be deducted from the bulky waste tonnage arisings (HH – Non-HH split). It should be noted that average commercial waste bin weights differ from household average weights.

Summary:

Lever	Collection Methodology
Impacts	Minor increase in recycling rate
Risks	None
Barriers	Revision to tonnage recording methodology
Cost	None (increased initial staff time)

5.1.3 Improvement 3 – Street Sweeping recycling

Several organisations have invested in dedicated facilities to enable the dewatering and recycling of street sweeping arisings.

At a benchmark gate fee of £35 per tonne, facilities for the recycling of this material are becoming more available. By segregating the collected material to produce sand, stones, aggregates, organic material and metals, this material stream can be successfully diverted from the residual stream.

Since this material is defined as household waste for the purposes of measuring recycling performance, utilising an appropriate facility would increase a Local Authorities recycling rate by approximately 1.5%.

Additionally, this would represent a cost saving compared to current disposal costs (without potential transport costs considered).

WasteDataFlow defines a process for the recording of such waste, predominantly utilising the ‘other materials’ categories, including the recording of organic waste from street sweepings as ‘Other compostable waste’.

The adoption of this approach requires no changes to street cleansing methodologies, represents a cost saving to Local Authorities and diverts waste from residual to recycling utilising an existing process. With sustainable tonnages available from all authorities, this represents a reasonable investment risk for reprocessors.

Summary:

Levers	Re-processing facilities
Impacts	Increase in recycling rate (1.5%)
Risks	Investment return
Barriers	None
Cost	Capital investment in reprocessing facilities, planning constraints. Transport costs

5.1.4 Improvement 4 – Re-use

In relation to meeting the Waste Framework Directive recycling targets, Commission Decision 2011/753/EU allows a choice of four options and calculation methods. Each Member State must use the calculation method that corresponds to the re-use and recycling option that it has chosen to apply the target to. The UK currently applies the target to the third option: “the preparation for reuse and the recycling of household waste”. This means that the UK must use calculation method 3 set out in the Decision and use national data to report on the recycled amount of household waste.

The municipal recycling rate is defined as ‘the percentage of local authority waste prepared for reuse, recycling or composting’.

The Defra recycling statistics demonstrate that ‘reuse’ is neglected as a component of the target, and that capacity thus exists within LA services to take advantage of reuse activities not currently recorded or maximised.

At the same time, the Social Value Act, which came into force in January 2013 requires all public authorities in England and Wales to obtain ‘social value’ in addition to value for money through their procurement of services. A common definition of Social Value is “the additional benefit to the community from a commissioning/procurement process over and above the direct purchasing of goods, services and outcomes”.

As a result, LA procurements often incorporate a requirement for service providers to explore options for community based innovations.

Examples of this approach include:

- Community re-paint programmes
- HWRC or community ‘Recycling Centres’ operated by the third sector, facilitating the refurbishment, repair, reuse and re-sale of a wide range of items, from WEEE, white goods and furniture to bric-a-brac and clothing. This involves the use of waste as a resource for social change, providing training and employment opportunities and selling the refurbished goods to people on low incomes.

- This can be expanded to utilise third sector organisations to collect bulky waste, offering a variety of social benefits and cost savings whilst maximising the reparability/reusability of materials through appropriate collection methodologies.

The diversion of this waste will reduce disposal costs, and may ultimately be self-financing. However, appropriate recording of tonnages diverted to re-use will conform with the requirements for the materials to be under the control of the Local Authority, and can thus be incorporated into the ‘recycling’ rate.

Summary:

Levers	Use of Social Value Act to engage with Third Sector
Impacts	Incorporation of reuse to increase in recycling rate
Risks	Investment return
Barriers	Organisational challenges
Cost	Capital investment in facilities, Planning space constraints

5.2 Communications

Underpinning any intervention should be regular communications with residents and businesses. When budgets are tight communications campaigns can be the first thing that’s cut however it’s important that investment in communications is ongoing. Critical currently is the need to reduce contamination and collect only good quality materials. With England moving towards a consistent approach to the core materials that can be collected it may be a suitable point to reconsider a national recycling campaign which is supported by local activity.

5.3 Government Policy Revisions

5.3.1 Policy 1 – Incinerator Bottom Ash

To quote WasteDataFlow guidance, ‘Incinerator residues such as incineration bottom ash and metals are not included in recycling tonnages. The Government’s aim is to encourage a movement up the waste hierarchy with a view to achieving a more sustainable approach to waste management, including encouraging the segregation and collection of the various components of household waste for recovery. The recovery of materials from incinerator residues is not consistent with these aims.’ (ref WasteDataFlow Guidance Notes)

This approach, whilst impacting negatively on England’s recycling rate, is inconsistent with the approach taken with respect to other material streams which, whilst not collected in a segregated manner, are included in the reported recycling rate. Examples of this inconsistency range from the recyclable and compostable outputs from MBT plants and the recycling of street cleansing litter, to the acceptance of sorting glass which has not been colour-segregated or the multi-stage requirements to segregate post-consumer plastics to an acceptable level of usability.

Were it possible to separately collect the components of IBA, a more sustainable approach might justify discounting this material stream. However, its production is part of a recovery process, meaning that segregated collection is not an option.

The recently agreed CEP states that metals within IBA which are recycled can be counted towards recycling targets, which may mean that the issue of IBA recycling is revisited.

Summary:

Levers	Revision of EA guidance
Impacts	Increase in recycling rate ~1-2%
Risks	None
Barriers	Government policy
Cost	None

5.3.2 Policy 2 – Leaves

In August 2013 the Environment Agency released a briefing regarding the management of seasonal, street leaf-sweeping waste and presented the main finding from local authority trials. These identified the issue that contamination levels in street leaf sweepings are too high to produce ‘quality compost’ marketed as non-waste, or compost that can be spread to agricultural land under waste controls. This is due to the high and variable levels of polycyclic aromatic hydrocarbons (PAHs) found in the trials conducted by the EA, both in the street leaf sweepings and in their composted outputs.

As a result, the composting of street leaf sweepings is no longer classed as a recycling activity; however, none of these findings affects leaf litter collected from parks and gardens, which can continue to be used to produce compost or ‘quality compost’.

This decision was based on the absorption of contaminants from the road surface through contact, and to a lesser (unquantified) extent, from exhaust fumes. The redefinition of this waste stream was estimated by the National Association of Waste Disposal Officers (NAWDO) to reduce the recycling rate by 2% across England. Despite frequent requests, the EA have proved unwilling to explore options to enable leaf-fall from specified location types to be classified as recyclable.

Whilst leaves cleared from road surfaces after any period of time will be potentially contaminated, this issue may not affect leaf-fall from wide verges, pedestrian areas or other surfaces where traffic residues are not a factor. The time the leaves remain on the ground will also be a factor.

Leaf clearance methodologies are carried out in an increasingly sophisticated manner. Leaf clearance programmes are necessarily dependant on varying weather factors, making efficient clearance difficult and necessitating repeat visits. However, where records of tree species are available, scheduling can be informed by the leaf-fall patterns associated with different tree species, including periods of leaf-drop and the volumes expected to fall. Whilst commencement dates will still vary, utilising or developing such data will improve clearance efficiency. This would also facilitate segregation of leaf-fall to enable non-road-sourced leafing to be sent to composting.

By thus splitting out the non-road collected leaf-fall, and allowing this element of the material, where separately collected, to class as recycled material, a proportion of leaf-fall could be returned to the recycling rate.

Summary:

Levers	Revision of EA guidance (with appropriate additional research)
Impacts	Increase in recycling (composting) rate ~1%
Risks	Poor compliance with revised requirements by Local Authorities
Barriers	Requirement for further research and analysis
Cost	none

5.4 Policy 3 – Review of Deregulation Act

In England and Wales, the Waste Collection Authorities (and Unitaries) are obliged by law to provide a domestic waste collection service to households. These duties are laid out in the Environmental Protection Act (EPA) 1990 (EPA).

Councils can require occupiers of premises to present their household waste for collection in a specified way under the EPA. However, their powers to enforce this, along with being able to require residents to recycle through the specification of what can be placed in each container and where containers should be placed were substantially curtailed by Section 58 of the Deregulation Act 2015 Act which downgrades failure to comply with any notice from a criminal to a civil offence whilst tightening the definition of an offence to “causing a nuisance or likely to be, detrimental to any amenities of the locality” This makes enforcement extremely difficult, undermining Local Authorities’ abilities to enforce their policies.

The statutory duty to provide a collection service constrains Local Authorities’ ability to ensure that residents’ participation in recycling services is maximised; if material isn’t set out for recycling, it will be collected as residual. The removal of powers for LAs to specify the container to be used for specific materials thus effectively removes the ability to ‘require’ residents to recycle.

The Deregulation Act also makes any form of enforcement activity regarding contamination of recyclate effectively impotent. The practical requirements of bringing a civil case against individual residents has yet to be fully tested, but the disproportionate effort and expenditure required acts as a significant disincentive to LAs.

As a result, the growing issue of contamination in the kerbside recycling stream will be difficult to address. From a Local Authority perspective, the lack of enforcement options limits any addressing of this issue to communications aimed at transgressing residents with no power to take further action. This will lead to a continuing increase in the proportion of contamination and non-target material delivered to MRFs from co-mingled kerbside collection schemes, and ongoing issues with source-segregated materials.

Conversely, a repeal or revision of this Act would provide LAs with a methodology to address contamination, encourage participation in recycling streams and engage with residents to improve the quality and quantity of recyclate.

Summary:

Levers	Revision of Government policy
Impacts	Increase in recycling rate dependent on authority recycling participation rates
Risks	None
Barriers	Government policy
Cost	None

5.5 Policy 4 – Pay As You Throw (PAYT)

The increasing introduction of in-cab technology represents a major step in the potential for introducing schemes whereby residents are required to pay directly for the waste they wish to have collected.

Whilst on-board systems are now highly cost-effective, they still represent a significant investment for operators. However, by providing a combination of interactive real-time information and comprehensive performance analysis, they represent options for significant operational efficiencies.

Loaded with appropriate LLPG data, the in-cab system should be integrated with the back office CRM system, to enable information to flow in real-time. This will allow service requests/updates (bin orders, bulky waste bookings, missed bin enquiries, assisted collection queries, additional trade waste lifts) to be executed rapidly.

Crew reporting of collections, bins not out, contaminated recycling or delayed operations can be communicated to supervisors, alternate vehicles and residents with sufficient promptness to allow rapid problem resolution.

The combined in-cab system and CRM system should also be capable of integration with hand-held devices. This enables supervisors, ancillary service vehicles, contract monitoring staff (and potentially community monitoring volunteers) to provide and react to issues in real time.

The inclusion of 360 degree cameras provides the crews with the ability to record collection issues, providing proof of bins not out, contaminated recycling, correct replacement of bins and blocked access.

On-board weighing systems are now available for use on most vehicle and lift types including split bin and bulk lifts. Each bin-lift can be installed with a weighing load-cell enabling two or more different household bins to be weighed independently and simultaneously. This functionality removes many of the impracticalities of the work process, and enables the weight of all bins to be recorded without compromising the efficiencies of the collection round.

These technical advances facilitate the introduction of three options for PAYT collections, which between them provide a methodology covering the range of current LA collection services:

- **Fixed rate:** residents are charged a flat rate, based on an agreed collection frequency. The capacity is not necessarily factored in to this equation, meaning all properties pay the same rate. This has the advantage of simplicity, and could be included on annual Council Tax bills as a separately quantified item. This methodology would be particularly appropriate for authorities utilising sack collections. However, it doesn't include any facility to vary the cost to the householder dependant on the volume of waste generated.
- **Unit pricing:** this represents a similar scheme to the fixed rate, but is varied by the size/number of containers provided to each household, effectively varying the charge dependant on the volume of capacity provided. This allows larger households to choose bigger bins, but also provides an incentive for residents to minimise the size of container utilised. In-cab technology can be utilised to confirm bin emptying to avoid 'missed bin refund' issues. Billing arrangements would be subject to change where bin-size is changed. This methodology could also be used for sack collections, but would require an agreed number of specified, clearly identifiable sacks to be provided to each household.
- **Pay-by-weight (PBW):** in this methodology, the weight collected from each property would be recorded, and the charging system would be directly related to the weight of the material. Charging would be variable, with the option of a set annual payment, with discounts/supplements charged at an agreed frequency for variance from the assumed standard weight.

In all cases, the options of additional bags or containers, to be paid for on purchase, are available should the user exceed the specified volume, should council policy prefer to allow this degree of flexibility.

Similarly, Local Authorities can decide whether to instigate a scheme that charges for residual waste only, recompenses for recycle only, or prefers a combination of both elements.

Government is currently opposed to PAYT for household waste. This is influenced/reflected in media reports, with common use of terms such as 'new tax on waste collection', 'tax on recycling' and 'bin tax' commonly used.

Patently, the methodology utilised to introduce such schemes would require clear communication of the separation of the 'waste management charge' from the remaining Council tax and its replacement by a variable charge in a manner which residents can buy in to. This approach would need to emphasise that, under a PAYT scheme, some or all of the costs of waste management can be completely removed from non-variable Council Tax bills, providing residents with flexibility in terms of how much they use, and thus pay for, waste management services.

By providing a service which allows residents to control their expenditure by paying only for the waste they produce is in line with the Producer pays principle, is fairer (as the current approach means low waste producers are subsidising high waste producers), and simply brings waste in line with the charging methodology utilised for other services, such as water, sewage, gas and electricity (utilities). The element of financial control could also incentivise a change in behaviour, with residents benefitting directly from producing less waste.

Viewed in terms of simply adjusting the payment methodology so that each household is charged in proportion to the waste collected, PAYT avoids environmentally conscious households subsidising high waste producers.

The government has recently referenced its preference for ‘nudge’ techniques to engender householder responsibility for their waste. The current stalling of the recycling rate suggests this approach has reached its peak. PAYT provides a more direct stimulus for improving recycling rates.

With current technologies available, and the implementation and revenue costs incorporated into the overall cost analysis, implementation of PAYT does not need to represent additional costs to LAs or contractors.

However, practical difficulties remain. Householders will doubtless try to abuse the system, compacting rubbish in their bin, contaminating their recycling with residual waste, utilising neighbouring bins, fly-tipping or other avoidance tricks. The cost of increased monitoring, engagement, education and enforcement will need to be factored in to the introduction and ongoing operation of any PAYT scheme. However, the introduction of this methodology is considered to have the potential to increase recycling rates. The ACR paper ‘Cross-analysis of ‘Pay-As-You-Throw’³⁴ schemes in selected EU municipalities’ identifies this trend, but also highlights that differentials exist depending on the nature of the scheme.

The report identifies that PAYT should only be introduced in parallel with a range of other policy measures, including full EPR, the banning of certain materials to landfill, a tax regime to encourage packaging recyclability and comprehensive communications programs. It also notes that the predominant diversion from the residual stream is represented by food waste.

In the current English waste landscape, the impact of PAYT may be reduced by the collection changes already introduced (or being introduced) by Local Authorities. The government’s opposition to PAYT has led to the ongoing reduction of residual waste capacity, through the reduction in collection frequency through fortnightly to three-weekly, with monthly collections gaining momentum.

Similarly, the reduction in bin sizes from the ubiquitous 240 litres to increasingly common 180s and 140s further limits the capacity available for householders to store and dispose of their residual waste. With this degree of limitation already applied to householders’ residual waste capacity, whilst PAYT would represent a more transparent, fair methodology for waste charging, householders may have already been required to substantially minimise their waste arisings already, begging the question of how much more performance PAYT would engender.

The Suez (Sita) At this rate report³⁵ included some information on potential impacts as set out in Figure 20 below. The increase of 12% is based on the assumption that all Local Authorities would implement the system. If only 255 implemented it then the uplift would be 3% (based on all authorities having introduced food waste and fortnightly residual).

Figure 20: Extract from SUEZ ‘At this rate’ report on PAYT

<p>3 Introduce pay-as-you-throw as a means of encouraging more sustainable waste management practices on the part of householders.</p>	12%	25%	3%	<p>An estimated 12 per cent from data for Ghent and Destelbergen, Belgium. Political factors could constrain take-up to 25 per cent of authorities.</p>
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Summary:

³⁴ <http://www.acrplus.org/index.php/en/news/acr-news/723-payt-report-now-available>

³⁵ <http://www.sita.co.uk/wp-content/uploads/2017/08/SUEZ-AtThisRateReport-1509-web.pdf>

Levers	Revision of Government policy
Impacts	Potential 3% uplift
Risks	Potentially unpopular
Barriers	Government policy
Cost	Infrastructure and technology to monitor, provision of receptacles and sacks

5.6 Policy 5 – Green Garden Waste

In certain circumstances, depending on the type of waste and/or the premises it is collected from, LAs can charge for the collection and/or the disposal of waste. The conditions governing this are set out in The Controlled Waste (England and Wales) Regulations (2012). This covers areas such as garden waste, bulky waste, C&I waste and defines the nature of the waste in terms of its origin and nature. The regulations are also known as the Schedule 2 Regulations.

LAs have utilised the ability to instigate charges for the collection of green garden waste (GGW) extensively since the austerity agenda was introduced, and the growth of chargeable garden waste collection services has provided a substantial income stream, with an estimated 42% of LAs levying a charge in 2016.

The move from a free garden waste service to a chargeable one reduces the tonnage collected, and thus reduces the recycling rate.

Research from WRAP has quantified the average impact of introducing a chargeable service to replace a universal free collection service. If a chargeable garden scheme is introduced it is assumed that the participation in the scheme will fall; the subsequent level of participation will be dependent on the price charged for the new service. However, reduction in green waste yields of 25% is not unusual when charging for services is introduced.

A quantity of waste no longer collected at the kerbside will instead be delivered to local HWRC sites. WRAP’s modelling assumes that 30% of the garden waste NOT collected goes to HWRC sites. Depending on the size of each district’s residual container provision, either 5% or 10% of the GGW not collected by the new scheme will revert to the residual bin. The remaining 60-65% of non-collected tonnage will be either not created or home composted.

The overall impact of a chargeable GGW scheme is thus a reduction in recycling tonnage collected, combined with an increase in residual tonnages. This impact is already incorporated in recycling figures for 42% of LAs, with LARAC surmising that all LAs will have introduced such schemes by 2022.

Summary:

Levers	Additional income for LAs
Impacts	Reduction in Recycling rate
Risks	Further reductions in recycling rates
Barriers	Reduction in LA funding by Government
Cost	Increasing shift to charging for garden waste will only generate revenues that can be used to administer that service

6 Summary

A healthy, productive resource economy requires action across the supply chain including:

- products that are placed onto the market that are ultimately easy to recycle
- a supportive policy and regulatory framework that makes it easy for residents and businesses to display the right behaviours and that can address the wrong behaviours
- available and economically viable end markets so that quality materials can be recycled and the materials produced used again, maximising material productivity.

Without a coherent strategy across all elements which both pushes and pulls materials through the supply chain recycling levels can stagnate and end markets collapse.

Weight based targets for recycling have been in place for a number of years and have been successful in driving recycling rates - to a point. Weight has been used as a proxy for recycling performance but it does have limitations. Our current weight based system can distort behaviour, incentivising the collection of heavy, low-value materials such as garden waste and not prioritising the best environmental outcome for individual material streams. The recycling targets required under the Circular Economy Package are weight based and this report looks at what England would need to do to meet the 60% recycling target by 2030 including what changes in operations would be required for our Local Authorities and Businesses to increase recycling and how much it might cost.

The second report in this series considers whether alternative measures or metrics to our current weight based system might be better in terms of driving environmental performance and value recovered from our resources.

England needs a balanced approach which delivers increased recycling and greater levels of recovery. Taking a step back to review the whole system will allow better metrics to be developed, which in turn will support better decisions.

This report has presented the results of analysis undertaken to understand what recycling performance could be achieved, at what cost and how this would influence predicted capacity gaps in 2030. It has focussed on the areas that ESA members can control – end of life and end of use.

Modelled Results

From our modelled results reaching the recycling targets required under the Circular Economy proposals will be **challenging** and **costly** both for Local Authorities and the commercial sector. This is especially true given the current difficulties within secondary material markets, with all future modelled scenarios requiring stimulation of end markets to ensure the value of recycled material can be recognised and recovered. Simply put, higher recycling rates are completely contingent on stronger demand for materials and sustainable end markets. It is also this commercial viability that will help incentivise greater investment in material collection and recycling infrastructure, as greater confidence in end markets allows both local authorities and the commercial sector to push for greater performance, rather than the status quo or minimum standards on contractual obligations

Collecting more material for recycling means more costs. Local Authorities could, however, offset some of these cost increases by reducing the frequency of residual waste collections (or other interventions for flats) that will allow them to drive change at a cost that isn't excessive. We have termed this 'cost neutral' from a system change approach, as although some authorities will face additional cost, there are those that could also see savings from changing services.

For all of the scenarios modelled increases to the commercial recycling rate result in a marked difference in overall performance. With current industry estimates for commercial recycling in the mid-50-60% it will take a lot of focus and investment to increase recycling rates. Encouraging SMEs in particular to recycle may need a different cost structure proposed for recycling collections to make them financially attractive or government intervention.

The approach that has been taken in this report to model results at an England level is optimistic in approach – we've assumed every service change is possible (both operationally and in terms of political palatability) and that improvements in average yield per household achieved will be consistent. It doesn't take into consideration the sheer volume of flats for some inner-city authorities for example or the desire for SMEs to recycle. Where scheme changes have been suggested that would not be possible to implement e.g. fortnightly residual waste collection for a high-rise block of flats, we have assumed that other interventions would be conducted including communications, focus on contamination, 'bring to' sites for food waste etc. These may not yield the same percentage improvement and would cost more, but will help to contribute to the recycling rate.

Modelling Results Summary

Scenario Modelled	Collection System changes	Whole system cost	Recycling Rate (2030)
Business As Usual	Changes to accommodate housing growth for Local Authorities Changes to accommodate new businesses recycling	Whole system cost won't change at a unit price level but Local Authorities will spend more to add new households to existing schemes and businesses will spend more to start recycling	43% Household 60% Commercial = 52% Overall Recycling Rate
Cost Neutral	Local Authorities will move from weekly to alternate weekly or three weekly residual waste collections with food waste depending on their starting position. Additional communications support will be provided by those Authorities that can't change residual frequency	Savings 55% of authorities can make a change that is broadly cost neutral. <ul style="list-style-type: none"> Those with food waste changing from weekly to fortnightly residual waste collection could collectively save = £34.5M Those that change from a weekly to a fortnightly residual waste collection and add a source segregated food waste collection could collectively save = £27M Those with food waste changing from a fortnightly to three weekly residual waste collection could collectively save = £31M Investment 45% of authorities will need to invest in services <ul style="list-style-type: none"> Those moving from a fortnightly residual waste collection without food to a three weekly residual waste collection with food could collectively cost = £91M 	53% Household 60% Commercial = 56% Overall Recycling Rate
Circular Economy Package	As per the cost neutral scenario but with the ability to recycle additional materials for households	Local Authorities would pay an additional £6 to £15/HH which equates to between £105 - £315 million per annum (excluding any additional household growth between now and 2030) For business the cost per tonne of additional recycling could be in the region of £40 - £50. This could cost the industry in the region of £160 million/yr in additional cost by 2030.	55% Household 70% Commercial = 65% Overall Recycling Rate

Approximately 80 – 85% of material in household waste is recyclable. To achieve some 60% recycling rate residents would need to capture at least 70% of their recyclables, consistently, every week particularly the heavier material streams such as food and garden waste. Contamination, inconsistencies within materials collected across authorities, and current levels of participation by residents would make this recycling rate almost impossible without increased investment and significant behaviour change.

Overall the results provided are at the top end of expected performance and other interventions and policy levers such as encouraging waste prevention, increasing reuse and doing more communications on recycling (locally and nationally) may be required to reach these levels.

Potential Government Policy revisions could also be considered to improve recycling rates in particular Extended Producer Responsibility (EPR) and review of the Producer Responsibility Obligations (Packaging Waste) Regulations 2007, and consideration of a Deposit Return Scheme and/or alternatives. These policy revisions cannot be guaranteed and the associated performance or challenges for many of them will need to be explored further. Some may even have a detrimental effect on recycling rate.

In summary – by 2030

- A business as usual scenario will allow England to achieve an overall recycling rate of 52%, increasing levels of commercial recycling will be needed to move to higher rates
- If Local Authorities move towards reduced frequency of residual waste collections with food waste and commercial recycling reaches 60% we will achieve an overall recycling rate of 56%
 - This will be broadly cost neutral for the majority of authorities. Political (residents may not want reduced frequencies) and practical (Local Authorities need all savings and therefore don't reinvest in separate food collections) constraints may however reduce the likelihood of some authorities adopting the required changes, which would result in a lower recycling rate.
- With additional measures we could get to an overall recycling rate of 65% but it will be difficult and could cost a lot more
 - Additional cost to Local Authorities = £105 – 315M per annum
 - Additional cost to commercial sector = £160m p.a.
- All scenarios are only possible in the event that the Government introduces policy to strengthen end markets for the use of recycled materials. One such solution could be reform of EPR

This report should enable sensible policy suggestions to be framed that will balance aspiration and environmental performance with reasonable cost to deliver. **Services will need investment to just standstill in the future and the adoption of high recycling targets should be fully evaluated to understand both the cost and environmental performance.**

6.1 Alternative Metrics

The next steps will be to consider alternative metrics so that the performance of our sector can be framed beyond simple recycling targets. The second report in this series considers the shift from weight based targets to the use of a 'dashboard' of metrics against which performance can be evaluated. It considers what environmental performance we want to achieve and therefore what metrics will be useful in measuring progress. There will always be a place for weight based metrics particularly as our current systems function using this metric, but as we start to focus on the lighter materials within our waste stream the performance gains (from a weigh based perspective) are small. Using a broader approach may allow the best environmental option per material stream to be considered. The introduction of any new metrics will take time and the transition needs to be carefully reviewed to make sure that they're fit for purpose and do not drive the wrong behaviour.

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