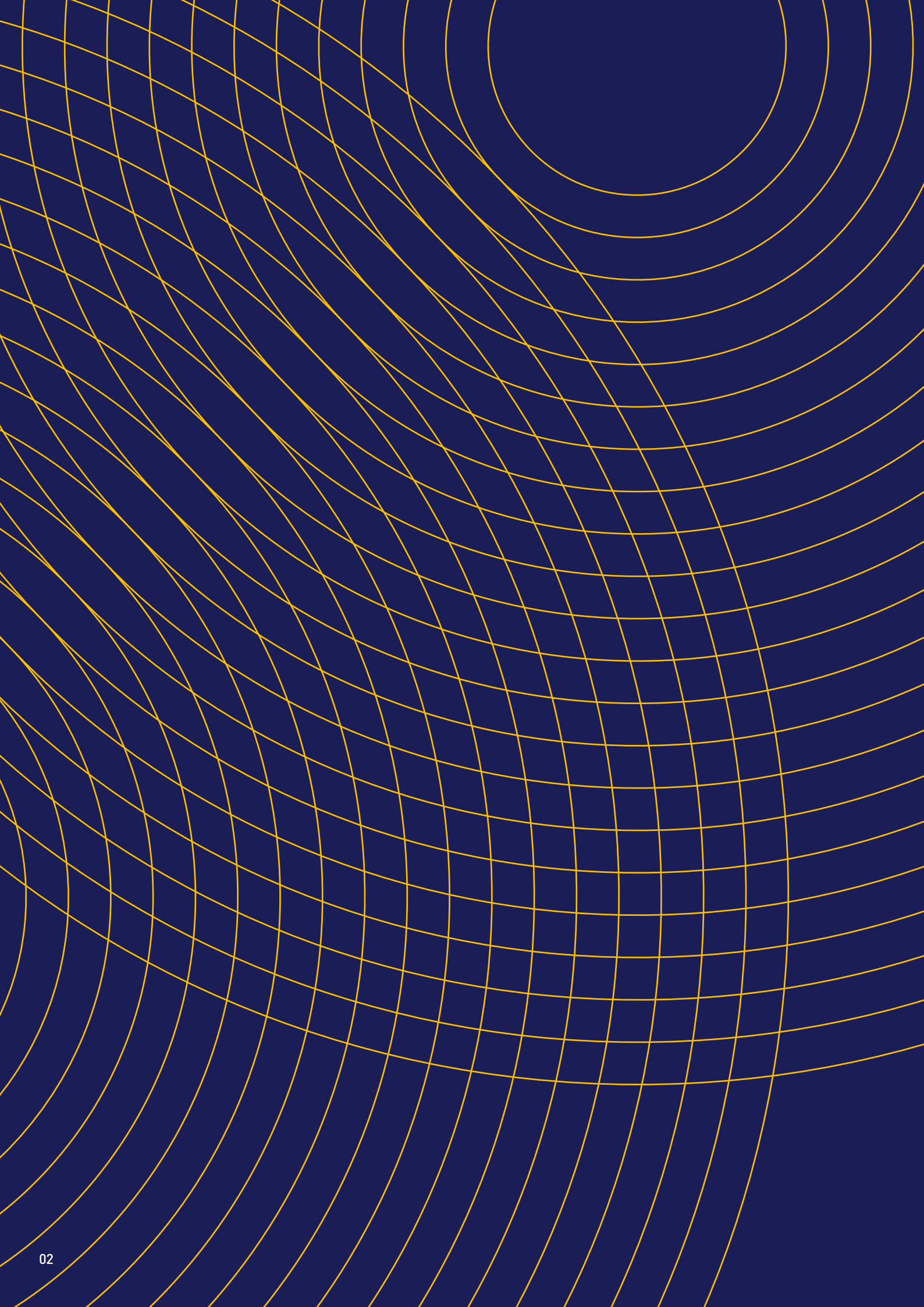
the economics of change in the resources and waste sector



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introduction

The resources and waste sector has been undergoing significant change for many years, from the more simple collection systems and disposal solutions of the past to the multiplicity of collection methods and treatment types we see today. However, in the next 10 to 20 years, we are likely to see even more significant and revolutionary change in the sector which will alter the fundamental economics of what we do following the publication of, and subsequent consultations for, the government's Resources and Waste Strategy for England in 2018.

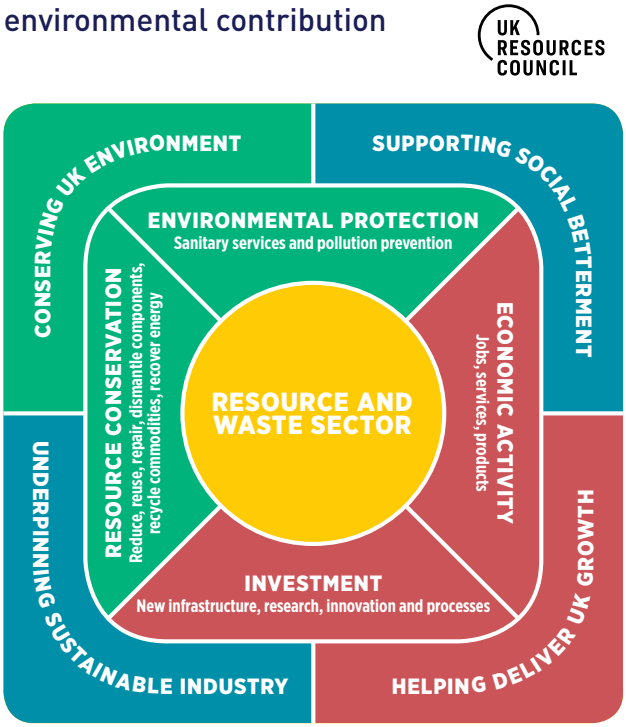
From the expected introduction of a deposit return scheme (DRS) to a dramatic change in the detail and extent of the use of extended producer responsibility (EPR) schemes, which will be for materials from packaging to products like tyres and mattresses, we will see dramatic changes in what we do as an industry and the money flows associated with those activities. As if that was not dramatic enough, we will need to consider the services we provide, the materials we handle and the products we make in terms of natural capital. This is especially the case in terms of biodiversity net gain (BNG) and environmental net gain (ENG) and how we can focus and deliver these activities in light of our expected obligations in helping to achieve net zero for carbon by the year 2050 or sooner.

Current policy changes are very much focused on resource conservation and improving performance based on weight-based metrics and a general expectation that these will continue to reduce carbon as a secondary outcome of better performance in reducing waste, increasing recycling and maximising resource recovery. Future policy changes will need to refocus this work on biodiversity and carbon to ensure we meet these added objectives as part of the solution suite.

The recent sector deal consultation document published by the UK Resources Council contained a diagram definition of the sector. This illustrates a simplified view of a complex, integrated set of activities – ranging from public health protection to the safe storage, collection and treatment of waste; innovation and investment in new solutions for traditional discarded materials; and new solutions for the new products placed on the market. Furthermore, the locally-embedded solutions we provide and facilities we build support local employment and supply chains that support the local economies, as well as the national economy.

The economics and money flows with some of the new systems and objectives will be fundamentally different from those of today, as will the new objectives and participants.

Figure 1
UK resource and waste sector social, economic and environmental contribution



the economics today

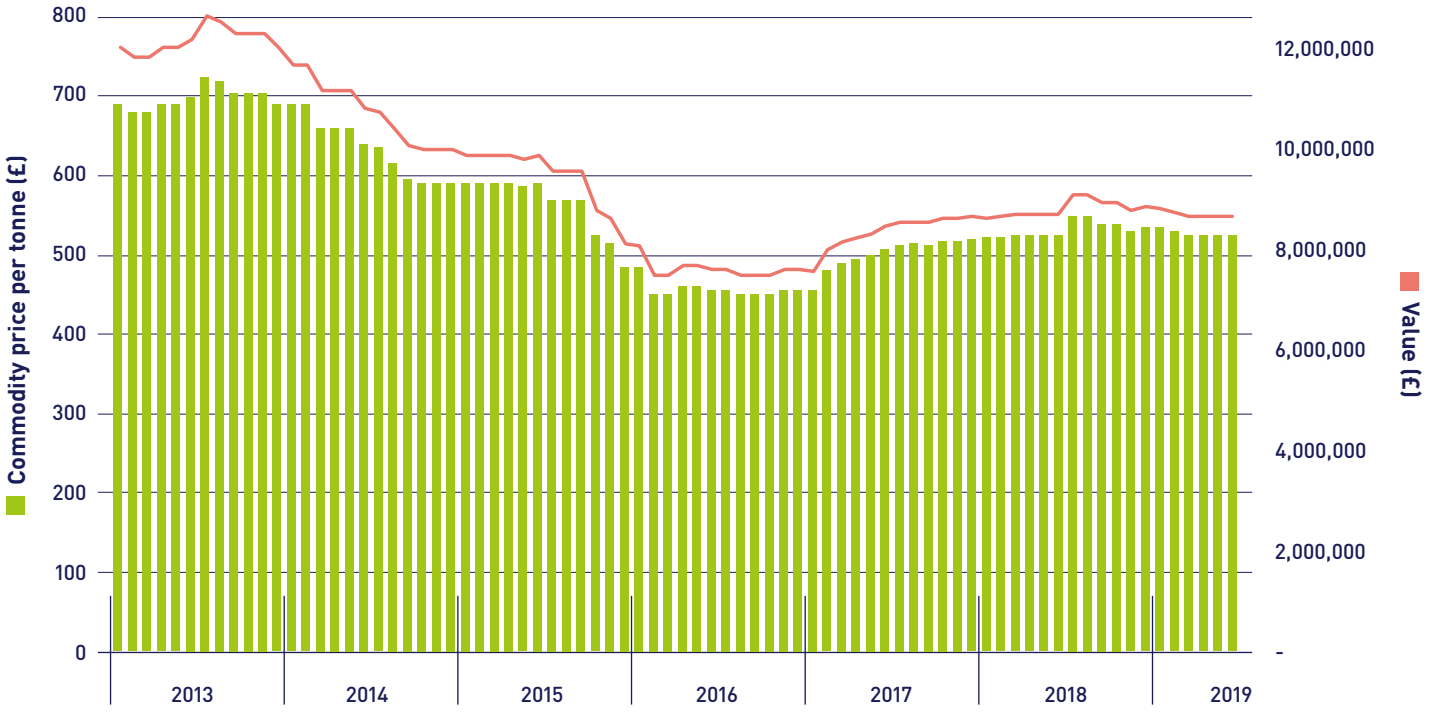
Much of the expenditure in our sector today is focused on the collection and disposal of waste from waste producers – both households and businesses. Waste collection and its safe management and treatment is a necessary requirement for protecting human health and the environment. Once collected, the various bulk materials are consolidated in transfer stations and sent on for treatment, including:

- Dry recyclate into new materials and products
- Organic materials into compost, digestate and gas for energy production
- Residual waste into power and heat

Further niche or single streams are collected and often repaired, dismantled for their components or recycled into new materials and products. Materials for re-use pass through many different channels of management – simple one-to-one exchanges, charities, exchange platforms such as school uniform shops and exchanges within internet platforms which see billions of pounds of goods exchanged per year.

If we look as an example at the relative value of charity rags within the textile sector, you can see from figure two that the value is many millions of pounds per year. Niche streams of waste and resource are often obscured from more frequently declared figures for the sector, but represent significant money and value flows, and these niche materials will become more prominent going forward.

Figure 2
Textiles sector – estimated value projection from 'charity rags'



When we look at the more traditional revenues from the foundation services offered by the sector, those services are often common between those provided to households and those provided to businesses. Municipal costs and revenues are more consolidated by the nature of there being only a few hundred entities to deal with and their contracts and services are mostly consolidated and reported as such. For commercial waste services, the approximately 5.8 million companies procure their services in a far more disaggregated manner and for far shorter contractual periods. In addition, consolidated or aggregated data for them is far more difficult to extract and subject to significant uncertainty.

As such, when looking at the current economics, we have chosen to consider the data from local authorities as a proxy for the sector, whilst recognising that due to scale and therefore buying power local authorities will often pay less per tonne of waste treated than the equivalent in material under a business contract. For instance, residual waste[1] treatment costs at the receiving facility vary in the 2017/18 WRAP gate fee report[2] from £33 per tonne to £117 per tonne for energy-from-waste and £2 per tonne to £82 per tonne, excluding the cost of landfill tax, for landfill. In both scenarios, it is likely that businesses are paying the higher average costs and local authorities are securing lower average costs.

Local authorities are, however, obligated to collect from domestic households and to ensure businesses have access to the necessary services they need. When combined with the lower waste production for a household compared to a business, this means they will undertake significantly more collections per tonne of material collected than a similar vehicle and crew collecting business waste.

In the UK, the typical household produces around one tonne of waste (recyclable and residual) per year, whereas the average business produces around seven tonnes of waste (recyclable and residual) per year. However, this average masks a wide range of companies – from those with only one employee to those with tens of thousands. Waste generated in the UK from construction, demolition and excavations works amounts to over 100 million tonnes, but is excluded from this analysis as they are not managed in a similar way nor represent equivalent compositions and treatment systems to those general waste materials arising from households and most businesses.

Therefore, if we look at the expenditure and budgets of local authorities in England, we can see how the revenue splits — both gross and net — are distributed between the core activities of waste collection, residual waste treatment, recyclable waste treatment, waste minimisation and trade waste services[3]. In the year 2017/18, in England 43.5% of the gross cost or 37.3% of the net cost[4] was incurred in the treatment of residual waste, 22.2% gross and 17.2% net in the collection of waste, and 15.9% gross and 11.5% net in the net cost of recycling. Waste minimisation comprised less than 1% of the costs incurred in both gross and net revenue. England represents around 84% of the UK population and therefore is the best proxy for the UK. However, regional variations both within England and between the devolved authorities mean that the average will mask significant differences. These costs are presented as percentages of total spend in figure three and as a monetary value in figure four.

1 Residual waste is that left over after materials than can be reused, repaired or recycled have been removed.

2 http://www.wrap.org.uk/sites/files/wrap/WRAP%20Gate%20Fees%202018_exec+extended%20summary%20report_FINAL.pdf

3 Trade waste services are those offered to businesses and undertaken by local authority organisations. These figures do not include the majority of those services which are undertaken by private waste and resource companies.

4 Net cost represents the cost of undertaking the services minus any revenues received.

Figure 3
Percentage total costs for local authorities in England 2017/18 by waste management activity [5]

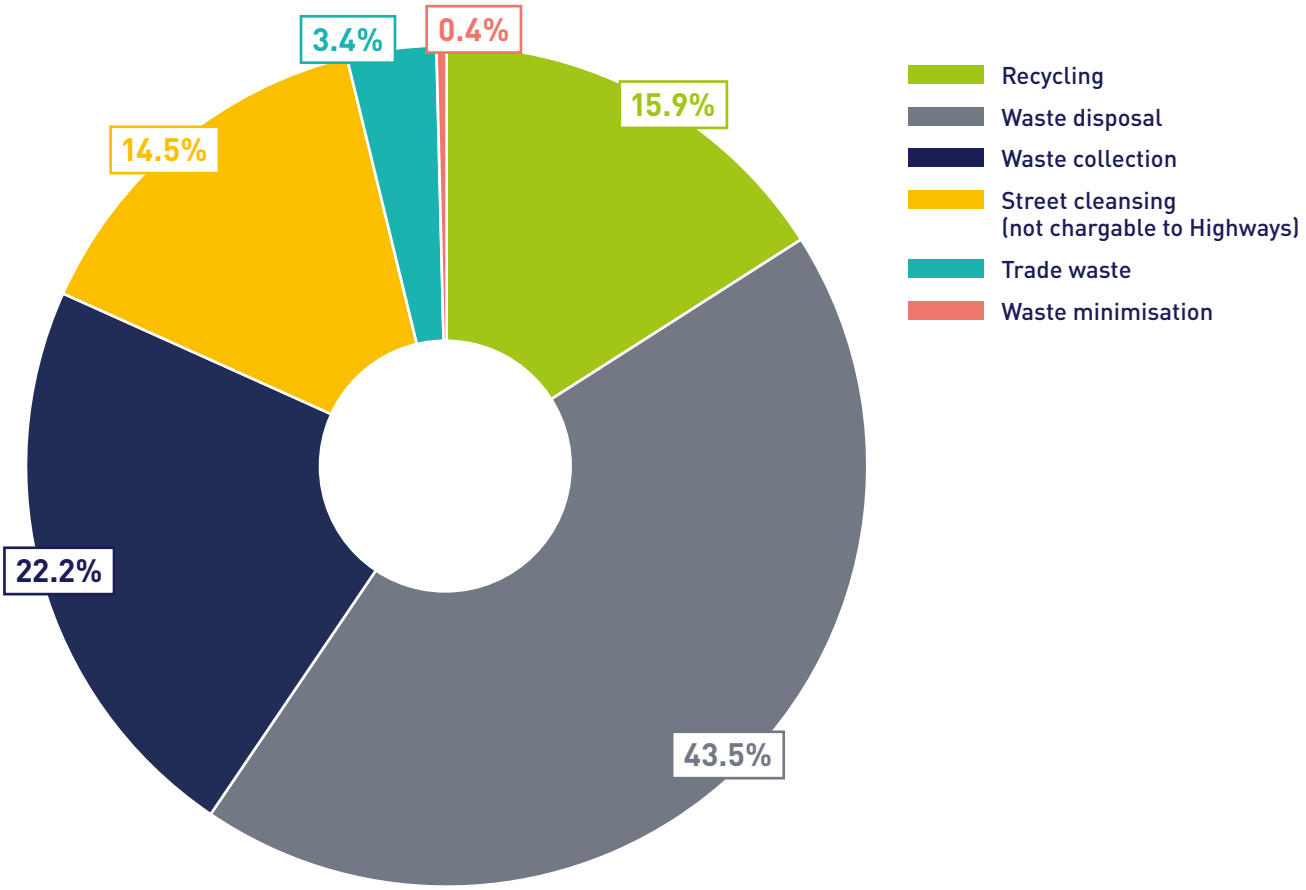
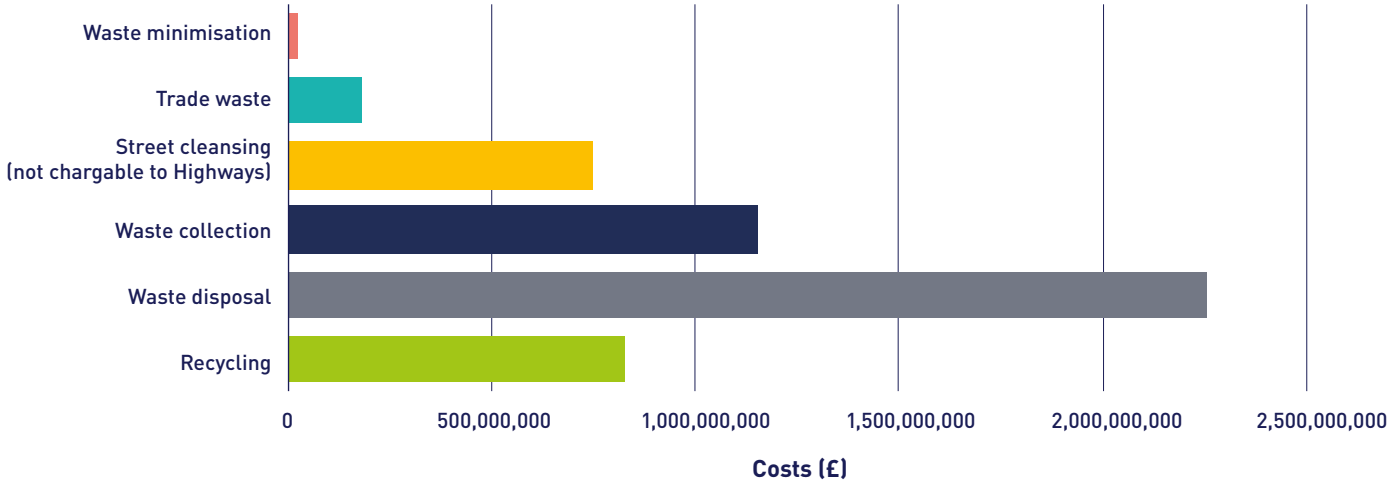


Figure 4
Total costs for local authorities in England 2017/18 by waste management activity [5]



5 Revenue Outturn (RO) 2017-18: Cultural, Environmental, Regulatory and Planning Services (RO5) data

Even net costs, after revenues for things such as sales of recycled materials, offer relatively little change in the total costs of services provided. Recycling revenue netted off amounted to £232 million in the year 2017/18, with residual waste revenues netting off £322 million and waste collection netting off £264 million. Trade waste services in the year netted £212 million and ran a surplus.

Looking forward to the budget year 2019/20 for the English waste authorities, the budget splits vary with a greater proportion of revenue focused on waste disposal and less on waste collection and recycling. Waste minimisation continues to attract less than 1% of the overall revenue spend. These are shown by percentage in figure five and by quantum in figure six.

Figure 5
Percentage net budget costs for local authorities in England 2019/20 by waste management activity [6]

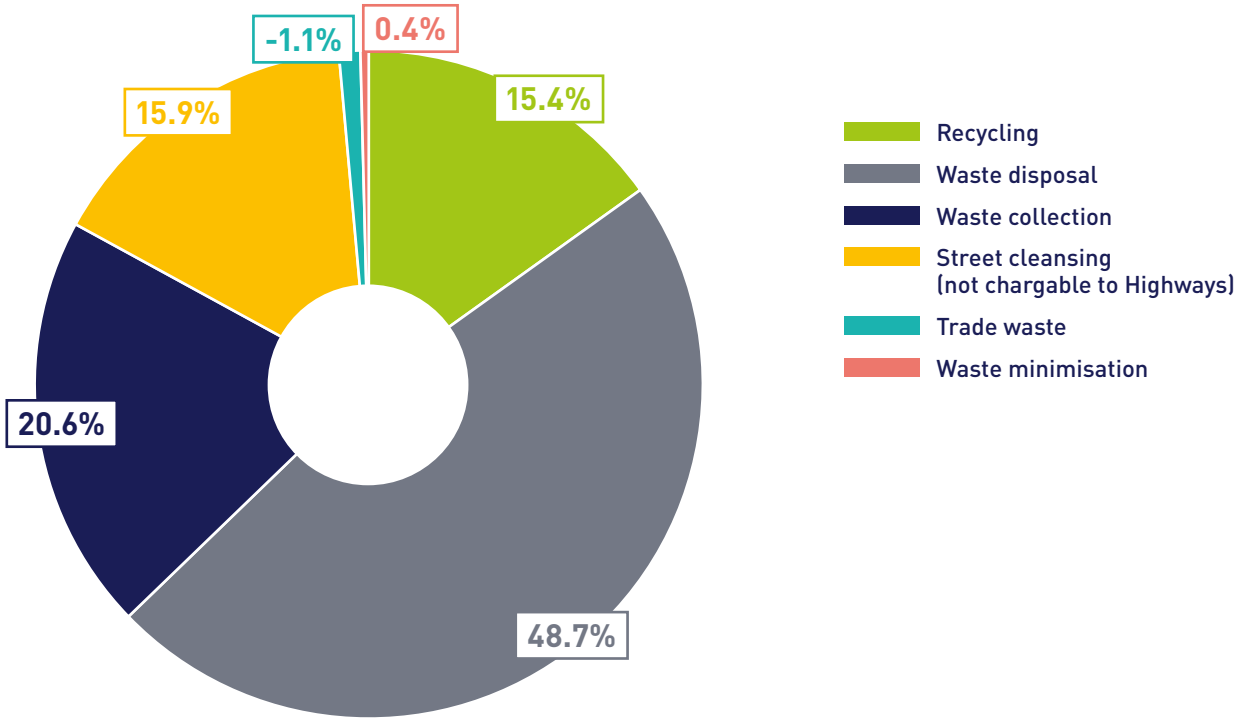
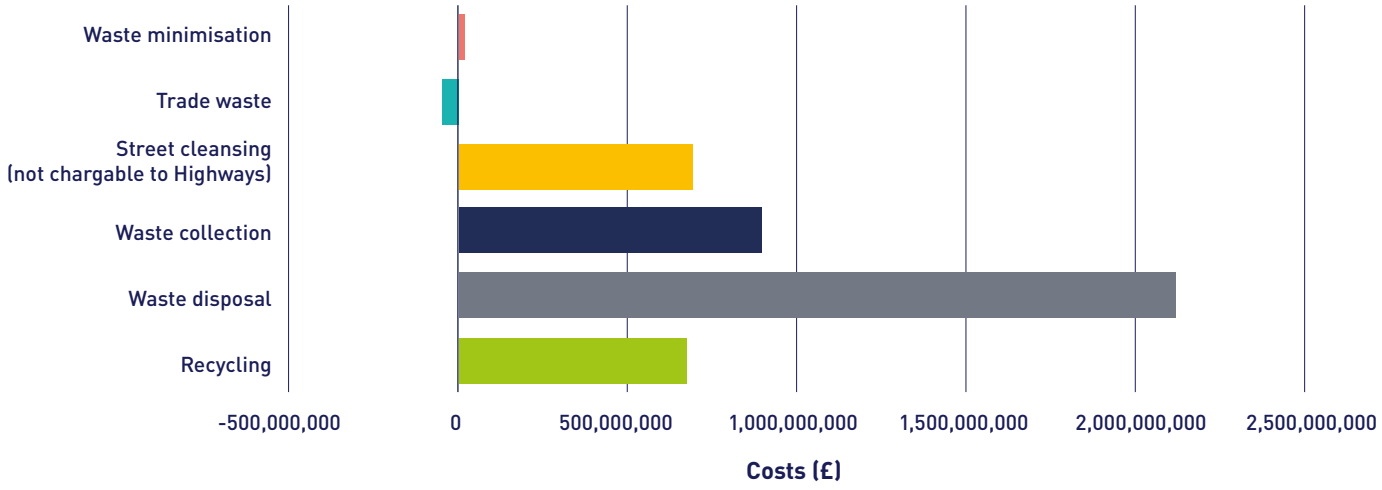


Figure 6
Net budget costs for local authorities in England 2019/20 by waste management activity [6]



6 Revenue Account Budget (RA) 2019-20: Revenue Account data

Going forward, England is proposing policy and regulatory changes to try and push the recycling rate forward from around 45% currently to nearly 65% by 2035. Wales, Northern Ireland and Scotland have devolved powers for waste management currently and have developed different systems and different targets, many of which are similar to those proposed in England. Wales has worked toward high levels of recycling, achieving targets not dissimilar to those which England aspires to. It's therefore interesting to consider the relative costs and net revenue splits between the two systems today as a foundation for thinking about what the costs might be for England in the future. As a foundation, we have presented the 2019/20 revenues for Wales by percentage in figure seven and quantum in figure eight. This allows easy comparison to the English equivalent figures presented earlier.

Wales net spend on waste disposal for the period 2019/20 is forecast to be lower proportionally than England's with recycling capturing 18% more of the revenue and waste collection approximately 2% less of the revenue proportion. Wales directs proportionally slightly more of its revenue costs to minimisation than England, but the difference is marginal.

Figure 7
Percentage net budget costs for local authorities in Wales 2019/20 by waste management activity[7]

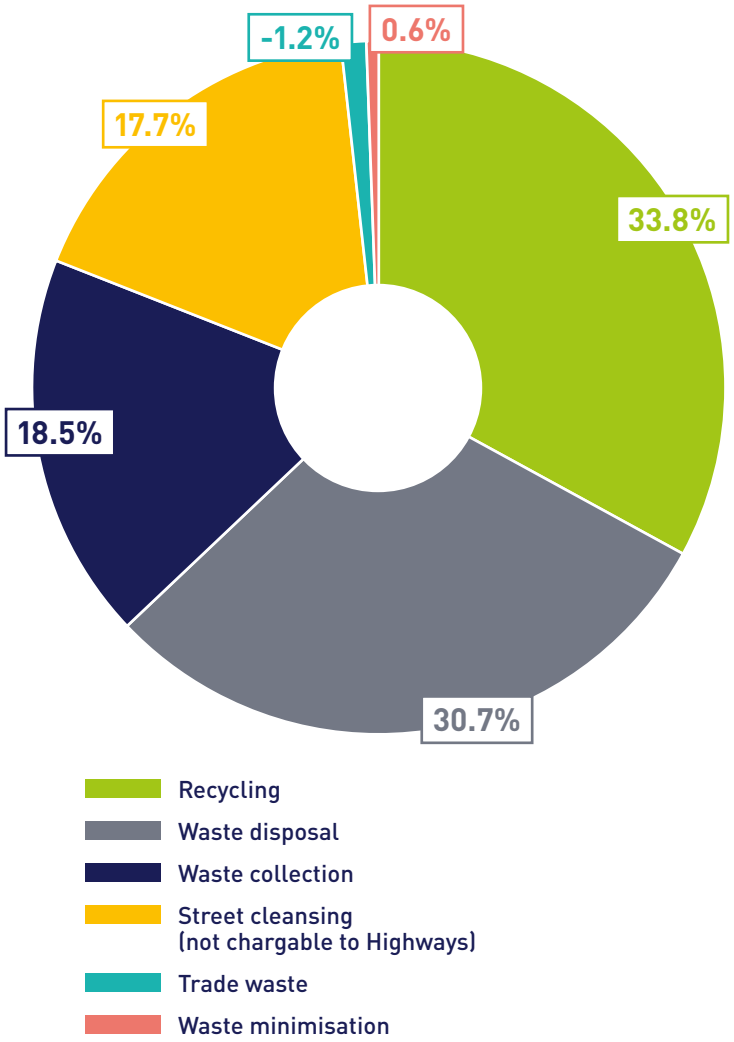
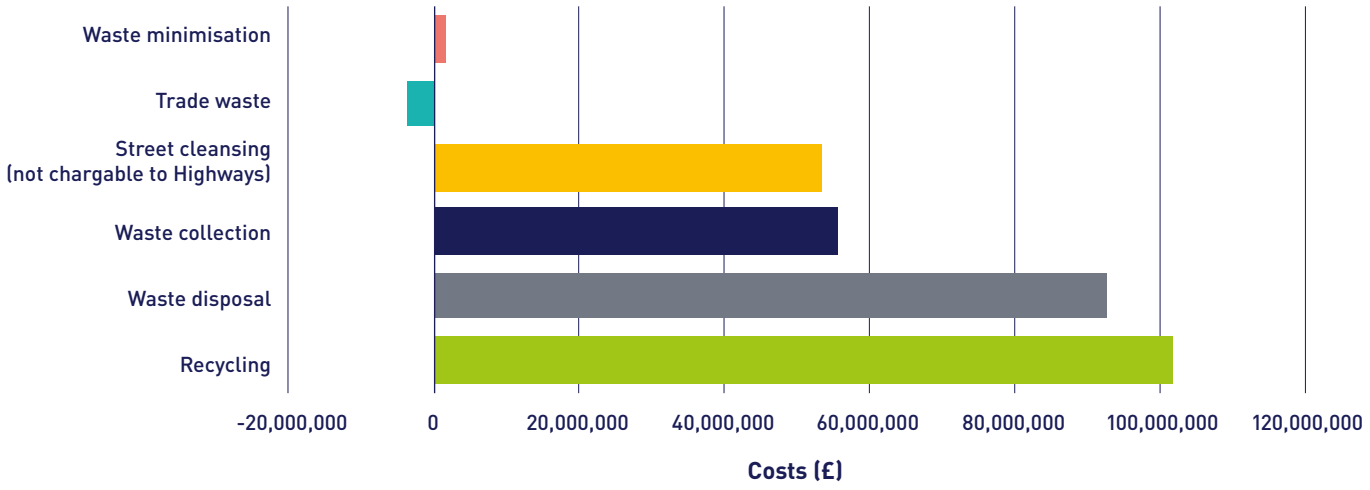


Figure 8
Net budget costs for local authorities in Wales 2019/20 by waste management activity[7]



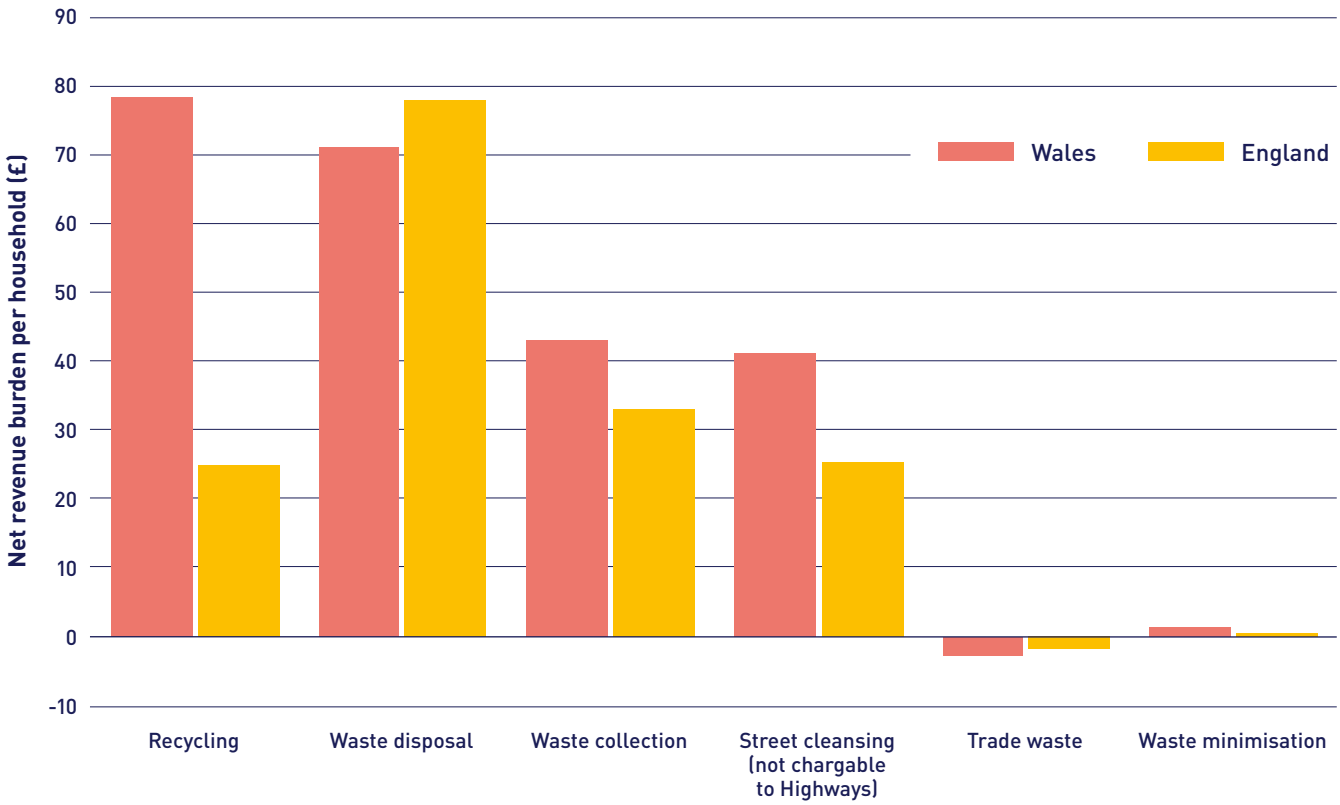
7 Revenue budget (RA) data collection, Welsh Government

It is difficult to compare the costs when declared in this way due to the scale and nature of the two countries. However, if we normalise these costs to the number of households, we get a better idea of the relative costs and, as mentioned earlier, Wales could be seen as a potential future for English expenditure and performance. A graphical analysis of the relative figures is presented in figure nine.

The net cost of recycling in Wales is approximately £54 per household more than that in England. Some of this difference in cost is related to the social, geographic and economic make-up of Wales (for instance, it has more rural areas than England by proportion of households) and the inclusion of some recycled materials, like food, which are not universally collected in England. However, even when corrected, more is invested per household, giving a return on that investment of higher recycling levels.

Interestingly, despite the higher investment and the higher recycling rates, the difference in expenditure between the two countries per household for the cost of waste disposal is forecast as only 9% cheaper in Wales than England in the year. Waste collection costs are marginally more expensive in Wales, which probably reflects the nature of the collection systems required and some of the geographic differences rather than any specific cost difference in like-for-like delivery. Trade waste and waste minimisation costs are comparable on a cost per household level.

Figure 9
Comparison of the net revenue burden of waste management services between Wales and England per household



If England were to follow the Welsh example, it's likely to increase revenue expenditure by in excess of £1 billion, a sum not dissimilar to that expected from the introduction of full net cost recovery (FNCR) under the proposals for extended producer responsibility.

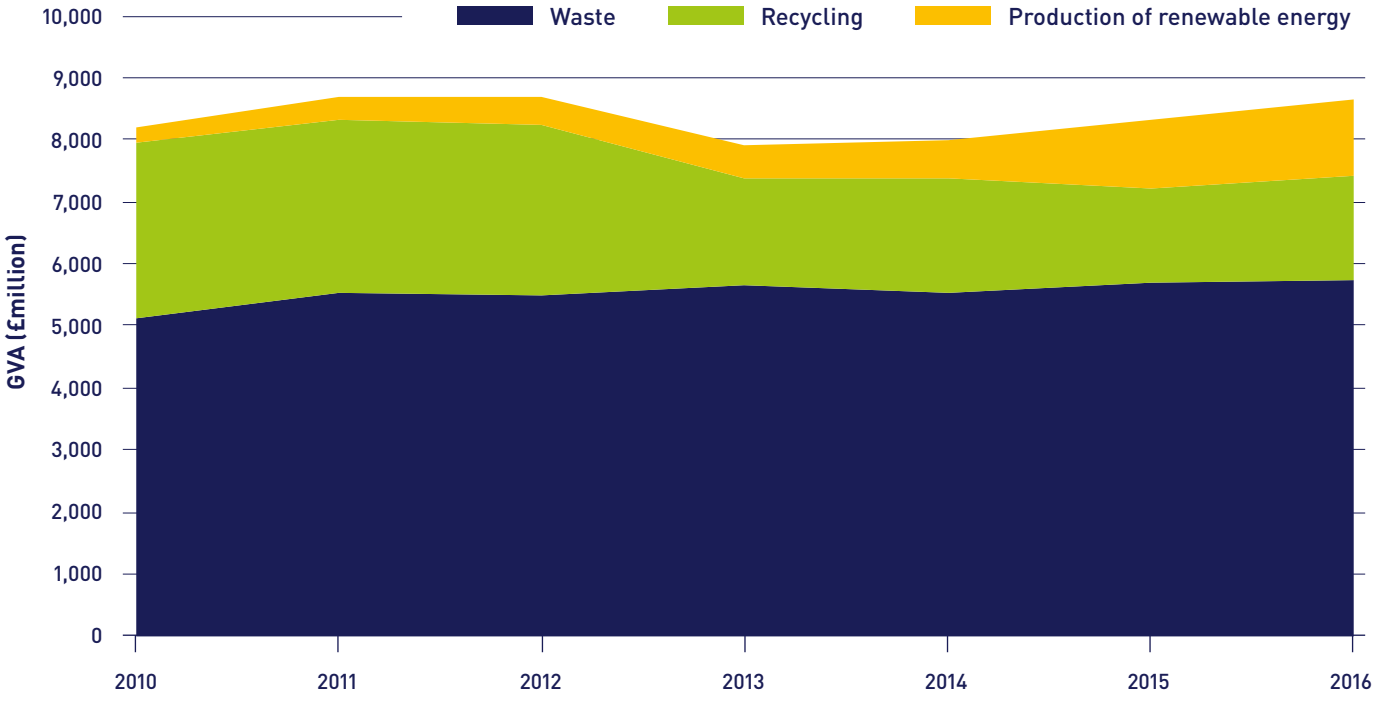
One might suggest that the increased recovery of recycled materials could deliver increased income for local authorities, but this is unlikely to be sufficient to counter the expected cost increases in delivering the new or amended services and will therefore fall to the extended producer responsibility payment. This does not mean that the value of recycled materials is not material, only that the scale of value when translated to the services delivered to each household or business is relatively minor in comparison. For example, the recent volatility in the packaging recovery note (PRN) and packaging export recovery note (PERN) for plastics created value deltas in excess of £300 per tonne of secondary resource.

However, when translated to a differential on the cost of service for a typical business waste collection for dry recyclate under the current economic conditions, amounted to no more than a 2% change in the full cost.

The transitory nature of the movements of the packaging recovery note and packaging export recovery note meant that the value was neither predictable nor reliable and thus little of this benefit in value flowed through the value chain to the original waste producer. Resource values are, however, a significant factor in their own right. To consider them, we have looked at the gross value added (GVA)[8] of the sector and the constraints in market offtake that started in 2014, which gives some interesting insight.

Gross value added of the resources and waste sector over time, illustrated in figure 10, shows us the relative importance of recycling activity when compared to waste and the production of energy.

Figure 10
Resources and waste sector gross value added contribution[9]



8 Gross value added (GVA) is the measure of the value of goods and services produced in an area, industry or sector of an economy. In national accounts, GVA is output minus intermediate consumption.

9 Environmental goods and services sector: GVA by industry, UK, 2010 to 2016. For energy, the proportion of power from the sectors is proportioned based on output data from the Digest of United Kingdom Energy Statistics (DUKES) 2018: long-term trends dataset.

As can be seen from figure 10, the contribution of recycling to the gross value added of the sector was less post 2014. When considering what might have caused this, the activity level shown by the sector through levels of employment clearly shows some level of continuity at similar or increased rates. Having taken account of tonnes collected and produced and activity levels, it appears that the majority of the driver for the decline in gross value added were the prices of the recycled materials, especially fibre (paper and card) which represents the largest weight of material collected. Over the period 2010 to 2016, the gross value added contribution of recycling to the sector declined from a peak of 34% to 18% at its lowest. It has not materially recovered since this point and continues to relatively underperform against the other main sector activities.

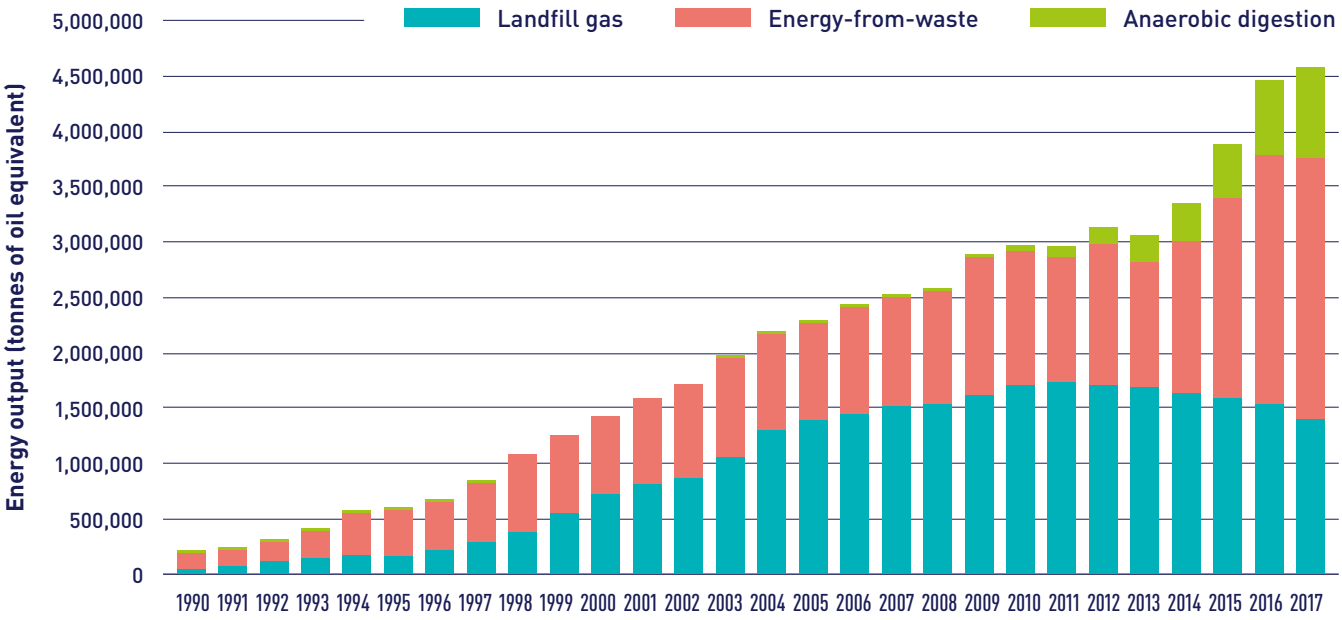
Commercial waste collection suffered the same issues on recycled material prices as those from local authorities and will also be required to undertake a larger proportion of the heavy lifting under current proposals than local authorities in achieving the new recycling targets.

Unless compensated through similar full net cost recovery processes, the increased cost of recycling services will fall to the individual companies, increasing their costs of operation. Although measures are proposed to be put in place to provide support for recycled materials values, these are likely to be insufficient to prevent increased costs to businesses.

Energy is another current output from the resources and waste sector that delivers material value, be it landfill gas to electricity generation, power and heat from energy-from-waste or anaerobic digestion of organic wastes into power and/or gas.

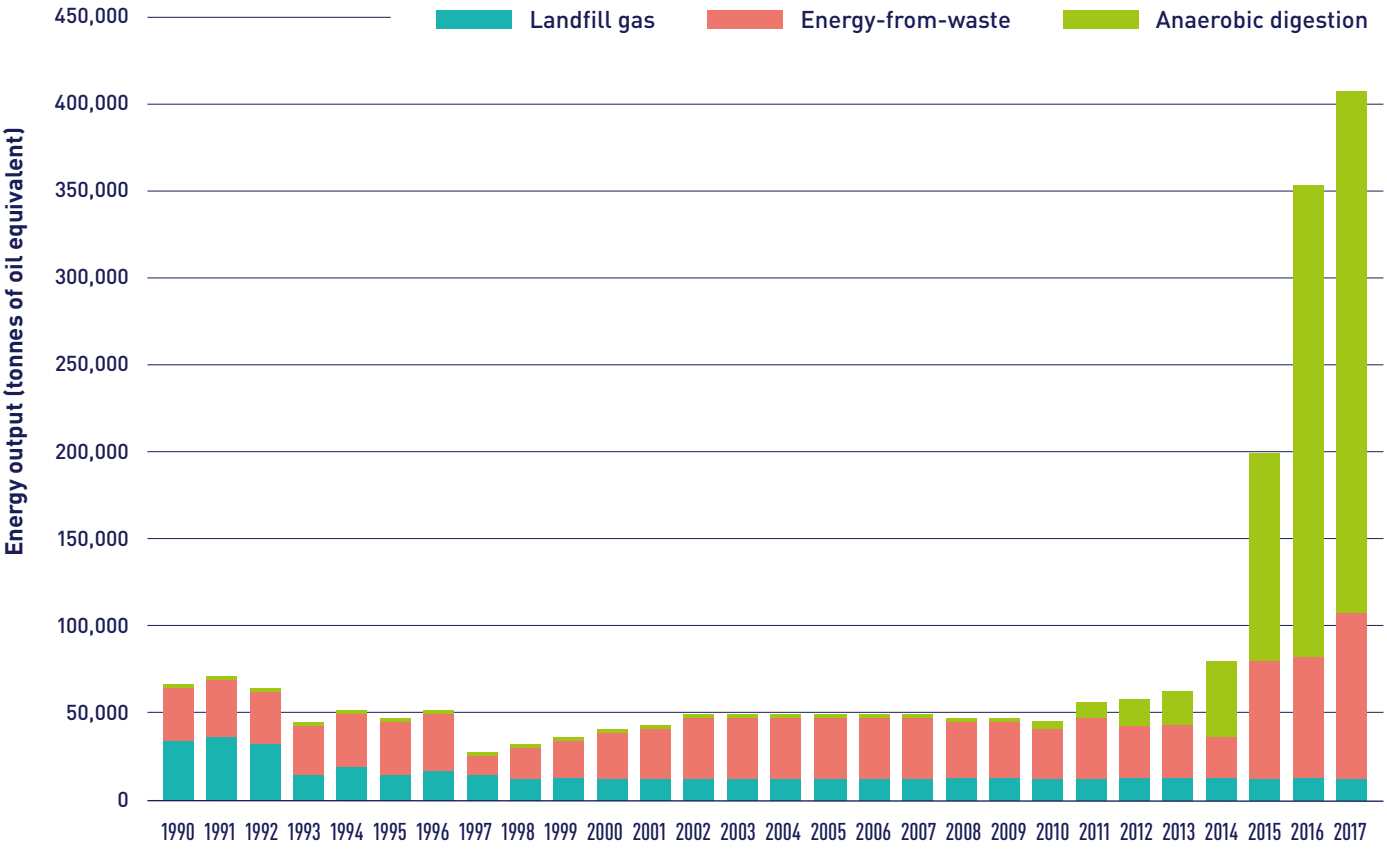
Power production has continued to grow each year, although the diversion of waste from landfill to other forms of treatment has elicited a more recent decline in power produced from landfill gas. However, this has more than been replaced with power from energy-from-waste and anaerobic digestion. A graph showing the approximate contribution of energy from landfill gas, energy from waste and anaerobic digestion is presented in figure 11.

Figure 11
Power production from the resources and waste sector



More interestingly, the contribution of heat rather than power has shown a significant rise in recent years, partly driven from increased heat supply from energy-from-waste, but mostly driven from gas to grid contributions from anaerobic digestion. This is presented in figure 12.

Figure 12
Heat production from the resources and waste sector (excluding waste wood to biomass)



the economics of tomorrow

Transitions in collections

Given that the sector has been operating on relatively stable and consistent conditions, almost all costs that we have looked at in the preceding section are ones that do not reflect significant costs in transition. The major transition we have seen over the last 10 years is the investment in technologies that move waste away from landfill, including recycling, energy-from-waste and anaerobic digestion. The capital investment involved in this simple transition is in excess of £10 billion so far and to complete the journey will require similar levels of investment.

The introduction of a new system of extended producer responsibility and a form of deposit return scheme is planned for 2023 and falls within what we would call the short to medium term (i.e. less than five years).

The proposals for consistent collection currently suggest that local authority contracts will be allowed to accommodate natural changes in their contractual arrangements. Taking into account that some contracts are unlikely to be fit for purpose and may be changed or replaced early, it's still likely that the full local authority cost of consistent collections will be spread over five to 10 years and be classified as a medium-term transition.

For collections from business waste producers, the position is less clear, with the Defra consultation discussing options for fully mingled collections only. These do not marry with the current regulatory demand for four streams of material (paper/card, metals, glass and plastic) unless there are proven technical, economic or environmental reasons why they need to be collected differently. If we assume that we keep the current basic regulatory position, and assume that the new model of extended producer responsibility supports the collection of obligated packaging items in a manner similar to those likely for local authorities, then we would expect that the business waste collection transition would take five to seven years, matched to an average fleet age of the collection fleets.

As it appears government is intending to require businesses waste producers to achieve higher performance than local authorities to meet the recycling targets themselves, they also need those same businesses to move quicker to help drive the early performance increases required. If half of the fleet needs to be replaced in the short term, the remainder will need to be replaced in the medium term incurring potential costs of £300 million over the next five years and a further £300-£500 million in the five years after this, during which the sector will also need to address the move to low or zero emission collection vehicles. To complete the transition, the sector is likely to need to invest a further £300-£500 million in the medium to long term to complete that low/zero emission transition.

Government has considered the replacement of the bins used at a household level and suggest in excess of £600 million would be needed for a full stock replacement. Although we wouldn't question the actual cost of such a change, we don't think the change is necessary and as such have not considered it further in this report. Bin changes match changes in service requirements and the actual costs of changes in the bin infrastructure depends very much on decisions on the products included in any deposit return scheme and the range of packaging products eventually included in the first phase of packaging extended producer responsibility change.

In addition to the equipment required, further costs for transition will be incurred in the following:

- Retraining and/or recruiting new staff if they are needed for the change in collection.
- Enabling new contracts or seeking to amend current ones, especially if coordination between collection contracts and the style and nature of materials collected and treatment contracts needs to be amended or established.
- Rerouting and/or collection round planning for the new styles and types of collection.
- Revised or new communication and education assets to introduce and promote any amended or new services.
- Data collection and hardware/software changes needed to record and collect the necessary and relevant data from the collections being undertaken.

These are more difficult to estimate, but are likely to be compounded into significant amounts for the sector to accommodate their part of the transition.

The plans for a deposit return scheme proposed to be introduced in 2023 in England and Wales and earlier in Scotland require:

- The setting up of the control and management organisations and their funding prior to the commencement of the scheme itself (from which point it would need to be self-financing).
- The design of contracts for the delivery of equipment or services required for the establishment and operation of a deposit return scheme.
- Changes to the target products manufacturing plants to accommodate the new deposit return scheme labelling requirements.
- The procurement of the equipment and services, which would include reverse vending machines, software and hardware systems or changes for collection points that don't use reverse vending machines.
- The planning applications for changes to buildings and sites to accommodate equipment or points of collection.
- The building and installation of the equipment to create the necessary network of deposit points before the scheme goes live.
- The procurement of new vehicles and containers that may well be needed to service the deposit points.
- Changes to the downstream logistical systems and consolidation or treatment facilities to accommodate the new flows and anti-fraud requirements.
- Accommodation of the changed waste flows in the traditional household and business waste collections and material treatment.

These changes and the associated costs will be cascaded through new and traditional participants in the sector, and their magnitude will depend on the final choice of materials and scope of the deposit return scheme adopted.

The plans for changes to the extended producer responsibility scheme in the UK are likely to also require:

- Changes to bins and collection vehicles aligned with the requirements of consistent collection.
- New management systems and organisations (depending on the final governance scheme design adopted).
- New software and data collection and monitoring systems to accommodate the new reporting and payment systems and monetary flows that will need to be established.
- Changes to transfer stations, sorting plants and recycling facilities to accommodate increased flows in some materials being collected (e.g. plastic pots, tubs and trays).
- Costs of contract amendments or terminations where those contracts are discordant with the targets and new services being introduced and where changes to services are required. Terminations are unlikely, as in most cases it's likely that the participants will negotiate satisfactory solutions. In some instances, however, the contracts that exist are wholly unsuitable to meet the future objectives and the scale of change may warrant termination.

Transition for infrastructure

New materials will need to be collected, such as:

- Dry recylate materials not currently universally collected, such as plastic pots, tubs and trays, or possibly flexible plastics and films.
- Food waste where not currently collected or if collected when mingled with green waste and if required to be separately collected.
- Glass waste where not currently collected.

New infrastructure will be required for these materials, or current infrastructure expanded or revised to accommodate flows of materials collected in new ways, such as dry recyclate collected in twin or tri streams rather than in fully mingled form. Although the actual cost of this transition is likely to be significant, it's difficult to estimate the actual cost range until the conclusions of the various consultations are visible and their interrelation understood. However, the increase in activity at sorting facilities and domestic reprocessing facilities, especially in plastic, could well involve investments between £750 million and £1.5 billion. This would include the potential delivery of sufficient chemical recycling facilities to support the recycling of some film and flexible plastic packaging into new products, including food grade plastic feedstock.

Government estimates of food waste that could be collected are, we think, overstated due to the impacts of minimisation of food waste and a lower expectation of avoidable food waste currently included in residual waste. However, we still believe that between two million and three million tonnes of food waste are likely to be required to be treated. This means somewhere between 30 and 100 new anaerobic digestion facilities will be required, depending on their scale, and an investment of between £500 million and £1 billion. It's vitally important, however, that we don't over-build anaerobic digestion facilities by either over-predicting the volume to be treated or by building to current levels of food waste without taking into account plans for the minimisation of food waste which, if successful, will reduce the current volume of food waste that needs to be collected and treated. Government ambitions are to halve food waste by 2030, well within the normal asset depreciation period of an anaerobic digestion facility. If government does significantly reduce food waste and if the sector builds to current levels of food waste, there may be a need to retire assets early before full payback is achieved.

With regard to completing the journey for the diversion of residual waste away from landfill, the need to build a potential six to eight million tonnes of new capacity will require a further £6-£8 billion to complete. This figure assumes the recycling targets are achieved, population growth continues and export of refuse derived fuel continues to decline. Again, care needs to be taken to continually monitor waste arisings, recycling target delivery and waste compositional mix to ensure that the required capacity is not under or over delivered.

In the longer term, government seems focused on using residual waste to generate not electrons but molecules for use in fuels or chemical production. Given the immaturity of the technology at this point in time and the expectation that the last major build session for energy-from-waste to electrons is about to start, it's unlikely that more than two large (multiple hundreds of thousands of tonnes of input fuel) facilities will be commissioned by 2025. If these prove successful and a wholesale transfer from electron to molecule is planned, then the current fleet of energy-from-waste facilities will be replaced as they reach their end of asset life with a new fleet of energy-from-waste facilities producing molecules. Given an expectation that the new technology will be proving its first commercial scale projects through 2025, it would be expected that this fleet replacement will be undertaken gradually over the next 25-30 years and cost an additional £18-£23 billion on top of the costs in completing the current energy-from-waste build-out.

Transition for revenue streams

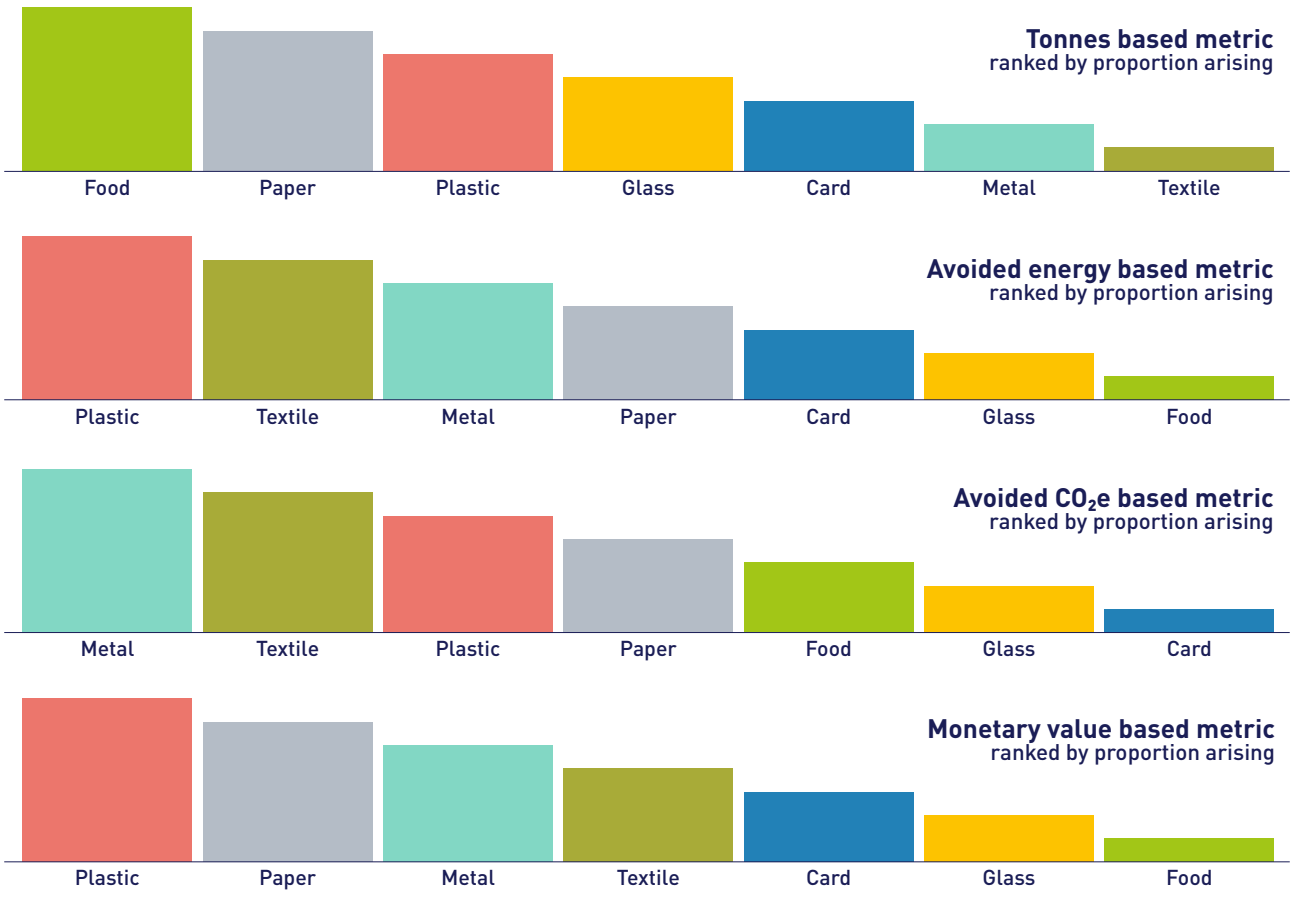
In the short to medium term, we will see changes in funding sources, flows and cost based on the policy interventions planned. If enacted, the proposed tax on plastic products that don't contain 30% recycled plastic will increase the relative value of recycled plastic secondary resources. However, many of the other sources and flows will be more dramatic and more complex to map.

The services of waste collection, consolidation, sorting and treatment will change in scale and complexity as deposit return scheme and extended producer responsibility services are added and change the source of income. Deposit return scheme and packaging extended producer responsibility materials services will move their source of income from a fundamentally tax-based funded source to one almost wholly funded by consumers through the goods they purchase. This is expected to drive changes from one packaging format to another, as well as a host of new services changes and a level of data-founded transparency not previously seen or expected in the sector. The data associated with these activities will itself take on a value.

Government incentives have driven technology changes historically and are expected to continue to drive some changes going forward. Currently, the Renewable Transport Fuel Obligation is designed to incentivise the production of renewable fuels and especially those made from waste feedstock. The incentive only supports fuels made with a minimum biogenic fraction and will therefore compete with feedstock destined for wood fuel biomass and wood recycling, as well as attracting traditional forms of residual waste. No incentive currently exists for waste to chemicals and the minimal incentives for waste-based energy-from-waste projects from electrons are in decline.

With recent increased focus on climate change and the target of net zero by 2050 or sooner, it would be expected that all the services currently undertaken or designed will need to account for their carbon burden. When we look at the primary services of the waste hierarchy, carbon can significantly influence the materials we target for recycling. SUEZ has explored this previously in our report 'At this rate'[10] and produced the following graphic (figure 13) in our publication 'A vision for England's long-term resources and waste strategy'[11] to show how materials targeting might vary if different metrics are chosen. Green waste was excluded from the analysis as it is not common to all local authorities and rarely arises in business waste collections.

Figure 13
Recycling metrics by proportion arising



10 https://www.suez.co.uk/-/media/suez-uk/files/publication/suez-atthisratereport-1509-web.pdf
11 https://www.suez.co.uk/-/media/suez-uk/files/publication/suez-resourcesandwastestrategyvision-2018529.pdf

Currently, the recycling rates and target materials are based on a weight-based metric, even though many have supporting greenhouse gas savings calculated for them.

However, if carbon becomes the dominant metric, it could well drive changes to the priority of what is collected and the methods used to collect them. Further, a full lifecycle approach could well challenge some of the assumptions or proposals for modulation of packaging under the new extended producer responsibility schemes and the collection method burdens throughout the traditional systems, as well as those required under extended producer responsibility and deposit return schemes.

However, when you consider carbon alongside biodiversity and natural capital as well as the wider environment, the value in materials and goods and the process or purchase, discard and waste management could be challenged. For instance, the investments required to maintain and increase the stocks of natural capital may well be funded through the polluter pays methodology.

In this case, the polluter will pay for the full externality costs of burden to society of their pollution and the wider environment which could, and arguably should, significantly increase the cost of waste production.

A good example here would be to consider food production and waste. Food production requires extensive resources, especially for animal protein production, and the wider cost burden of its unnecessary wastage is significant. Costing in the full externality cost of unnecessary food waste would significantly increase the cost burden to waste producers and hopefully reduce the scale of waste at source.

Waste minimisation has the potential to drive the most carbon savings and if carbon costs were applied, to drive significantly larger values, per tonne of waste, than recycling. A study published by the EU in 2017[12] gave approximate savings between the same material flows for recycling and the avoidance of waste in the first instance. This is shown here in figure 14.

Figure 14
Relative CO_2e benefits of avoiding waste vs. recycling waste

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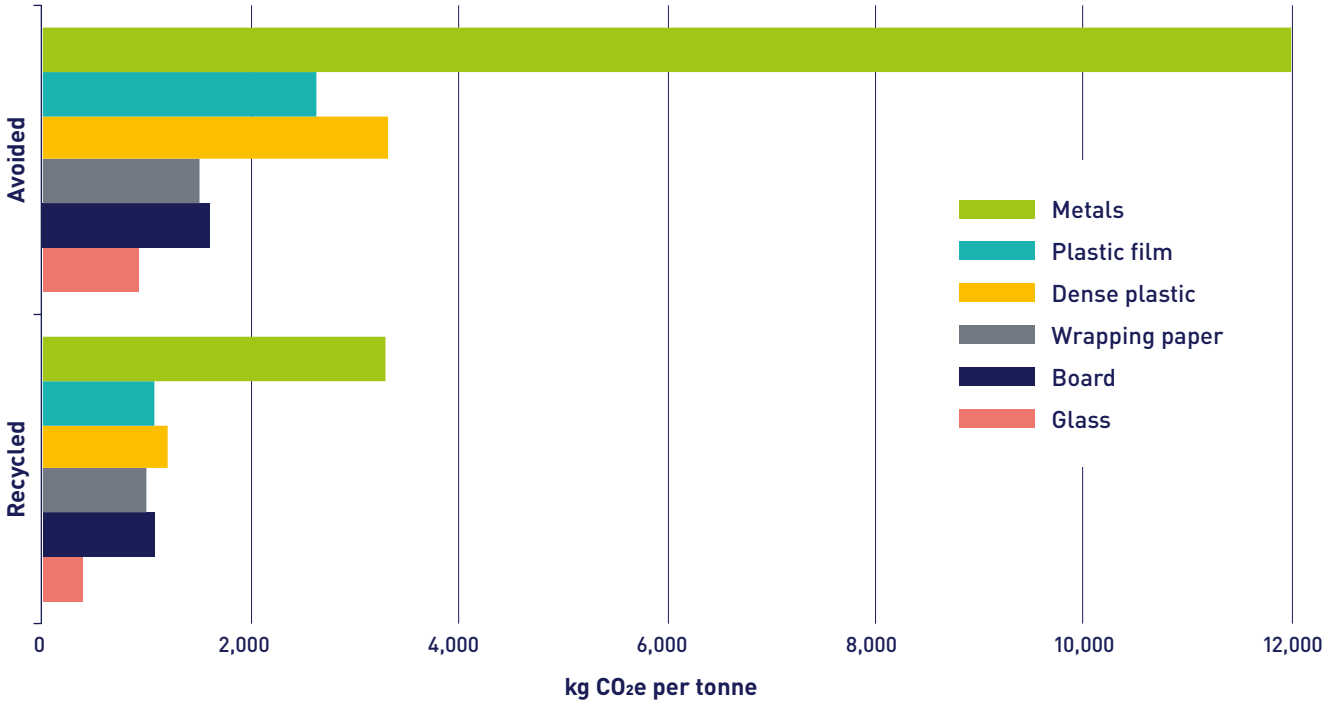
The magnitude of these revenue streams will depend on the carbon price at the time they are incurred, but using the individual values as shown in figure 15, we are able to estimate the relative values between materials. If we take for instance plastic film, the recycling value amounts to almost twice the saving by avoiding the waste than by recycling it when discarded. The volume of plastic film in the UK amounted to around 1.2 million tonnes – for carbon prices between £10 and £50 per tonne of CO_2e saved, this would generate revenues of between £12 million and £65 million if recycled, and between £31 million and £157 million if avoided.

Clearly, adopting a carbon-based pricing mechanism won't fully answer to the government's wider objectives of biodiversity and environmental net gain or the requirements of natural capital, but it will better focus the solutions going forward.

Figure 15
Relative CO_2e benefits of avoiding waste and recycling waste



Adopting biodiversity net gain, environmental net gain and natural capital as metrics for the whole value chain might better support some of the thinking around production, consumption and waste. For instance, plastic packaging in preserving and protecting food delivers significant benefits in preventing food waste. Making sure that extended producer responsibility for packaging therefore takes into account in its modulation of fees the supply chain benefits or burdens of plastic packaging as well as its benefits and burdens in avoidance, recycling or recovery will be fundamental to delivering net zero and to the revenues flowing through the resources and waste sector.

summary

Over the last 10 to 20 years, the resources and waste sector has been going through many evolutionary changes – from the move away from landfill to the new collection, treatment methods and technologies now employed. However, these changes will be small when compared to the changes in activity and revenue that are likely to occur in the next 20+ years – from new funding sources and transparency of data and cost to completely new revenue streams from works that improve biodiversity, natural capital stocks and reduce carbon and climate change.

The sector will need these revenues and others to help fund at least the £26 billion to £35 billion of new investment noted in this report and that is required to deliver all of the outcomes wanted by government and society.

About the author

This document was authored by Stuart Hayward-Higham, Technical Development Director at SUEZ recycling and recovery UK. Stuart's role includes delivering market knowledge and strategy and understanding policy implications to the sector through negotiating offtake contracts, advising customers, research, development and innovation and implementing new solutions or making successful niche activities mainstream.

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