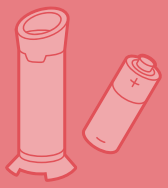
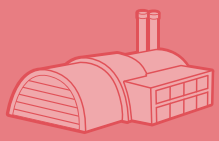
HM Government









OUR WASTE, OUR RESOURCES: A STRATEGY FOR ENGLAND

















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PB 14552

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MINISTERIAL FOREWORD

Dame Ellen MacArthur broke the solo record for sailing round the world and is now dedicated to an even tougher challenge – completely rethinking how we use resources, and designing out waste and pollution.

This superb advocate for a circular economy speaks of the vital lesson she learned on her lengthy voyages, about the true value of resources which are so often taken for granted: from fuel, food and water, to wood, metals and plastics.

Because in a boat, thousands of miles from land, 'What you have is all you have,' as Dame Ellen observes. And that means valuing finite resources by keeping them in the economy and out of the environment.

The same should be true of the planet's raw materials – the source of all that we eat, drink, wear, drive, use and breathe. We rely upon these valuable assets, the Earth's 'natural capital', for energy to fuel homes, businesses and transport; the materials to build shelter; the seeds, soil and water we use to grow food.

And our consumption of them places greater strain on our planet as the global population grows. More people are migrating from rural areas to cities. Greater prosperity and higher living standards are driving demand for nutritious food, comfortable housing, reliable energy and consumer goods. With everything humans do, we inevitably create waste. However we manage it, there is an impact on the environment.

The Government's ambitious new Resources and Waste Strategy seeks to redress the balance in favour of the natural world. Our goal is to move to a more circular economy which keeps resources in use for longer – for that to happen, we must all reduce, reuse and recycle more than we do now.

Our Strategy focuses on known problems with effective solutions that, among other benefits, will reduce our reliance on single-use plastics, cut confusion over household recycling, tackle the problems of packaging and end the economic, environmental and moral scandal that is food waste.

We also tackle the problem of waste crime, which cost the English economy around £600 million in 2016, harms local communities and which pays no heed to the value of scarce resources.

Our goal is to maximise the value of the resources we use, minimise the waste we create, cut emissions and help create a cleaner, greener, healthier planet.

Turning the tide on pollution

By making sure that manufacturers and producers bear a heavier financial burden for the pollution they cause, the Strategy fully upholds the 'polluter pays' principle.

By introducing new incentives – regulatory and economic, along with better infrastructure and information, our measures help people do the right thing.

And by protecting the natural world, and leaving it in a healthier state for the next generation, it will help us uphold a core pledge of our 25 Year Environment Plan.

This Strategy reflects that ambition. Leaving the European Union is an opportunity to refresh and renew our environmental policy, and show domestic and international leadership.

Secondly, these new measures support our commitments, in the Industrial and Clean Growth Strategies, to double resource productivity and eliminate avoidable waste, both by 2050.

Thirdly, and as importantly, we know there is an urgent need for new thinking to tackle avoidable waste, particularly plastic. An estimated eight million tonnes of plastic waste enter the sea each year. Devastating evidence of the damage to wildlife and habitats has been shown in programmes such as Blue Planet II on the BBC, and Sky's Ocean Rescue campaign.

We will consult on increasing our successful 5p plastic bag charge to 10p, and extending the scheme to small retailers. We will consult on introducing a deposit return scheme for drinks containers, to reward people for bringing back bottles and encourage them not to litter their empties. We have also consulted on banning plastic straws (except for medical use), stirrers and cotton buds.

Plastic pollution is, however, far from the only threat to the environment. Radical action is necessary to improve our use of resources and our handling of waste. Government moves to cut consumption of single-use plastics have both paved the way for the fundamental reforms set out here, and put the sector on notice that we expect lasting, long-term change.

The consequences of every country's behaviour are seen and felt across the world. Pollution knows no national boundaries – it damages the global environment as well as our own landscapes, rivers and seas. And countries are responding to the threat they face. Nations such as China are no longer prepared to accept lower quality waste materials; nor indeed should this nation be offshoring its waste for others to deal with.

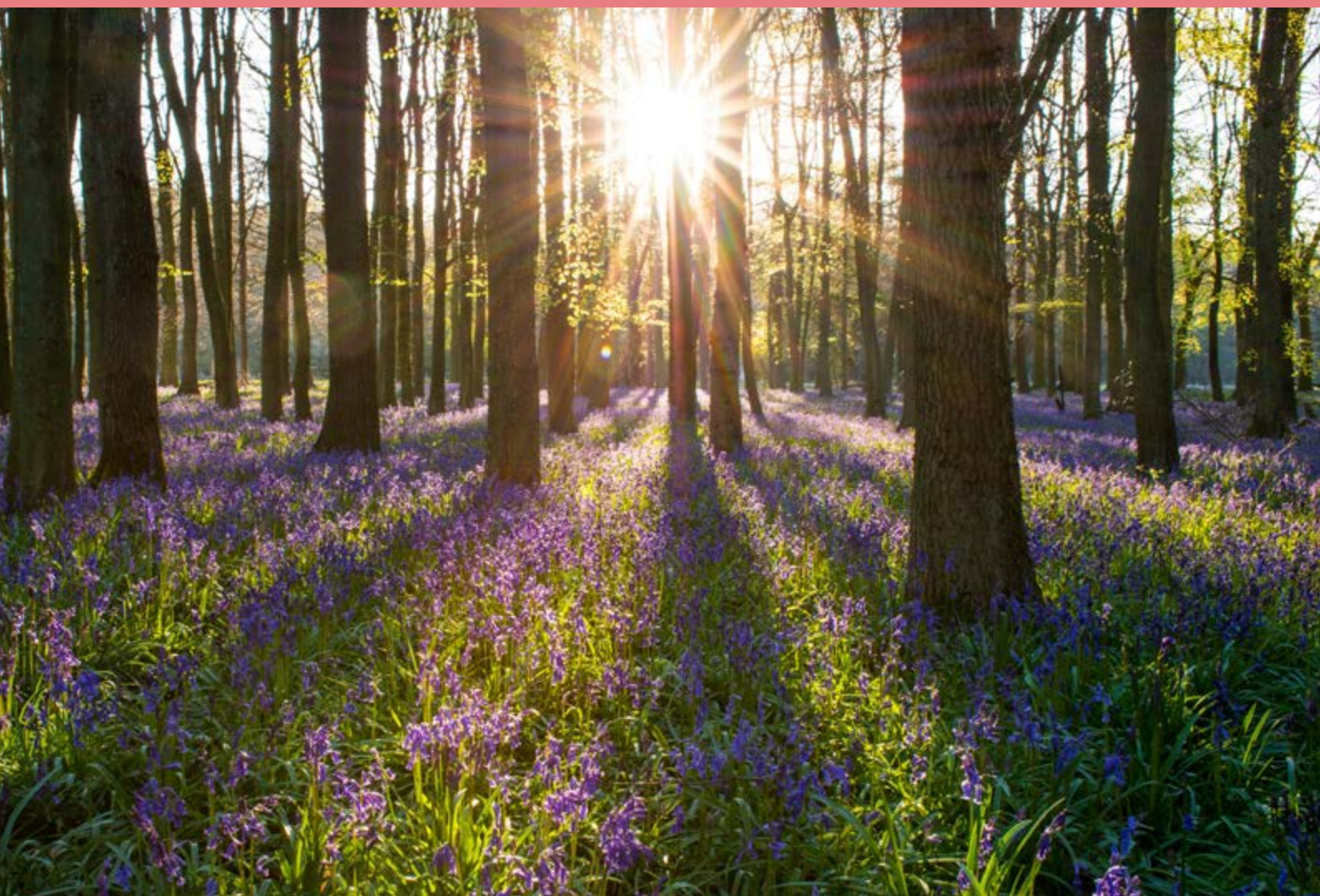
In recent decades, this country has been making progress on how it manages waste and resources. Recycling rates are up, and carbon emissions are holding steady. But we are ambitious for more. The planet needs us to do more. And with this Strategy we will go further, faster.



Michael Gove

Secretary of State for Environment, Food and Rural Affairs

THE RESOURCES AND WASTE STRATEGY AT A GLANCE



Natural capital is one of our most valuable assets. The air we breathe, the water we drink, the land we live on, and the stock of material resources we use in our daily lives are at the heart of our economy, our society and our way of life. We must not take these for granted.

Our Strategy sets out how we will preserve our stock of material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. At the same time we will minimise the damage caused to our natural environment by reducing and managing waste safely and carefully, and by tackling waste crime. It combines actions we will take now with firm commitments for the coming years and gives a clear longer-term policy direction in line with our 25 Year Environment Plan. This is our blueprint for eliminating avoidable[1] plastic waste over the lifetime of the 25 Year Plan, doubling resource productivity, and eliminating avoidable waste of all kinds by 2050.

We want to be ambitious. Where existing legislation cannot match our ambitions, we will take new powers to strengthen it.

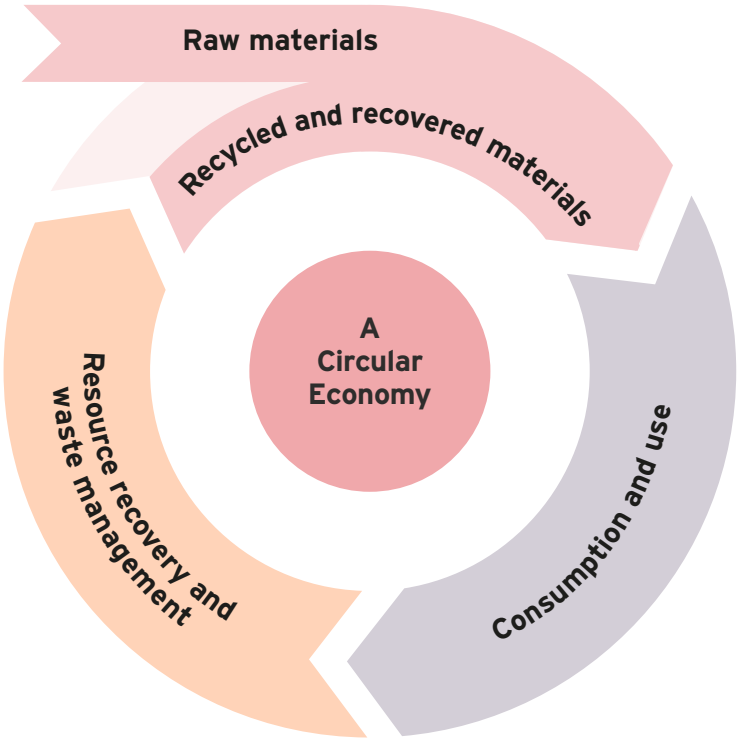
Introduction – The case for action

In the 25 Year Environment Plan, the Government pledged to leave the environment in a better condition for the next generation. This Strategy will help us meet that commitment. It will be supported by a series of consultations on known problem areas, such as packaging waste, and we encourage you to engage with us in delivering this strategy by sharing your views.

Our plan is to become a world leader in using resources efficiently and reducing the amount of waste we create as a society. We want to prolong the lives of the materials and goods that we use, and move society away from the inefficient 'linear' economic model of 'take, make, use, throw'.

A more circular economy will see us keeping resources in use as long as possible, so we extract maximum value from them. We should recover and regenerate products and materials whenever we can, giving them a new lease of life.

1 We talk about plastic waste being 'avoidable' when the plastic could have been reused or recycled; when a reusable or recyclable alternative could have been used instead; or when it could have been composted or biodegraded in the open environment



Chapter 1 – Sustainable production

During the first stage of the resources lifecycle, we turn valuable natural resources and materials into the goods and services upon which modern life and a healthy, vibrant economy depend. Evidence suggests that 80% of the damage inflicted upon the environment when products become waste can be avoided if more thoughtful decisions are made at the production stage[2].

This chapter sets out how we will:

- **Invoke the 'polluter pays' principle and extend producer responsibility for packaging, ensuring that producers pay the full costs of disposal for packaging they place on the market**
- **Stimulate demand for recycled plastic by introducing a tax on plastic packaging with less than 30% recycled plastic**
- **Harness the potential of extended producer responsibility for other product types**
- **Set minimum requirements through ecodesign to encourage resource efficient product design**
- **Manage chemicals sustainably and address barriers to reuse and recycling posed by their use, through a Chemicals Strategy**
- **Develop a model for realising resource efficiency savings, working with businesses through 'resource efficiency clusters'**

2 WRAP (2013) http://www.wrap.org.uk/sites/files/wrap/Embedding%20sustainability%20in%20design%20%20-%20final%20v1.pdf

Chapter 2 – Helping consumers take more considered actions

Helping consumers choose and use more sustainable products, is both good for them and the environment. Despite advances in technology in recent decades, the average life span of many products we buy and use in daily life is actually lower than it was 20 years ago[3]. We want to extend the lives of products through repair, reuse and remanufacture. We want to help consumers to be able to recycle the materials they contain and dispose of them in the most environmentally sensitive ways.

This chapter sets out how we will:

- **Incentivise consumers to purchase sustainably**
- **Provide consumers with better information on the sustainability of their purchases**
- **Ban plastic products where there is a clear case for it and alternatives exist**
- **Address barriers to reuse**
- **Support the market for remanufactured goods**
- **Encourage appropriate disposal of used products**
- **Lead by example though procurement and the Greening Government Commitments**

Chapter 3 – Resource recovery and waste management

Household waste recycling rates in England have risen from around 11% in 2000/1 to about 45%[4]. Recycling rates in construction have also improved over the same period[5]. But since 2013 rates for both have plateaued. We need to drive better quantity and quality in recycling, and more investment in domestic recycled materials markets. This government supports comprehensive and frequent waste collections and is determined to help local authorities and waste management companies act in the most sustainable and resource-efficient way possible. We want to promote UK-based recycling and export less waste to be processed abroad.

This chapter sets out how we will:

- **Improve recycling rates by ensuring a consistent set of dry recyclable materials is collected from all households and businesses**
- **Reduce greenhouse gas emissions from landfill by ensuring that every householder and appropriate businesses have a weekly separate food waste collection, subject to consultation**
- **Improve urban recycling rates, working with business and local authorities**

3 The German Environment Agency (2017) https://www.umweltbundesamt.de/en/press/pressinformation/lifetime-of-electrical-appliances-becoming-shorter

4 Local authority collected waste from households from January 2010 to March 2018. (https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables)

5 UK Government services and information (2018) https://www.gov.uk/government/statistics/uk-waste-data

- **Improve working arrangements and performance between local authorities**
- **Drive greater efficiency of Energy from Waste (EfW) plants**
- **Address information barriers to the use of secondary materials**
- **Encourage waste producers and managers to implement the waste hierarchy in respect to hazardous waste**

Chapter 4 – Tackling waste crime

Waste-related criminal activity costs the economy hundreds of millions of pounds per year[6]. Rogue operators illegally dump or export waste, undermining legitimate businesses by disposing of waste cheaply and recklessly. This deprives the economy of tax income and harms the environment and local communities. By tackling this crime we will ensure that resources are properly recycled or recovered and fed back into the economy.

This chapter sets out how we will:

- **Improve the transport, management and description of waste by reforming existing regulations**
- **Strengthen intelligence sharing and engagement to tackle illegal activity**
- **Prevent illegal activity being hidden through waste exemptions by reforming the existing regime**
- **Mandate the digital recording of waste movements, subject to consultation**
- **Create a Joint Unit for Waste Crime**
- **Toughen penalties for waste criminals**
- **Increase awareness of waste regulations and publicise positive work of enforcement bodies as they tackle waste crime**

Chapter 5 – Enough is enough: cutting down on food waste

We have long recognised the need to tackle food waste. In the UK alone, an estimated 10 million tonnes of food and drink are wasted post-farm gate annually, worth around **£20 billion**. Excess food waste costs us money and is environmentally damaging. Growing excess food that no one eats damages the Earth's ecosystems when we dispose of it. Moreover, a fifth of UK greenhouse gas (GHG) emissions are associated with food and drink, mostly created during production (agriculture and manufacturing) – and needlessly if the food and drink are wasted[7]. We are fully committed to reducing food waste, reducing our carbon footprint, and also meeting the UN Sustainable Development Goal to halve global food waste at consumer and retail levels by 2030.

6 DEFRA - Rethinking Waste Crime (2018) https://consult.defra.gov.uk/waste/crime-and-poor-performance-in-the-waste-sector/supporting_documents/Waste_Crime_Cons_English.pdf

7 WRAP (2016) http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environment-food-and-rural-affairs-committee/food-waste/written/38003.html .

This chapter sets out how we will:

- **More effectively redistribute food to those who need it most before it can go to waste**
- **Consult on annual reporting of food surplus and waste by food businesses**
- **Consult on legal powers to introduce food waste targets and surplus food redistribution obligations**
- **Publish a new food surplus and waste hierarchy**
- **Promote awareness of the issue by appointing a new food waste champion**
- **Support cross sector collaboration through the Courtauld 2025 agreement**

Chapter 6 – Global Britain: international leadership

Concerns over resources and waste management cut across continents and oceans. Pollution and environmental damage do not respect national borders and tackling them requires a broad coalition. Plastic which pollutes the ocean can be carried by currents and cause damage far from where it originated: there is little to be gained by making improvements in isolation. International leadership is needed.

This chapter sets out how we will:

- **Promote the goals of our Resources and Waste Strategy internationally**
- **Drive international political commitments through the ground-breaking Commonwealth Clean Oceans Alliance**
- **Support developing nations to tackle pollution and reduce plastic waste, including through UK aid**
- **Improve the quality of plastics exported for recycling through the Basel and Stockholm Conventions**
- **Establish cross-government oversight of the UK's natural resource security**

Chapter 7: Research and innovation

In some areas where we are seeking transformative change, our knowledge, data or technology has yet to match the breadth of our ambitions. Innovation here is vital – both to developing novel solutions and improving the efficiency, cost and/or effectiveness of existing technologies. As Government, we can support industry and academia to stimulate innovation.

This chapter sets out how we will:

- **Support further investment and innovation in resource efficiency, working with UK Research and Innovation (UKRI) on our Areas of Research Interest**
- **Launch a call for evidence on the development of standards for bio-based and biodegradable plastics**
- **Support further investment in resource efficient technologies, including through the Industrial Strategy Challenge Fund**
- **Support the Waste and Resources Action Programme**
- **Encourage innovative waste treatment technologies that create transport fuels through the Renewable Transport Fuels Obligation (RTFO)**

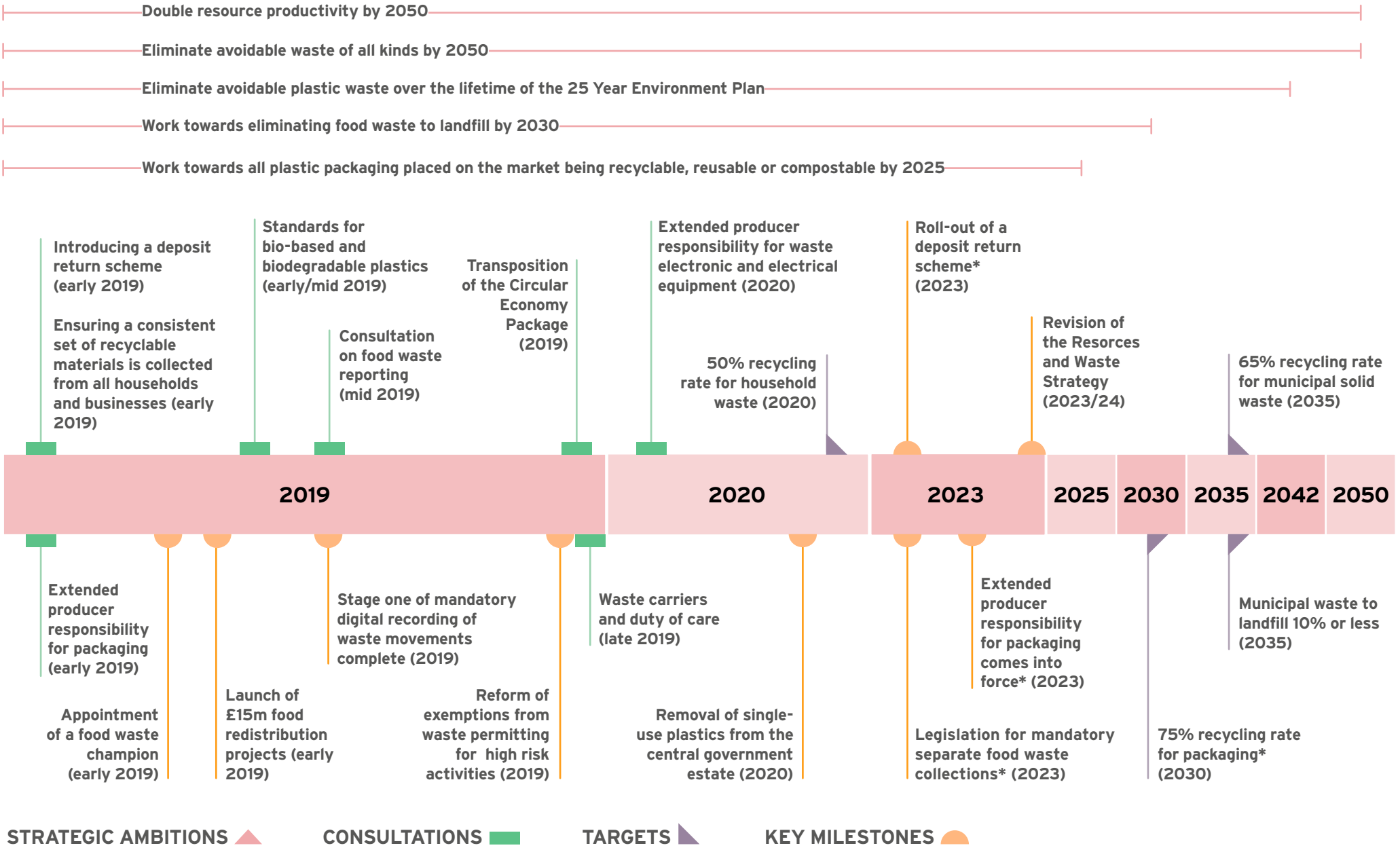
Chapter 8 – Measuring progress: data, monitoring and evaluation

High quality data, information and insights are essential for effective policy making.

This chapter sets out how we will:

- **Work with our partners and stakeholders to develop a shared vision and bold new approach to data on resources and waste**
- **Move away from weight-based towards impact-based targets and reporting, focusing initially on carbon and natural capital accounting**
- **Maintain the coverage and quality of local authority-collected waste and improve data collection to meet future needs**
- **Work with tech firms to develop innovative digital solutions for tracking waste, and consult on options to mandate the digital recording and sharing of waste movement data**

KEY MILESTONES



*subject to consultation

THE CASE FOR ACTION



Our growth over many decades has been over-reliant on exploiting finite natural resources whose depletion inevitably leaves future generations poorer.

A new chapter in resources and waste management

Material resources are at the heart of our economy, and we consume them in large quantities. They allow us to meet our basic human needs as well as generate economic growth and create social value. But our use of resources is unsustainable. We use too much and are too ready to throw things away, and this waste causes damage if it is not managed properly. We can no longer ignore this. In the 25 Year Environment Plan, the Government pledged to leave the environment in a better condition for the next generation. This Resources and Waste Strategy is a key part of this new chapter.

Our goals are clear. We will lead the world in using resources efficiently and reduce the waste we create. We will keep resources in use for as long as possible. We will safeguard and enhance the natural capital upon which our wellbeing and prosperity depend. We will unlock the value in waste and think smarter about how it is managed. We will help consumers by tackling confusion over domestic recycling. We will eliminate from use the most problematic plastics. And we will make sure that those responsible for creating polluting products pay for the costs of that pollution: enshrining the '**polluter pays principle**' throughout our Strategy.

What is natural capital?

When we talk about 'natural capital', we mean the elements of nature that directly or indirectly produce value for people, including resources, ecosystems and species, the land, air and oceans, as well as the natural processes and functions that link them together and sustain life[8].



8 Natural Capital Committee (2017) How to do it: a natural capital workbook https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/608852/ncc-natural-capital-workbook.pdf

The measures set out in this Strategy will help our society move away from a 'take, make, use and throw' approach to resources and materials and instead waste less and reuse, recycle and repair more. We will leave behind our traditional linear economic model and create a more sustainable and efficient circular model from which the environment, the economy and society all benefit.

This Strategy is for the long term. It is our policy framework for decision making and action and establishes what we all need to do to achieve our goals. We will go further in areas where we are already doing well, including the move to a low carbon economy. The Strategy does not answer all the questions for implementation or cover historic waste policy. Instead, it aims to be a guide to future government policy, our commitment to safeguard the planet's precious natural resources and environment. It encourages and invites you to play your part.

This document is to be read in conjunction with its Evidence Annex and sets out why our current approach to using resources isn't working and why we must all make some changes. The Strategy proposes a new approach, new policy objectives, and sets out how they can be achieved. This document, divided into **three parts**, sets out these policies, actions and commitments:

Part 1, the product lifecycle, considers the production (chapter 1), consumption (chapter 2), and end of life[9] (chapter 3) of resources and materials.

Part 2, topical areas, focuses on two areas – waste crime (chapter 4) and food waste (chapter 5) – for which the lifecycle approach is not the best way to tackle them.

Part 3, the bigger picture, explores three areas which cut across the lifecycle – international leadership (chapter 6), research and innovation (chapter 7), and data, monitoring and evaluation (chapter 8).

This Strategy

This Strategy is the first significant government statement in this area since the 2011 Waste Review and the subsequent Waste Prevention Programme 2013 for England. It builds on this earlier work but also sets out fresh approaches to long-standing issues like waste crime, and to challenging problems such as packaging waste and plastic pollution.

Some things don't need to change – like our commitment to the 'polluter pays' principle. Reforming existing producer responsibility systems in line with this principle, will make certain that both the responsibility for and the cost of treatment or disposal of post-consumer products sits fairly and squarely with producers and not tax payers. Our determination to rid the country of waste crime is not new, but our strategic approach to achieving this is, including the Government's response to the recommendations of the review of serious and organised waste crime.

9 The phase of the product life-cycle after the product reaches its end of life. It includes collection, treatment and reprocessing.

Our strategic framework

Our Strategy is framed by natural capital thinking and guided by **two overarching objectives:**

1. To maximise the value of resource use; and
2. To minimise waste and its impact on the environment.

We will deliver this through policies, actions and commitments which adhere to at least one of **five strategic principles:**

1. To provide the incentives, through regulatory or economic instruments if necessary and appropriate, and ensure the infrastructure, information and skills are in place, for people to do the right thing;
2. To prevent waste from occurring in the first place, and manage it better when it does;
3. To ensure that those who place on the market products which become waste to take greater responsibility for the costs of disposal – the 'polluter pays' principle;
4. To lead by example, both domestically and internationally; and
5. To not allow our ambition to be undermined by criminality.

This Strategy complements and helps deliver other government strategies which relate to the environment and include our ambitions to double resource productivity[10] and eliminate avoidable waste by 2050. As well as the 25 Year Plan, they include: the Clean Growth Strategy[11], the Industrial Strategy[12], and the Litter Strategy[13]. It also responds to the recommendations of the 2017 Government Office for Science Report, *From Waste to Resource Productivity*[14]. This explores how we can treat waste as a valuable resource and this Strategy takes forward a number of its recommendations.

Our Strategy will contribute to the delivery of **five strategic ambitions:**

1. To work towards all plastic packaging placed on the market being recyclable, reusable or compostable by 2025;
2. To work towards eliminating food waste to landfill by 2030;
3. To eliminate avoidable[15] plastic waste over the lifetime of the 25 Year Environment Plan;
4. To double resource productivity[16] by 2050; and
5. To eliminate avoidable waste of all kinds by 2050.

10 A measure of the value obtained from resources. Typically measured as value added per tonne of resources used. At national level, measured by GDP/Domestic Material Consumption (DMC measures the total amount of materials directly used by an economy and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports).

11 UK Government services and information (2017) https://www.gov.uk/government/publications/clean-growth-strategy

12 UK Government services and information (2017) https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future

13 UK Government services and information (2017) https://www.gov.uk/government/publications/litter-strategy-for-england

14 UK Government services and information (2017) https://www.gov.uk/government/publications/from-waste-to-resource-productivity

15 We talk about plastic waste being 'avoidable' when the plastic could have been reused or recycled; when a reusable or recyclable alternative could have been used instead; or when it could have been composted or biodegraded in the open environment.

16 Resource productivity is a measure of the value (in terms of GDP) we generate per unit of raw materials we use in the economy.

As most of our existing waste legislation is EU-derived, this will be retained in UK law through the European Union Withdrawal Act 2018. And proposals which follow from this Strategy will take account of the future relationship we negotiate with the EU on environmental matters. Where existing legislation is insufficient to deliver our ambition we will take new powers to do so, including through our Environment Bill. And we will work with the devolved administrations to co-ordinate policy on resources and waste, to ensure that approaches are aligned and impacts on the UK Internal Market are minimised.

Material or sector specific targets, for example for packaging waste, will primarily be addressed through particular policies rather than the Strategy as a whole, and so are referenced in the appropriate chapters.

Our Approach

On the basis of the best available evidence, set out in the evidence annex, and valuable input from stakeholders[17], we have summarised the current position, established the case for government intervention, and assessed the policy instruments available to achieve the desired outcomes. We have explored a range of ways government can incentivise action including the application of behavioural insights to complement conventional economic thinking. We have considered ways to motivate organisations and individuals to do things differently, including regulatory, market and communicative solutions. Government has three critical roles within this framework:

1. To set the framework including clear objectives and direction of travel;
2. To put the incentives in place to motivate change; and
3. To lead by example.

Whilst government can set the direction, we encourage you to continue to make the difference for the environment. Local authorities, the waste sector, manufacturers and retailers, businesses, schools, charities, designers, academics, campaign groups, individual citizens – all are central to the success of this new approach on resources and waste. As we consult on many of the proposals contained within, we invite contributions from all.

Government recognises the financial pressures on local authorities. They will therefore receive additional resource to meet new net costs arising from the policies set out in this Strategy once implemented. This includes both net up front transition costs and net ongoing operational costs.

Monitoring and Evaluating Progress

It's not enough to challenge ourselves to meet ambitious targets, we must also track our progress, monitor how things change, and carry out quality evaluation of our flagship policies. We have developed a suite of indicators which we will use to assess our progress and complement the goals of the 25 Year Environment Plan. Each has one or more metrics associated with it which we will update annually and report publicly on every three years.

17 For example, via the Defra (2018, forthcoming) 'Post Implementation Review of the Waste (England and Wales) Regulations 2011' on legislation.gov.uk.

The strategic indicators are:

Maximise the value of resource use, and minimise adverse environmental impacts

1. Raw material consumption
2. Carbon footprint of resource use
3. Carbon footprint of a basket of consumer goods

Minimise waste and its impact on the environment

1. Waste generation
2. Recycling
3. Landfilling
4. Illegal waste sites
5. Fly-tipping
6. Litter

Currently our metrics are framed in tonnage terms. We are committed to moving away from weight-based to impact-based targets. Using weight as the basis for making policy, setting targets and monitoring progress can lead us in inappropriate directions as some lightweight materials have large environmental footprints, like plastics, while some heavy materials have small footprints, like aggregates. Initially we will focus on greenhouse gas emissions and natural capital. It will take time, and some new research, to develop versions of our targets and indicators that help us understand and act more in line with our strategic principles. More detail about our framework of indicators can be found in Chapter 8.

We expect the policies set out in this Strategy to contribute to a wide range of economic and social goals. Although our initial focus is on measuring natural capital related outcomes, we will also develop indicators of social and economic outcomes.

We will continue to refine and improve the Strategy, reporting every three years on our progress and refreshing it every five years.

Time for change, our wasted resources

Our current linear approach to resource use means that we are failing to capitalise on the true value of these resources. Not only are we wasting these valuable resources we are also seeing the impacts of such waste. Illegal waste dumping and littering causes local blight and the transport of waste materials around the country causes atmospheric pollution. Biodegradable waste in landfill breaks down anaerobically, leading to the generation of significant amounts of methane (a

greenhouse gas 25 times more potent than CO_2, and which accounted for 11% of the UK National Inventory of greenhouse gases in 2016)[18], some of which escapes and contributes to global warming.

Eliminating biodegradable waste to landfill

Despite significant progress, England continues to rely on landfill[19]. Twelve million tonnes of municipal waste[20] were landfilled in 2016, half of which was biodegradable. The Committee on Climate Change (CCC) highlight this as a concern and we want tackle it. That's why, over and above our commitment to work towards eliminating food waste to landfill by 2030, we will explore policies to work towards eliminating all biodegradable waste to landfill by the same date.

Growth in energy from waste (EfW)[21] and alternative residual waste treatment infrastructure will divert further waste from landfill. And several proposals in this Strategy, such as maximising separate capture of food waste (Chapter 3), should significantly reduce the volume of biodegradable waste sent to landfill. Once these have been implemented, we will conduct composition analysis to determine whether food and other biodegradable waste to landfill remain an issue and, if so, consult on banning biodegradable material being sent to landfill.

The waste hierarchy, which ranks options for waste management, has driven some progress. Priority goes to preventing the creation of waste in the first place, followed by preparing waste for reuse; to recycling, and then recovery. Disposal – in landfill for example – is regarded as the worst option. Instead we have increased our rates of recovery and recycling and generated much more energy from waste. We want to shift away from waste towards resource efficiency, and will do this by focusing not just on managing waste, but, on managing the resources which become waste.



Existing measures such as the landfill tax and the 5p plastic bag charge have brought about the kind of changes in behaviour and attitude that we want to encourage. More than 15.6 billion fewer plastic bags have been used since the charge was introduced. The landfill tax was introduced in 1996 and has been a key influencing factor on the waste management industry and a driver for the fall in demand for landfill and a rise in demand for alternatives[22].

18 UK Greenhouse Gas Emissions, final figures (2018) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/680473/2016_Final_Emissions_statistics.pdf

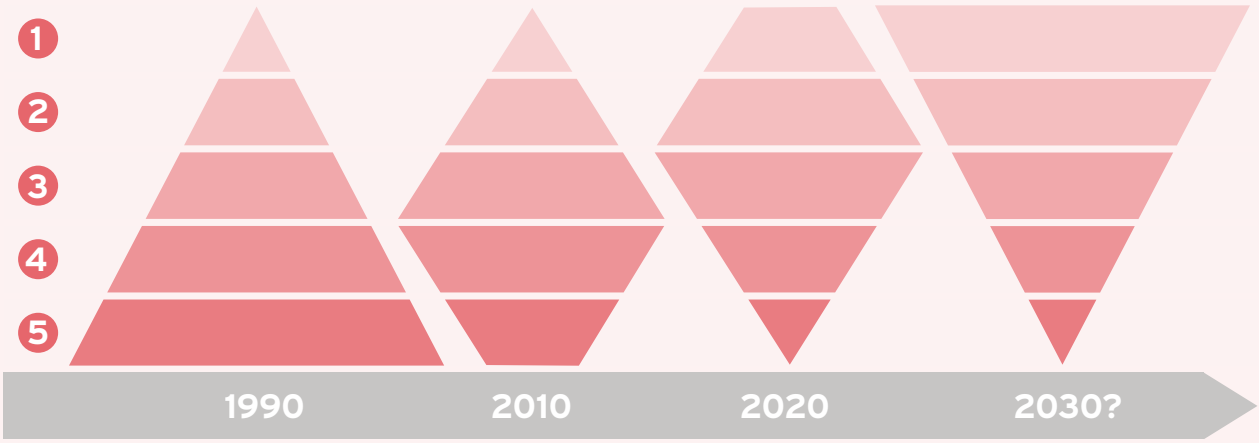
19 The current level of biodegradable municipal waste sent to landfill across the UK is 22% of **1995** production levels, on track to deliver our commitment of a reduction of biodegradable municipal waste sent to landfill to 35% of **1995** production levels by **2020**.

20 UK Statistics on Waste (2018)

21 Energy from waste (EfW) technologies include: The controlled combustion of municipal waste or products derived from municipal waste in specialised plant specifically to generate power and/or heat from waste feedstock.

22 UK Parliament website (2014) https://publications.parliament.uk/pa/cm201415/cmselect/cmenvfru/241/24105.htm

Evolution of Waste Management Practices: In the past, most waste was dealt with by disposal, but over time that will shift increasingly to recycling, reuse and ultimately prevention.



1 Prevention
Using less material in design and manufacture. Keeping products for longer; reuse. Using less hazardous materials.

2 Preparing for reuse
Checking, cleaning, repairing, refurbishing, whole items or spare parts.

3 Recycling
Turning waste into a new substance or product. Includes composting if it meets quality protocols.

4 Other recovery
Includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste; some backfilling.

5 Disposal
Landfill and incineration without energy recovery.

We have also made great progress in recent decades on larger, more complex global challenges. The ozone layer was saved after nations signed up to the Montreal Protocol, spurring technological advances around alternatives to CFC gases[23]. 35% of England's seas are now within designated marine protected areas, safeguarding important and vulnerable habitats and species. And since 1990, the household recycling rate has increased fourfold and the proportion sent to landfill has fallen by three quarters[24]. We will face the global plastic pollution challenge with the same determination.

Tackling plastic pollution

Plastic is everywhere, for good reason. When it was first created it was hailed as a wonder product: robust but lightweight, malleable but resilient, and low cost. Today, those same qualities mean it poses one of the greatest pollution challenges we face. Since the mid-20th century, this durable and versatile material has been manufactured in abundance - and disposed of in substantial quantities.

23 The United Nations Development Programme (2014) http://www.undp.org/content/undp/en/home/sustainable-development/environment-and-natural-capital/montreal-protocol.html

24 DEFRA (2017) Statistics on waste managed by local authorities in England in 2016/17

Only now are we realising the full extent of the damage that thoughtless disposal of plastic causes to the environment.



We use five million tonnes of plastic in the UK every year, nearly half of which is packaging, and demand is rising[25]. Plastics are in our clothes and shoes, in products on supermarket shelves, in vehicles and buildings. Yet plastic waste often does not decompose and can last centuries in landfill, or else ends up littering the streets or polluting the natural environment. This means plastics are also found where we don't want them – polluting our soils, rivers and oceans, and harming the creatures that inhabit them. Animals suffer when they eat plastics, and habitats suffer when chemicals leach from plastics. Between 2015 and 2025, if we do not act, marine plastic pollution is set to treble world-wide to 150 million tonnes[26].

Our priority will continue to be preventing plastic entering the environment in the first place and eliminating avoidable plastic waste over the lifetime of the 25 Year Environment Plan.

Plastics in the Circular Economy

The UK welcomes international collaboration on preventing and reducing plastic waste. The actions listed in the EU's plastics strategy[27] and its proposed Directive[28] on reducing the impact of certain plastic products on the environment are broadly consistent with Government policy in this area. The UK supports this initiative and welcomes the EU in following our lead and recognising the importance of addressing plastic pollution. We will match or where economically practicable exceed the Directive's ambition.

What does that mean in practice? It means avoiding unnecessary use of plastics – as with all materials - in the first place. And where we do, for good reasons, continue to use plastics, stopping them being sent to landfill or incineration. Not all plastics can be recycled indefinitely: it is not always technically, environmentally, and economically practicable to do so. Polymers can start to degrade, meaning their quality is too poor to be used in new products. However, there is also scope for innovation in terms of plastics and in finding substitute materials.

We will also carry on cleaning up and clearing plastic dumped on land and at sea. And we will continue to lead international efforts and help developing nations reduce their plastic waste. Our

25 British Plastics Federation (2016) http://www.bpf.co.uk/sustainability/plastics_recycling.aspx

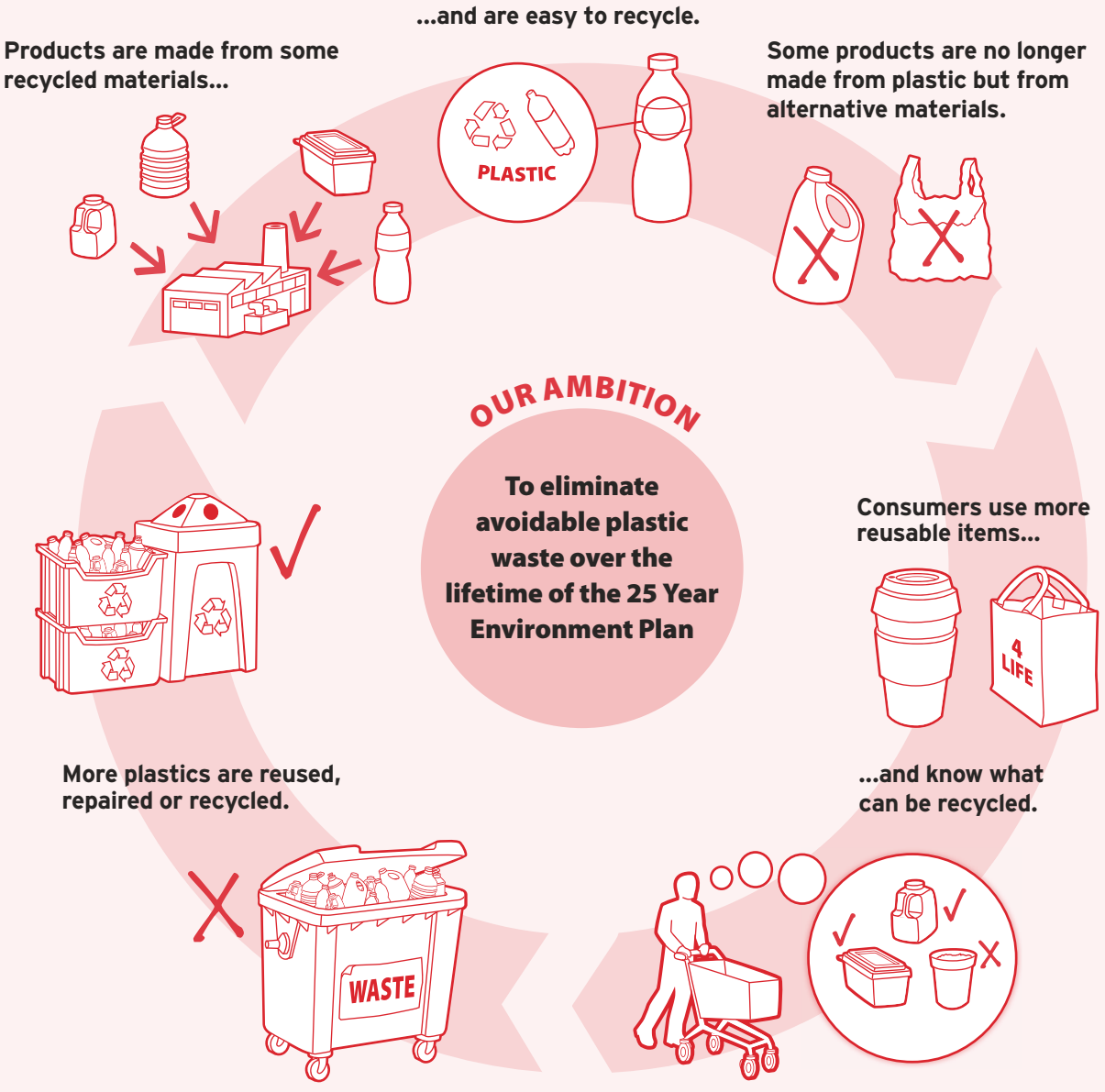
26 Government Office for Science (2018), Foresight Future of the Sea. https://www.gov.uk/government/publications/future-of-the-sea--2

27 European Commission (2018), An European Strategy for Plastics in a Circular Economy http://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy-brochure.pdf

28 European Commission (2018) http://ec.europa.eu/environment/circular-economy/pdf/single-use_plastics_proposal.pdf

commitment to tackling plastic pollution reflects feedback we have received from businesses and the world-leading UK Plastics Pact, which Defra supports.

A CIRCULAR ECONOMY FOR PLASTICS



What is the UK Plastics Pact?

The UK Plastics Pact is a collaborative initiative to create a circular system that keeps plastic in the economy and out of the natural environment. Led by the charity WRAP and set up in partnership with the Ellen MacArthur Foundation, it is a coalition whose members cover the entire plastics value chain. Its ambitious targets to 2025 for plastic packaging[29] are:

- **100% to be reusable, recyclable or compostable**
- **70% to be effectively recycled**
- **30% average recycled content across all plastic packaging**
- **Action taken to eliminate problematic or unnecessary single-use plastic packaging items**

A roadmap to achieving these targets has been published[30].

Looking ahead - putting a price on waste and valuing our resources

To do this means understanding where things aren't working, where market failures are holding us back, and what needs to change. Consultations on our proposals will continue to explore just this. As set out in more detail below, we want to focus not just on managing waste, but on managing the resources which become waste.

Case study: The Waste to Wealth commitment

Government welcomes the leadership taken by the Prince's Responsible Business Network, as members of Business in the Community (BITC), to organise the inaugural "Waste to Wealth Summit" in November 2018.

The 'Waste to Wealth Summit' saw HRH The Prince of Wales stress the importance of resource efficiency. The Prince highlighted the opportunities created by a prosperous and resilient, low carbon economy and the case for making the most out of precious resources, wasting as little as possible and finding ways of turning the waste we do create into new wealth.

Over 200 leaders from business, government, academia and civil society came together to help tackle this challenge head on and create radical new solutions that will double resource productivity and eliminate avoidable waste by 2030, supercharging this Strategy's 2050 targets.

29 Current Pact business members are responsible for 80% of plastic packaging sold through UK supermarkets.

30 WRAP (2018) http://www.wrap.org.uk/content/the-uk-plastics-pact-roadmap-2025

The Government will support businesses which are stepping up to this challenge. Over 40 leading businesses signed the Waste to Wealth Commitment and more are expected to join. The Waste to Wealth Commitment signatories committed to:

- **Set targets** to improve the productivity of resources that are key for business
- **Work collectively** towards doubling the nation's resource productivity and eliminate avoidable waste by 2030, contributing in the way that is most relevant to business
- **Redesign** how resources are used in products, services and operations
- **Collaborate** across organisations, value chains and sectors
- **Reconvene and report** on progress annually to share learning and demonstrate results

Seven Waste to Wealth Champions representing five key areas identified by Defra (chemicals, construction, food, metals and textiles) also signed the Commitment. The Waste to Wealth Champions will develop and deliver innovation hubs to identify challenges, create roadmaps and start to develop innovative solutions, reporting annually to The Prince's Responsible Business Network.

BITC will develop a programme of research, learning and action working closely with Waste to Wealth Champions and supporting partners. They will support businesses to define individual and collaborative action plans and start to identify innovative solutions to shared challenges within and across sectors, reporting back at the Waste to Wealth Forum in 2019.

The environment will benefit as we reduce landfill and carbon emissions, and use fewer finite natural resources. Reducing carbon emissions is fundamental to mitigating the severe risks and impacts posed by a warmer world, and, as highlighted by the IPCC (2018)[31], urgent action is required.

The economy benefits as producers become more efficient, paying less for resources. We will become more resilient to critical raw material shortages and less vulnerable to price volatility. A number of our initiatives will give businesses the confidence to invest more in resource-efficient technology and infrastructure, helping them to understand and mitigate risks in raw material supply chains and rewarding them for good product design.

Importantly, society benefits too - experiencing all the rewards of a healthy, protected environment and a natural world that is being safeguarded from dangerous climate change.

31 IPCC (2018), Global Warming of 1.5°C

Valuing resources, changing behaviour and reducing litter

When we all, as consumers, come to realise that possessions – even those we no longer want – retain a latent value as resources, and are not simply 'waste', long-term attitudes will change. The right infrastructure will help to change society's mind-set, as will appropriate enforcement measures that nudge people to 'do the right thing'[32]. Our policies seek to speed up this process – helping people value the resources that pass through their hands, and supporting them with the right infrastructure to keep those resources in use.

There will be a positive effect on littering in society. By reducing waste – particularly single-use plastics – and making it clearer how people should best dispose of unwanted items, the problem of littering will ease.

Hand in hand: the 'lifecycle approach' and the circular economy

When products made from Earth's precious raw materials are recycled, it removes the need to go back to the original, depleted source for more. And when resources are reused, it also prevents many harmful materials leaching into the environment – chemicals and acids from batteries dumped in landfill; shreds of plastic that swill around our oceans, choking marine life and acting as a breeding-ground for harmful bacteria; as well as pollutants entering our atmosphere that damage air quality.

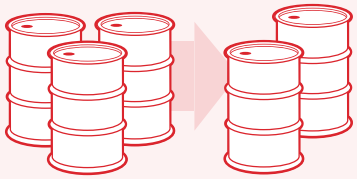
Over the life of a car we can fix it when it goes wrong until it's finally beyond repair. We can then reuse the components and recover useful materials, such as alloys. This ensures that at each stage in the product lifecycle, we are extracting the highest quality and value.

But it's not just in material reuse that the circular economy delivers benefits. It's also relevant to energy generation and savings. Incinerating non-recyclable or contaminated waste (such as food packaging) can generate energy. Bio-waste can also be used to make bio-gas, a renewable energy source. Reusing products preserves the energy and materials embedded in them during their production.

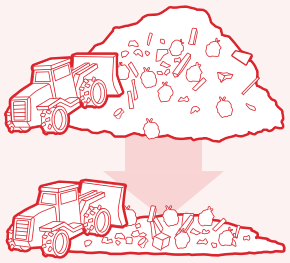
The 'lifecycle' approach complements the circular economy model. It requires us to focus not just on managing waste responsibly, but on preventing its creation in the first place. It means taking into account how decisions taken during the design stage – at the start of the lifecycle – affect how a product is used and then disposed of by the consumer. At every stage of a product's lifecycle there is scope for people to do all they can to maximise resource value and minimise waste.

32 UK Government services and information (2018) https://www.gov.uk/government/publications/litter-strategy-for-england

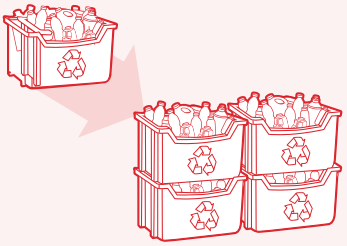
OUR PROGRESS SO FAR



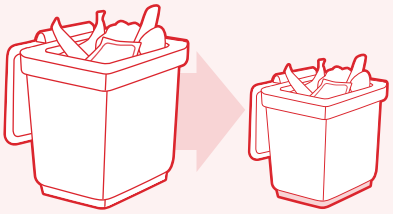
Consumption of raw materials **down almost a third** since 2000



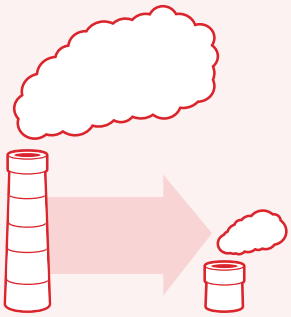
Local authority collected waste sent to landfill **down over 85%** since 2000



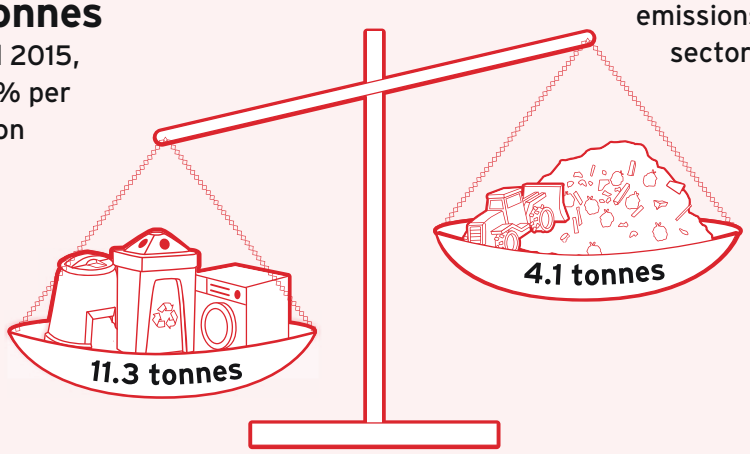
Household recycling levels have **quadrupled** since the turn of the century



UK food waste **reduced by a million tonnes** between 2007 and 2015, equivalent to a 14% per capita reduction



A **70% fall** in carbon emissions from the waste sector on 1990 level



Increased recycling

In 2016/17 in England, local authorities recycled, composted or reused 11.3 million tonnes of the waste they collected, far outweighing the 4.1 million tonnes (15.7%) that were landfilled. 9.9m tonnes (37.8%) were incinerated in the UK or abroad

Chapter 1

SUSTAINABLE PRODUCTION



During the first stage of the product lifecycle, we turn valuable natural resources into the goods and services upon which modern life and a healthy, vibrant economy depend. Evidence suggests that 80% of the damage done to the environment from waste products can be avoided if more thoughtful decisions – about their design, the choice of materials and chemicals used, and how they will be distributed and sold to consumers – are made at the production stage[33]. This is why it is so important to prevent waste occurring in the first place, as well as manage it better when it does.

To be more efficient in the way we use our stock of natural resources we need to rethink how we design and make products. This will involve those who place products on the market which become waste taking greater responsibility for the costs of disposal for those products – the '**polluter pays**' principle.

This chapter sets out how we will:

- **Invoke the 'polluter pays' principle and extend producer responsibility for packaging, ensuring that producers pay the full net costs of managing packaging waste at end of life**
- **Harness the potential of extended producer responsibility for other product types**
- **Stimulate demand for recycled plastic by introducing a tax on plastic packaging with less than 30% recycled plastic content**
- **Set minimum requirements through ecodesign to encourage resource efficient product design**
- **Manage chemicals sustainably and address barriers to reuse and recycling posed by their use, through a Chemicals Strategy**
- **Develop a model for realising resource efficiency savings through 'resource efficiency clusters'**

33 TechUK (2018), *Reuse, Repair, Remanufacture in the ICT Sector Report*

1.1 Resource efficient product design

Currently, too many products are discarded before their useful life is over. This is wasteful of our precious stock of natural resources, some of which cannot be renewed. We want products to be designed to use less material and achieve greater circularity. Where possible we want to support the replacement of products with services (as with online music replacing CDs), and encourage the adoption of more resource efficient business models.

What are resource efficient business models?

The common feature is that they extend product life, conserve resources and prevent materials from becoming waste. Examples include:

- Product-service systems – for example Rolls Royce sell their aerospace engines' thrust as 'power by the hour', which includes full in-use monitoring, servicing, repair, remanufacture, and replacement[34].
- Hire and leasing – for example, joining a car club and hiring a car as and when necessary. There are several companies in this market in the UK[35].
- Incentivised return – for example Desso offer a carpet take-back programme and have developed an innovative separation technique to tackle the millions of square metres of worn-out carpet thrown away every year[36].
- Reuse – for example RDC Recycling is an IT asset recovery company specialising in the reuse and recycling of used computer equipment[37].
- Product life extension – for example Kyocera's printer design concept means only the toner, rather than the whole toner cartridge, needs to be replaced. As many as 500,000 pages can be printed without replacing anything except toner, significantly reducing waste and cost[38].

The REBus project, led by WRAP, has estimated that widespread roll-out of resource efficient business models across the UK economy could add up to £75 billion to GVA[39] by 2030.[40]

34 Rolls Royce (2017) https://www.rolls-royce.com/media/press-releases/2017/24-05-2017-nor-lines-and-rr-sign-landmark-power-by-the-hour-service-agreement.aspx

35 Zipcar (2018) https://www.zipcar.co.uk/what-is-zipcar

36 Desso Holding PSV (2016) http://www.desso.com/c2c-corporate-responsibility/cradle-to-cradle-achievements/

37 Arrow (2018) https://www.arrow.com/s-tech/

38 Kyocera (2018) https://www.kyoceradocumentsolutions.eu/index/about/corporate_profile/ecosys.html

39 GVA: Gross value added

40 'Resource efficient business models: moving to a circular economy' (2017) www.rebus.eu.com/resources/reports-and-tools/.

The products designed for traditional business models must be more durable. Spare parts should be readily available long-term, and components able to be easily and efficiently taken apart to facilitate reuse, repair, and recycling.

To achieve this, actions we will take include:

1.1.1 Invoking the 'polluter pays' principle and extending producer responsibility for packaging, ensuring that producers pay the full net costs of managing packaging waste at end of life

1.1.2 Reviewing the effectiveness of legislation designed to minimise packaging and encourage design for greater reuse and recycling

'Extended Producer Responsibility' (EPR) is a powerful environmental policy approach through which a producer's responsibility for a product is extended to the post-use stage. This incentivises producers to design their products to make it easier for them to be reused, dismantled and/or recycled at end of life. Alongside stakeholders[41], we consider EPR to be a crucial tool in moving waste up the hierarchy, and stimulating secondary markets. It has been adopted in many countries around the world, across a broad range of products, to deliver higher collection, recycling and recovery rates. The most successful schemes use a range of measures to encourage more sustainable design decisions at the production stage.

The current state of play



UK-wide producer responsibility (PR) schemes are already in place for four waste streams, putting a level of financial responsibility on producers for their goods at end-of-life. These are:

- Packaging waste;
- End-of-life vehicles (ELV);
- Batteries and accumulators;
- Waste electrical and electronic equipment (WEEE).

While these schemes have been broadly successful in meeting recycling targets, they can do more to drive sustainable design decisions, make it easier for consumers to make more sustainable choices, and fully fund the management of products at end of life. Our reforms will explore how we can incentivise producers to redesign products in support of a more circular economy.

Our existing producer responsibility schemes operate on a UK-wide basis, recognising that many manufacturers and retailers operate as part of UK-wide supply chains. As we reform our existing schemes and develop new schemes we will continue to work with the governments of the devolved administrations.

41 For example, see Defra (2018, forthcoming) 'Post Implementation Review of the Waste (England and Wales) Regulations 2011' on legislation.gov.uk.

Our framework for EPR

We have developed a set of core principles that will act as a framework for reviewing our existing producer responsibility schemes and developing new EPR schemes:

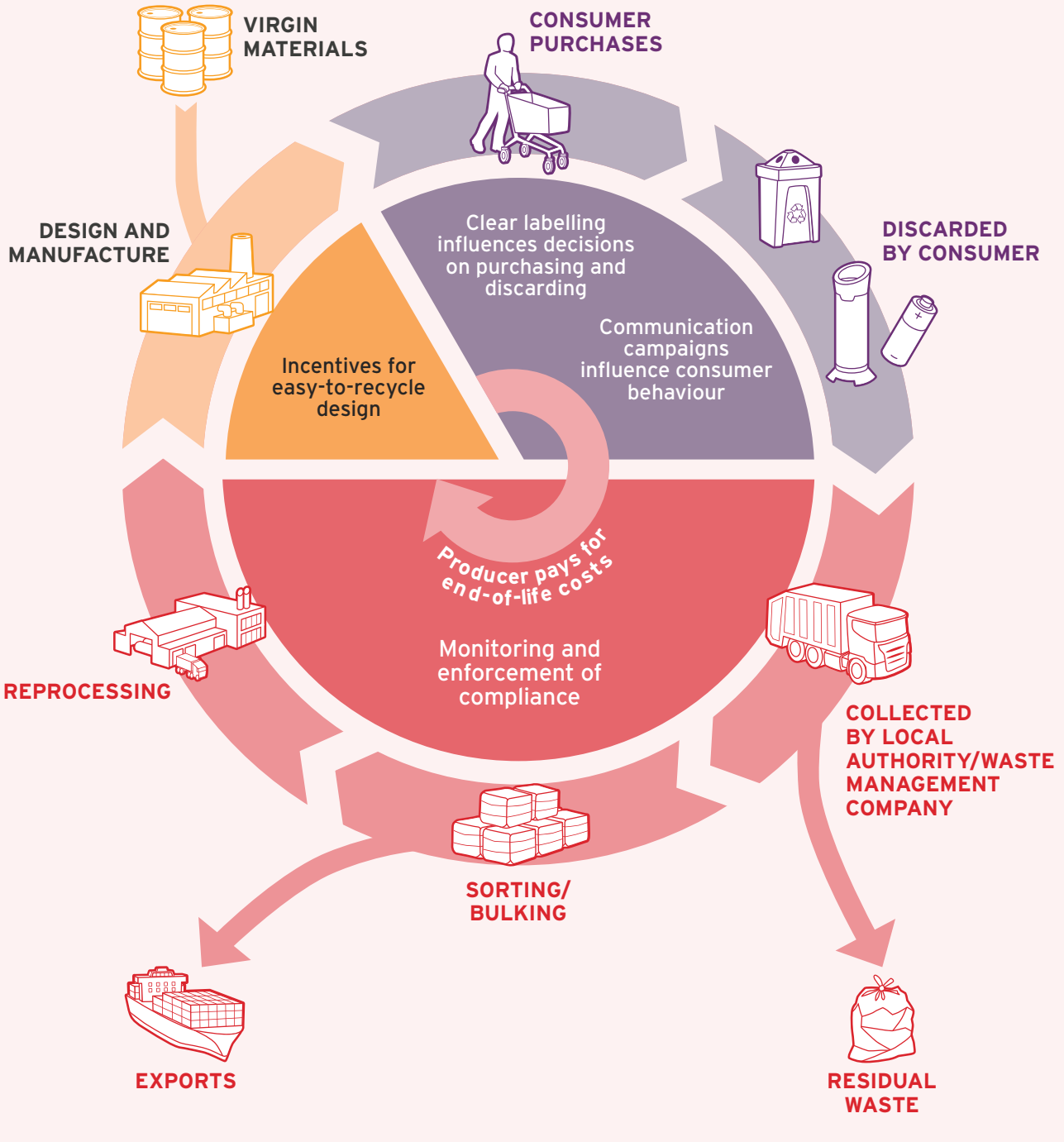
1. **Clear outcomes, objectives, targets and responsibilities** are set for individual EPR schemes to support long-term planning, investment, and research and development by producers in specified sectors and the resource management sector.
2. **Producers bear the full net cost of managing their products at the end of their life**[42], including impacts on the environment and society so that objectives and targets are met.
3. **Modulated fees or other measures** are used to encourage producers to make more sustainable design, production and purchasing decisions in line with the waste hierarchy and our resources and waste priorities. For example, producers may pay a lower fee for products which are easy to reuse, repair or recycle and a penalty for those that are not.
4. Schemes are designed and implemented to make it **easy for consumers to play their part**, whether through their choices at point of purchase, during ownership of a product, or at the end of its life.

The following principles underpin how we expect the EPR schemes to be organised. They will apply to all reformed and future EPR schemes:

5. **All producers are expected to pay into the system**, either directly or through the price they are charged by others in the supply chain, in line with the 'polluter pays' principle. These payments will be proportionate, and without unnecessary administrative burden.
6. Appropriate measures are put in place to increase transparency of markets, target setting and costs, in order to drive efficiency and to reduce waste crime along the value chain and ensure **costs to producers are fair, necessary and transparent**.
7. **Government will support measures relevant to a scheme's targets and objectives, and ensure that costs to local authorities are met where appropriate.**
8. EPR measures should **complement other policy measures** which aim to achieve similar outcomes (such as product standards, resource efficiency criteria and landfill tax).
9. **Appropriate governance, compliance and enforcement arrangements** will be decided for each individual scheme, as not all products or materials will benefit from the same approach. These will however need to enable delivery of the principles set out above.

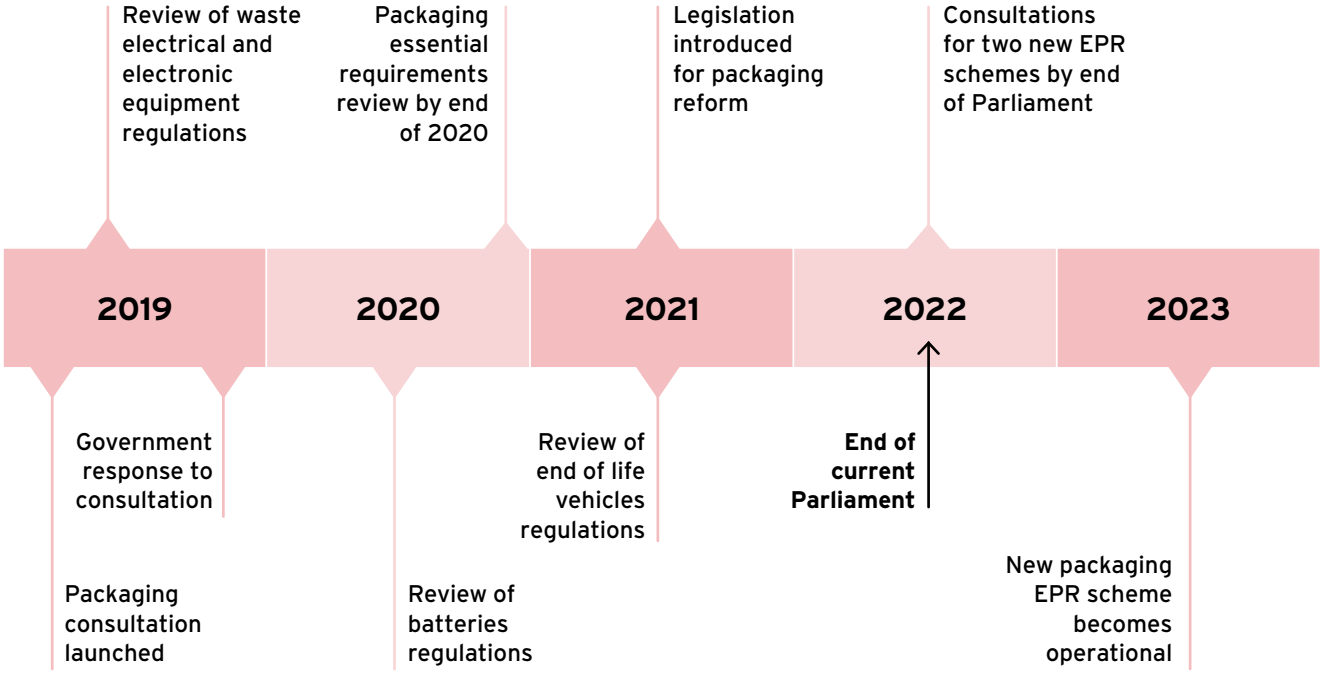
42 We will ensure that local authorities are resourced to meet new net costs arising from the policies in this Strategy, including upfront transition costs and ongoing operational costs.

EXTENDED PRODUCER RESPONSIBILITY



For all EPR schemes, we will put in place appropriate risk-based monitoring and effective enforcement to ensure compliance by all obligated parties, and structure the chosen models to minimise the opportunity for fraud. We will work with producers to ensure that there is a level playing field, so that no one can gain an unfair or illegal advantage.

EXTENDED PRODUCER RESPONSIBILITY TIMELINE



Indicative timeline only

Packaging

Packaging reform is our immediate priority. We will launch a consultation to reform the packaging waste regulations shortly. Our intention is to legislate by 2021 and to have reforms operational by 2023. We will ensure that the reformed system will match or exceed the revised packaging recycling targets set by the EU for 2025 and 2030.

The Government has made a clear commitment to increase the recycling of packaging waste and the recyclability of packaging. The Producer Responsibility Obligations (Packaging Waste) Regulations have succeeded in ensuring that the UK has met its targets at the lowest possible cost to producers. In the current system, producers of packaging (raw material manufacturers, converters, pack-fillers, sellers and importers) are obligated to meet a share of the annual recycling targets. This share is based on the weight of each type of packaging material that they place on the market. Producers, usually through compliance schemes, purchase packaging waste recovery notes (PRNs) from accredited reprocessors (or packaging waste export recovery notes, PERNs, from accredited exporters), as evidence that they have met their obligations.

The current system, however, does not sufficiently incentivise design for greater reuse or recyclability and less than a tenth of the costs of managing household packaging waste is covered by producers. Our reforms will change this, and the full net costs will be covered.

Demand from reprocessors for recyclable materials is not being stimulated sufficiently and there are concerns that the current system favours the export of packaging waste for recycling. It is also not comprehensive enough, lacks transparency, and falls short of our new objectives.

As we reform the Packaging Waste Regulations we will address these issues and ensure:

- Measures incentivise the reduction of unnecessary and difficult to recycle packaging, the production of packaging that can be recycled, and the recycling of packaging back into the same or similar products provided there is no conflict with other policies such as food hygiene requirements.
- Producers fund the management of packaging at the end of its life. Subject to consultation, this may include: collection, recycling, disposal, reduction of littering and fly-tipping, communications, data collection and reporting, compliance monitoring and enforcement.
- Collection of a nationally agreed set of packaging materials for recycling, adoption of minimum service standards and delivery of good quality recyclate.
- It is easier for consumers to know what packaging they can recycle through the adoption of mandatory labelling on packaging and improved communications (funded by producers).
- Export of packaging waste is done in an environmentally responsible way and that there is a level playing field between accredited domestic reprocessors and exporters. We will consult on actions to better manage and control waste exports, including through tighter monitoring and enforcement of existing export regulations. We want to ensure that our exports do not have adverse impacts on human health and the environment when shipped overseas, and that domestic reprocessors are not unfairly disadvantaged by waste exports which do not meet our environmental and accreditation standards.

We will also review the effectiveness of the Packaging (Essential Requirements) Regulations 2015 by the end of 2020 and will reform them to make them more effective.

Black plastics and rigid plastic packaging

Food retailers use black packaging to make products look more attractive; they also do this when the packaging itself contains recycled content which, without additional pigment, may be of an inconsistent colour. But most black plastic is not recycled because sorting machinery cannot detect the black pigment. Black plastic is one of the problematic packaging materials being addressed through the UK Plastics Pact. Solutions include using detectable pigments, improving optical sorting technologies at plastics recovery facilities or moving away from the use of black plastic packaging.

Some rigid plastic packaging, such as pots, tubs, and trays (but not bottles), can also be difficult to recycle. Some items are composites, made from multiple polymers and are also prone to contamination by food waste. Here too, initiatives are underway that will make it easier for people to recycle. Industry is committed to increasing the recyclability of all plastic packaging and to streamline the plastic polymers used for packaging.

These initiatives by industry, combined with packaging producer responsibility reform, will work together to eliminate from use the most problematic and difficult to recycle plastic packaging.

1.1.3 Improving producer responsibility for waste electrical and electronic equipment, batteries and end-of-life vehicles

By the end of 2020 Government will consult on changing the waste electrical and electronic equipment (WEEE) and batteries producer responsibility regimes to incentivise more sustainable product design, increase recycling and ensure alignment with the wider EPR framework. Following these reviews, we will amend the Regulations as necessary.

Waste electrical and electronic equipment

The current system for WEEE is based on 'collective producer responsibility' – producers pay based on their market share in specified equipment categories, but do not have to reprocess their own equipment, unlike in an individual producer responsibility scheme. The 2013 WEEE Regulations have led to separate collections of WEEE, primarily via Household Waste Recycling Centres, with producers financing the full cost of collection and proper treatment. Retailers also have obligations, either to take back waste electrical equipment from consumers, or to engage in a Distributor Take-back Scheme (DTS) which provides funding for local authorities to support collection and reuse. Nevertheless, more needs to be done to increase collections, particularly of small items (often with high plastic content) that are easily discarded as residual black-bin-bag waste. The current system does not reward producers for designing and selling more resource efficient products or services.



We will publish a review of the effectiveness of the 2013 WEEE Regulations in 2019 and will seek views by the end of 2020, including on how the existing Regulations can be amended to encourage better designed products. These will incorporate findings from our consultation on EPR for packaging. The review will explore options for tackling the growing numbers of internet sellers who do not meet their obligations, taking into account the recommendations from the Organisation for Economic Co-operation and Development (OECD) in addressing free-riding in the context of electrical and electronic equipment[43]. We will review the role of retailers, in particular the Distributor Take-back Scheme as a mechanism designed to fulfil their take-back obligations.

43 OECD, Working Party on Resource Productivity and Waste, Extended Producer Responsibility (EPR) and the Impact of Online Sales, 2018. https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPRPW(2017)2/FINAL&docLanguage=En

Case study: White Goods leasing trial – Beko and Cottsway Housing

One of the problems encountered by some housing association tenants, when moving into a new property, is that they can find it difficult to afford to buy high quality, resource and energy efficient white goods, and may instead end up with appliances that are cheaper to purchase but are lower quality, have higher running costs and do not last long. White goods manufacturer Beko, in partnership with the Cottsway Housing Association in Oxfordshire and the consultancy Resource Futures, is conducting a pilot project to explore whether a resource efficient business model could provide a solution to this issue that works for all the parties.

The pilot involves 36 of Cottsway's tenants. They will be invited to lease up to three white goods (a cooker, a washing machine and/or a fridge-freezer) for a two-year period, during which they will receive a maintenance and repair service, with a take-back option at the end of the lease period.

A parallel feasibility study will assess the potential impact of a national roll-out of such a scheme, if it proves successful, recognising that there are more than 4 million socially rented homes in England, with 2.8 million of them owned by housing associations.

The closed-loop leasing model is designed to reduce the volume of white goods that become waste, whilst providing an alternative method for tenants to access affordable, high quality and efficient appliances which deliver an improved standard of living, and reduced energy, food and clothing costs. The products will be kept in use for longer through good maintenance, and all products will be captured at end-of-life for reuse and recycling by Beko.

Batteries



The Waste Batteries and Accumulators Regulations have similarly led to an increase in the collection and recycling of portable batteries, alongside a ban on the disposal of industrial and automotive batteries to landfill. However, the current system should be pulling more portable batteries out of residual, black-bin-bag waste. Lead-acid batteries make up only 4% of portable batteries placed on the market every year, but make up over 50% of the batteries that contribute towards collection targets. We estimate that the over-contribution of lead-acid batteries means that there are over 320 million portable batteries which aren't being recycled every year in the UK[44]. This must be addressed. We will review the current system to target higher recycling rates for non-lead-acid portable batteries, including consideration of chemistry-specific targets and whether there should be increased kerbside collection.

44 Assuming an average of 24 grams per AA battery, and the 7800 tonne difference in lead-acid batteries collected beyond that declared as place on the market – 2017 UK Portable Batteries Data Summary, National Packaging Waste Database.

Industrial and automotive batteries are changing, with the Government investing £246 million through the Faraday battery challenge to support the development of new battery technologies, and the rapid uptake of electric vehicles. As the number of electric vehicles increases, so will the number of waste electric vehicle batteries. These are currently predominately lithium ion technology cells, defined as industrial batteries, but new lithium ion and alternative chemistries are being developed rapidly. The Faraday Battery Challenge aims to make batteries more sustainable, and is sponsoring research and innovation projects to do just this. This includes promotion of improved technologies to increase the feasibility of remanufacturing or recycling of batteries.

We will work across Government and with industry to ensure that British companies are well placed to respond to these changes. This will include consideration of how to develop and enhance domestic processing infrastructure.

We will consult by the end of 2020 on changes to the batteries regulations to resolve the imbalance in the recycling of portable batteries between chemistry types as well as other emerging issues, such as non-complying internet sellers. Part of this may involve an expansion of collection points, and greater consumer awareness of how to recycle their batteries. This may, for example, include using EPR fees to cover the costs of local and national communications campaigns, or new mandatory labelling requirements. We will also look to ensure that the financial responsibilities placed on battery producers properly reflect treatment costs.

We will consider under these reviews whether closer alignment between the batteries and WEEE regimes, or indeed a single approach for both batteries and WEEE, is possible.

End-of-life vehicles

The End-of-Life Vehicles (ELV) Regulations have led to an improvement in the treatment of scrap vehicles and increased recycling and recovery rates. Vehicle manufacturers and importers are obligated under an "own marque" approach to maintain a collection system into which last owners can deliver their vehicles free of charge, and to ensure that the recycling and recovery targets are met for these vehicles.

In 2016, the UK achieved an overall recovery rate of 92%. Although this is high compared to many other waste streams, this was below the target of 95% and the system is not without its issues. We will continue to consider whether links between target obligations and achievement are sufficiently robust to drive recycling and recovery investment in the sector. We aim to consult on reform to ELV Regulations in 2021.

1.1.4 Invoking the 'polluter pays' principle and harnessing the potential of EPR for other waste streams

By the end of 2025 we will have reviewed and consulted on measures such as Extended Producer Responsibility and product standards for five new waste streams, two of which we plan to complete by 2022.

We have identified the following five areas as priorities:

- **Textiles** – Including at least all clothing, as well as other household and commercial textiles such as bed linens;
- **Bulky waste** – Including mattresses, furniture and carpets;
- **Certain materials in the construction and demolition sector** – The full list of products and materials in scope are yet to be defined, and will be subject to further review and consultation;
- **Vehicle tyres** – Including tyres from cars, motorcycles, commercial and goods vehicles, and heavy machinery;
- **Fishing gear** – We expect the EU to introduce legislation requiring Member States to implement EPR for fishing gear. We are supportive of this measure and expect to review and consult on our own EPR scheme. We will ensure that any new requirements do not create a competitive disadvantage for our fishing industry, and this will be a key consideration in the consultation.

This list is not fixed and does not exclude the potential to review and consult on EPR for other waste streams if these are identified as being of equal or higher priority.

As we consider EPR more broadly we will put in place appropriate arrangements for business, technical experts and other relevant stakeholders to provide advice to government.

EPR and the chemicals-waste interface

Chemicals contribute significantly to human wellbeing and economic growth. Very few products on the market are produced without industrial chemicals: around 140,000 chemicals are in known use today. There are regulations and systems in place to help assess the impact of chemicals on human health and the environment before they reach the market, however there are instances where evidence of increased risk comes to light only after some time in use, for example so-called 'legacy chemicals' which contaminate waste streams and pose a barrier to efficient and safe recovery of resources. Other chemical additives, while benign, are disruptive in different ways – in some cases by making items difficult to sort or reducing the quality of recycled material. Regulations allow bans or other restrictions on use to be introduced when evidence becomes available that limitations are needed but this can often be after the chemicals are in widespread use.

Extended producer responsibility can help deal with those items and products which cannot be classified as hazardous waste, for example soft furnishings that contain chemicals which were legal at time of manufacture but which have subsequently been banned.

The chemical content of packaging varies widely across sectors, as does the likelihood of it coming into contact with people or the environment. We want to encourage the use of the safest available chemicals by using green chemistry principles as well as non-chemical alternatives, and will explore how we can promote this approach through producer responsibility.

1.1.5 Setting minimum requirements through ecodesign to encourage resource efficient product design

Our producer responsibility reforms should drive the production of more resource-efficient products, such as those which are more durable or readily repairable. We will strengthen this framework through setting minimum ecodesign standards.

Ecodesign is a way of designing products which takes a preventative approach to protecting our natural capital by considering whole lifecycle impacts. To date minimum Ecodesign requirements have been used in the EU to transform the design of energy-using products to reduce energy consumption. Recently Member States voted to include eco-design requirements in product regulation for resource efficiency, taking into account the potential to design for disassembly, repair and recyclability.

Through similar mechanisms to the EU Ecodesign system we will seek to drive change in product standards by gradually removing from the market the least resource efficient products and demanding a certain level of resource efficiency.

We will match or where economically practicable exceed the ambition of the EU's Ecodesign standards which to some extent currently allow for material efficiency standards, by legislating to expand the scope to cover more resource intensive product groups, such as textiles and furniture. We will also explore using this mechanism to mandate that spare parts be made available for repair.

We will also look to address the presence of harmful chemicals in products, to ensure they neither end up in secondary products, where they may pose a high risk due to increased exposure, nor prevent recycling altogether owing to their presence in the waste stream.

1.2 Sustainable material choices

We want producers to use materials which reduce the impacts of products and services over their lifecycle whilst keeping pace with changing customer requirements.

When we use virgin raw materials in production, we deplete precious resources. The process of extraction can also harm habitats and landscapes, affecting the beauty of our environment and compromising its ability to function. Conversely, making new products from recycled materials (or secondary raw materials) can cause less harm, using less water and energy, and generating lower carbon emissions. When we create new markets for recycled materials, we also make recycling more economically viable. Other ways to boost economically-viable recycling include cutting the use of hazardous materials during production, such as the phase out of Persistent Organic Pollutants[45].

Our producer responsibility reforms will help to achieve this. In addition, actions we will take include:

1.2.1 Stimulating demand for recycled plastic by introducing a tax on plastic packaging with less than 30% recycled plastic

The vast majority of plastic packaging used in the UK is made from new plastic, rather than recycled material, as recycled plastic can be expensive than new plastic, despite its lower environmental impact.



Budget 2018 announced the introduction of a world-leading new tax on plastic packaging from April 2022. Subject to consultation, this tax will apply to plastic packaging containing less than 30% recycled plastic, to encourage manufacturers to produce more sustainable packaging and in turn create greater demand for recycled material.

This tax will work hand in hand with our reforms to the current system of producer responsibility for packaging, described above. The revenue collected from these measures will enable investment in further action to address the issues surrounding single-use plastics, waste and litter, to help improve the waste system in the UK. We will consult on these policies together to ensure that they work in a coherent way.

Business will have until April 2022 to adapt their processes before the introduction of the tax. This will allow them to adjust their behaviour and manage any costs they face while ensuring action is still taken to tackle this important environmental issue. As seen following the announcement of the Soft Drinks Industry Levy, Government expects businesses to begin to change their practices before the tax is introduced.

45 World Health Organisation (2018) https://www.who.int/foodsafety/areas_work/chemical-risks/pops/en/

1.2.2 Developing policy proposals to reduce the environmental impacts of clothing, including the impacts of microplastics in the water system

Achieving our overarching targets requires identifying those product or material streams which have the biggest impact on our environment – and one of these is clothing. Across the EU and UK, clothing is the eighth largest sector in terms of household spending. In terms of environmental impact, however, it is fourth - behind only housing, transport, and food[46]. The industry is highly complex, with supply chains stretching worldwide. It affects the world's natural capital in many ways:

- **Water pollution**, from processes such as dyeing: The Global Leadership Award in Sustainable Apparel reports that 20% of freshwater pollution comes from textile treatment and dyeing[47];
- **Water use**, in particular to grow cotton: The water used to make cotton is 60% of the total water footprint of fabric processing. This considerably outweighs its 43% share of the market[48];
- **Microplastic shedding**, released when clothes are washed: whilst the impacts are not yet fully understood, we have commissioned research to better understand how plastic particles from a range of sources including synthetic materials enter waterways and the marine environment, and to analyse their impact[49].



Since 2011 we have worked with WRAP, clothing brands, manufacturers, retailers, charities and others to reduce environmental impacts under a voluntary agreement, **the Sustainable Clothing Action Plan (SCAP)**. Its signatories, representing nearly 60% of clothes sold in the UK market and including retailers such as Primark and Marks & Spencer, have agreed to reduce their carbon and water footprints by 15%, waste to landfill by 15%, and whole lifecycle waste by 3.5% by 2020. Good progress has been made in achieving these targets.

The European Clothing Action Plan is extending the SCAP circular economy approach for the clothing sector across Europe. This project involves partners from the UK, Denmark and the Netherlands, and is applying the principles of SCAP on a wider basis.

Taking on board this research and progress to date under the SCAP, we will consider how best Government can continue to support voluntary industry action, as well as the role of wider policy measures to support reuse and closed-loop recycling to reduce the environmental impacts

46 Valuing Our Clothes – the Cost of UK Fashion' (2017) http://www.wrap.org.uk/sites/files/wrap/valuing-our-clothesthe-cost-of-uk-fashion_WRAP.pdf WRAP 2017

47 The State of the Apparel Sector 2015 Special Report (2015) https://glasaaward.org/wp-content/uploads/2015/11/GLASA_StateofApparelSector_SpecialReport_Water_Final_151001.pdf

48 The European Commission (2006) https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/environmental-improvement-potential-textiles-impro-textiles

49 UK Government (2018) https://www.gov.uk/government/news/government-launches-microplastics-research-to-protect-oceans

of clothing. This work will form part of our review and consultation on extended producer responsibility for textiles, and we will continue to work closely with WRAP and others on future policy development.

What is fast fashion?

One aspect of the clothing industry we will particularly focus on is so-called 'fast fashion'. Fast-fashion refers to clothing which is produced relatively quickly to capture current trends, but which as a result of typically being poorly made (for example in terms of durability) often ends up as waste following a short lifespan.

The impacts of this are severe, with 300,000 tonnes of clothing in UK household residual waste going to landfill or incineration in 2015[50]. We want to address this, in line with the 'polluter pays' principle. As we consider policy proposals for the environmental impacts of clothing we will give particular attention to fast fashion, including as we consider an EPR for textiles.

1.2.3 Supporting the Office for National Statistics to develop a 'National Materials Datahub'

Lack of reliable data on the availability of secondary materials is cited by industry as a barrier to their use. A National Materials 'Datahub' could help address this issue by providing comprehensive data on the availability of raw and secondary materials, including chemicals, across the economy to industry and the public sector, and by modelling scenarios around material availability. The Datahub would be hosted, managed and assured by the Office for National Statistics (ONS), and openly available as a public good. There will potentially be strong synergies between this project and the development of innovative digital solutions for tracking waste (see Chapter 4).

Following a successful pilot project by a joint BEIS, Defra and ONS team in 2018, a further phase of work has been commissioned, concluding in April 2019, to determine the need for and viability of such a Datahub, and to develop the scope and business case for delivery if appropriate. Delivery of the final product will be dependent upon this phase demonstrating benefits to industry.

An Advisory Group, including representatives from industry, will guide the project through this phase, and ONS, BEIS and Defra will continue to ensure links to related initiatives are identified and exploited - for example the development of electronic tracking of waste.

50 Government evidence to Environmental Audit Committee enquiry on the sustainability of the fashion industry (2018) http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/sustainability-of-the-fashion-industry/written/88753.html

1.3 Manufacturing processes which maximise resource productivity

We want to increase the material efficiency of production and manufacturing processes, as part of our strategic ambition to double resource productivity by 2050.

Poor product design and inefficient production processes result in valuable material resources being wasted which is not only a waste of money but also has negative environmental impacts. There is a wide variation in the productivity of different businesses across the UK; improving resource efficiency increases productivity, cuts carbon emissions and enhances resource security. Creating waste or by-products during manufacturing processes cannot always be avoided. But one company's rejects can be another's raw materials and we want to incentivise businesses to do just this.



To drive progress, actions we will take include:

1.3.1 Developing a model for realising resource efficiency savings, working with businesses through 'resource efficiency clusters'

One of the key barriers to increasing the resource efficiency of businesses is insufficient information to enable them to cut resource use and waste. Small and medium-sized businesses in particular may lack the budget, personnel or time to devote to researching issues around waste and resource use. Yet increasing resource efficiency can be good both for the environment and the bottom line: Defra research suggests[51] that businesses overall could save £3 billion annually through short-term investments by making their processes more resource efficient.

One way to support businesses to innovate and achieve such savings is by supporting clusters of them to come together to share knowledge and good ideas with counterparts – this may be on a local or regional level, on a sectoral level, or by bringing two or more sectors together. By joining forces businesses can spread the costs and leverage the benefits from economies of scale. Specialist technical advice can also strengthen the impact of these clusters.

To begin with we will review the results being achieved in a small number of existing LEP-led, local authority or industry-led sectoral business clusters, and have commissioned research for this purpose. We will use this review to develop models and plans for taking this idea further. Subject to the findings, we will roll out plans from 2020. Through this Strategy we invite expressions of interest by LEPs or sectoral groups in taking this work further.

51 Oakdene Hollins for Defra (2017) Business Resource Efficiency Quantification of the no cost/low cost resource efficiency opportunities in the UK economy in 2014

Case Study: Leeds City Region Enterprise Partnership (LCREP)

In February 2017, The Leeds City Region Enterprise Partnership launched a £2.65m programme to support small and medium-sized enterprises (SMEs) to become more resource efficient.

The LEP's Resource Efficiency Fund (REF) provides specialist advice and financial support to help make businesses more efficient with their energy, water and waste.

The process begins with eligible businesses benefitting from a free efficiency audit of their current operations to assess where they can make savings. Specialist advisors work with businesses to analyse the results and address areas where resource efficiency can be improved. Businesses are then able to apply for financial support to invest in efficiency measures.

The benefits for businesses are huge - they can invest in their operations, use resources more efficiently, save money and have a positive impact on the environment.

1.3.2 Developing plans to increase resource efficiency and minimise waste in the construction sector, working with the Green Construction Board



We will only achieve our overarching resource productivity and waste targets by working with the key sectors through which resources flow. Constructing, maintaining and repairing our built environment – our homes, schools, offices, hospitals and infrastructure – represents a major material resource flow in the economy. Such material flows inevitably create waste, with the construction, excavation and demolition sector estimated to have produced around 120 million tonnes in 2014 in the UK[52].

The construction sector has already made considerable progress in increasing resource efficiency. Between 2008 and 2012 WRAP's Halving Waste to Landfill commitment to significantly reduce the amount of construction, demolition and excavation (CD&E) waste successfully stimulated industry wide discussion on construction waste. By 2012 over 800 companies had signed the commitment to reduce waste diverting 5 million tonnes of waste per year from landfill and saving £400 million per year[53]. But there is considerable scope for further improvement[54], something which has been underlined by our stakeholders[55].

52 Defra (2018), Digest of waste and resource statistics, 2018 edition.

53 The Environment Agency (2016) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/652423/Regulating_the_waste_industry_2015_evidence_summary_LIT_10488.pdf

54 Financial savings available through resource efficiency opportunities estimated at £1,589m/year (Eunomia, Material Resource Efficiency Report, 2017).

55 For example in the Defra (2018, forthcoming) 'Post Implementation Review of the Waste (England and Wales) Regulations 2011' on legislation.gov.uk.

The construction industry is on the brink of fundamental change with developments such as digitalisation, off-site manufacturing and new, innovative construction materials and techniques offering huge potential for increasing resource efficiency. The recently announced Construction Sector Deal[56] recognises this and will deliver an investment of up to £420 million between industry and Government to accelerate this transformation. The focus on transforming construction through use of digital building design and new manufacturing technologies offers a unique opportunity to reduce waste and increase productivity, with an overall aim of a 50% reduction in build time.

The Green Construction Board[57] has already developed guidance[58] for increasing resource efficiency and reducing waste in the sector through the adoption of circular economy principles. We will work with them to establish a definition of zero avoidable waste in the sector and develop an ambitious route map by 2020 setting out how and when this can be achieved.

We will also work with the construction industry in preparation for reviewing and consulting on EPR for certain construction materials.

1.3.3 Managing chemicals sustainably and addressing barriers to reuse and recycling posed by their use, through a Chemicals Strategy

As with construction, there are significant opportunities for resource efficiency savings in the chemicals sector[59], and we want to put in place the framework for them to be realised. This sector is additionally important due to the presence of 'legacy chemicals' in products, which can contaminate waste streams and pose a barrier to efficient and safe recovery of resources. Currently such chemicals cannot be tracked through the supply chain, meaning recyclers often don't know which chemicals are present in the materials they receive.

Measures such as EPR and Ecodesign can help address this. But we can, and will, go further. Our Chemicals Strategy will set out further detail on how we will strengthen the chemicals-waste interface and will:

- Consider how we address the identification and tracking of chemicals in products across supply chains to reduce barriers to reuse and recycling, whilst preventing a risk from harmful chemicals.
- Set out our approach to working internationally to strengthen the standardisation of methods that assess chemical safety. This will support the mutual acceptance of data to identify and share information on emerging concerns and new approaches to risk assessments.

56 UK government services and information (2018) https://www.gov.uk/government/publications/construction-sector-deal
57 Construction Leadership Council (2018) http://www.constructionleadershipcouncil.co.uk/workstream/sustainability/
58 Green Construction Board (2018) https://www.greenconstructionboard.org/index.php/resources/circular-economy
59 Estimated at £306m/year (Eunomia, Material Resource Efficiency Report, 2017).

We will also:

- Shape the post-2020 framework under the Strategic Approach to International Chemicals Management (SAICM) to ensure:
  - Actions are based on strong scientific evidence;
  - A focus on tackling chemicals throughout the product lifecycle;
  - A global approach to resource and waste issues.
- Take action to address the issues associated with the presence of persistent organic pollutants (POPs) in products, including by:
  - Establishing a programme of work to effectively implement regulations for both legacy and future products containing POPs;
  - Continuing to fund targeted research on POPs and other substances of concern aimed at increasing our knowledge base;
  - Encouraging innovation on chemical identification and extraction technologies, working with stakeholders and industry;
  - Continuing to engage internationally to align rules on the classification of hazardous chemicals with hazardous waste rules.

1.4 Resource efficient distribution

The distribution of products to the consumer can result in wasted resources across the supply chain. It's not just the amount of packaging used; it's what happens if a customer is dissatisfied with their purchase. In a competitive marketplace, retailers trading on the quality of their customer service have introduced return policies that go beyond their statutory obligations in respect of faulty goods. In the electronics sector the typical return rate is up to 10%[60]. Where a business focuses on reducing damage to products during distribution, and thereby minimises returns, it can make clear cost savings, boost customer satisfaction and improve resource efficiency.

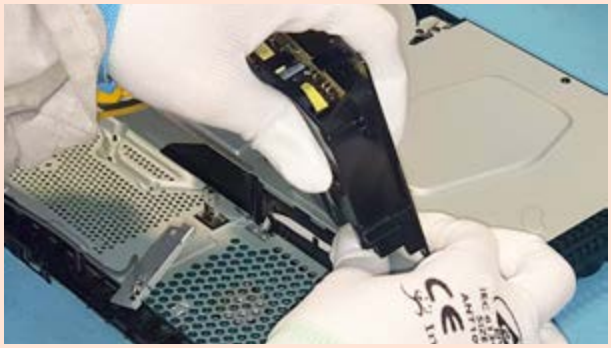
Separately, the growing popularity of online retailing has completely transformed how people shop. More orders come straight to the doorstep, meaning there are more delivery vehicles on the road and more packaging left for the consumer to handle.

We want to minimise the impact of distribution on the environment, and make sure business models are designed around 'circularity' and keeping products in use for longer. This means adopting more resource efficient models which generate less waste, fewer returns, and make better use of reverse logistics[61] to capture value and avoid wasting resources unnecessarily.

UK legislation requires some retailers to take back unwanted electrical equipment and batteries, and recycle a proportion of the packaging they put on the market. We propose to revise these regulations, subject to consultation, to ensure that producers bear the full net costs of dealing with products as they become waste. This includes making sure that online sellers with an internet-only presence are fully meeting their obligations.

As we reform existing producer responsibility systems, and look to introduce new EPR schemes, we will consider how retailer take-back and reverse logistics can be incentivised. The forthcoming consultation on packaging waste will consider opportunities for incentivising reverse logistics and back-hauling[62] of packaging waste.

Case Study: Sony Interactive Entertainment reverse logistics



For over 20 years Sony Interactive Entertainment (SIE) has provided affordable repair and reuse of PlayStation consoles outside of warranty in the UK. Up to 4000 consoles a month can be repaired, avoiding the creation of electronic waste and unnecessary consumption of virgin resources.

60 WRAP (2017) Switched On To Value http://www.wrap.org.uk/sustainable-electricals/switched-on-to-value

61 "All activity associated with a product/service after the point of sale, the ultimate goal to optimise or make more efficient aftermarket activity, thus saving money and environmental resources." Reverse Logistics Association (2018) http://www.reverselogisticstrends.com/reverse-logistics.php

62 Where companies which use packaging have their own systems for managing that packaging once it becomes waste.

To return a console for repair consumers can take it back to the retailer, use a website, or phone a dedicated call centre to organise for it to be collected. SIE partners with a specialist logistics company, Cycleon, who manage and organise the collection of consoles from retailers and customers. They take the consoles to a dedicated service centre, Infoteam, who carry out diagnostics and repairs. Any consoles beyond economic repair are harvested for reusable spare parts before being sent to secure facilities for recycling. Cycleon also organise carriers to return the repaired or replacement consoles to customers.

As the cost of repairing a console is less than the cost of a new product the out-of-warranty repair service is viable and SIE's reverse logistics operations successful. The overall process of console repair is also quick and easy from the customer's perspective; the partnership with a 4PL has brought the end-to-end average time within 21 days. Consoles are complex products using proprietary technology; this service depends on having dedicated expert technicians at Infoteam.

The repair process is made more efficient by collecting data on recurring issues from the service centres. This information is fed back to product design teams and used to improve the product, making consoles more reliable in the longer term; there has been an 80% reduction in return rates from the initial PlayStation®4 model to the most recent. This reverse logistics business model benefits both the consumer and the environment as it considers the whole lifecycle of the product, helps to improve product reliability, and avoids the need for consumers to replace broken consoles unnecessarily through an efficient collection, repair and return process.

Chapter 2

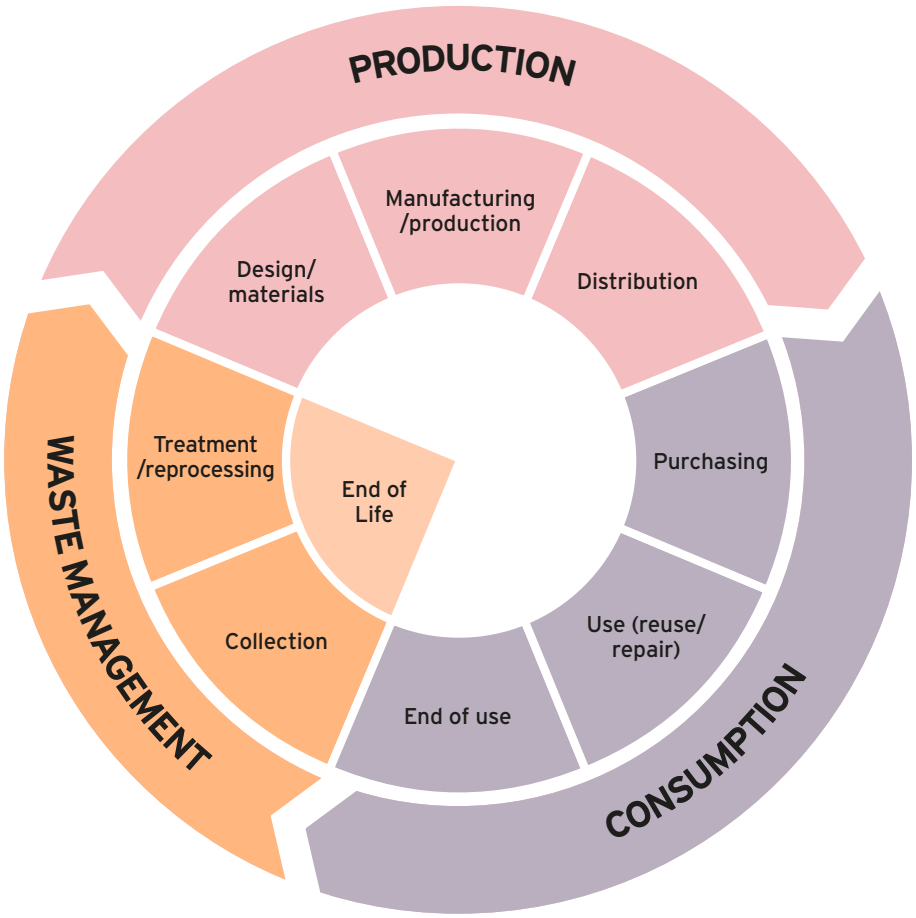
HELPING CONSUMERS TAKE MORE CONSIDERED ACTION



Consumers deserve to know more about how they can unlock hidden value for themselves, and for the good of the environment. Our policies will help consumers identify and access more sustainable products, and extend the lives of them when they do. And, when it's time to dispose of them, we will help them recycle the materials contained within.

This chapter sets out how we will:

- **Incentivise consumers to purchase sustainably**
- **Provide consumers with better information on the sustainability of their purchases**
- **Ban plastic products where there is a clear case for it and alternatives exist**
- **Address barriers to reuse**
- **Support the market for remanufactured goods**
- **Encourage appropriate disposal of used products**
- **Lead by example though procurement and the Greening Government Commitments**



2.1 More sustainable purchasing

Most people want to do the right thing – and we want to help them do it. This means making it easier for people and organisations to buy products that are better designed to be re-usable or upgradable – that have longer lives and lower environmental impacts. Producers need to help consumers by giving them better information about the long-term as they choose what to buy.

We welcome the fact that, already, consumers are taking advantage of a growing range of 'win-win' collaborative and sharing business models, which offer good value to the customer and are also less harmful to the environment – audio and video-streaming services, for example, and car-rental clubs.

We fully support this type of consumption model. It promotes the design of more durable products because the producer can look forward to receiving revenues from them for longer. It also creates opportunities for closed loop remanufacturing and recycling processes that keep precious natural resources in use for longer and prevent the damage to our ecosystems caused by dealing with waste.

To achieve this, actions we will take include:

2.1.1 Incentivising consumers to purchase sustainably, for example by consulting on extending and increasing the carrier bag charge

Since large retailers in England began charging 5p for a carrier bag in October 2015, 15.6 billion fewer bags have been handed out to shoppers by the seven main retailers – a drop of 86% in 2017/18 compared to 2014 levels[63]. A key principle of our Strategy is that we want to provide opportunities for people to do the right thing, and incentivise them to do so, including using taxes and charges where appropriate. The success of the carrier bag charge demonstrates the difference even relatively small incentives can make. So, we will consult on increasing the existing 5p charge and extending it to all retailers on a mandatory basis. In considering future environmental policy, the Government will look at the relative costs and benefits of different approaches, including taxes, charges and other policy instruments such as regulations or bans, as we have proposed for plastic straws, stirrers and cotton buds, for example.



2.1.2 Providing consumers with better information on the sustainability of their purchases through better product labelling

In certain circumstances, the most appropriate policy is to provide consumers with better information when they purchase. One way of doing this is through **Ecolabels**, which are used around the world to show that a product or service meets a certain standard of environmental

63 Defra (2018), Single-use plastic carrier bags charge: data in England for 2017 to 2018. https://www.gov.uk/government/publications/carrier-bag-charge-summary-of-data-in-england/single-use-plastic-carrier-bags-charge-data-in-england-for-2017-to-2018

performance. Certification marks provide a level of trust for consumers and aim to reduce dubious 'green washing' by manufacturers and brands. Ecolabels exist for a range of products and cover a range of environmental impacts from production to design to disposal.

At present the UK uses the EU Ecolabel scheme but there is low take-up and few consumers recognise it. Meanwhile, private sector ecolabels have emerged that cover a range of aspects around environmental sustainability. We will address this confusion and ensure consumers are provided with better information, starting by working with key stakeholders including industry, trade associations and standard-setting bodies to develop options for a domestic ecolabel, before consulting more widely. We have also commissioned research on the extent to which consumers given factual information up front then make more environmentally sustainable decisions, particularly when buying repairable, upgradable and/or recyclable products.

Among the options available are multi-factor schemes that enable products to obtain an ecolabel; those that make consumer information on products mandatory; and schemes which provide different ratings – similar to current energy labelling. Issues that we will consider include how to encourage people to buy on the strength of those labels, and whether a scheme requires statutory backing, given that private sector standards are emerging alongside well-recognised ISO standards.

We will draw links between ecolabel schemes and our proposals to extend producer responsibility systems and other relevant fiscal measures. For example, under extended producer responsibility for packaging we could require producers to ensure that packaging items are clearly labelled as to whether or not they can be recycled[64]. In the interim, we will continue to work with businesses to improve existing consumer labelling through groups such as the Council for Sustainable Business and the UK Plastics Pact. We will also explore whether consumer labels should identify the level of recycled content within the packaging.

Disposal of wet wipes

We all use the wastewater and sewage system every day, and can help it run smoothly and efficiently. Defra is working with the water sector and wet wipe makers on ways to tackle the problem of backed-up sewers. Revised industry guidance requires a 'Do Not Flush' label to be displayed far more prominently on non-flushable wipes. We support the water industry's ongoing work to ensure that any wipes which are marked as being 'flushable', are plastic free and are truly flushable, meaning they can enter the sewage system without causing blockages or harming the environment.

64 This means that the consumer can be confident that the infrastructure is in place to collect and sort the packaging waste, and that it can be recycled back into new products.

2.1.3 Banning the most problematic plastic products where there is a clear case for it and alternatives exist

In general, we prefer to help people and companies make the right choice, rather than banning items outright. There may, however, be times when a ban is appropriate as part of a wider strategic approach. We have already banned the sale of plastic microbeads, consulted on banning plastic drinking straws[65], stirrers and cotton buds, and are assessing the impact of banning other single-use plastic items. We will continue to review the latest evidence on problematic products and/or materials to take a systematic approach to reducing the use of unnecessary single-use plastic products including problematic packaging materials, in line with our commitment to match and where economically practicable exceed the ambition of the EU in this regard.

65 A recent study indicated that up to 4.7 billion plastic straws are used and thrown away annually in the UK DEFRA (2018) https://consult.defra.gov.uk/waste-and-recycling/plastic-straws-stirrers-and-buds/supporting_documents/Consultation%20Document.pdf

2.2 More reuse, repair, and remanufacture

Consumers are often encouraged to replace a damaged item with a new one, even when they'd prefer to repair or reuse it. We want to extend the life of products and preserve our natural capital. For this to happen, all consumers – whether individuals or businesses – must be able to find affordable spare parts and technical advice, or access affordable repair services.

Ideally, a product no longer needed by one consumer should be reused by another. We need to encourage reuse through Household Waste Recycling Centres (HWRCs), for instance through contracts with charities. At present, barriers prevent certain products brought to HWRCs from being reused or resold, even when members of the public would happily take them away. Online platforms such as Gumtree, Freecycle and Shpock support reuse, which we welcome – but it is still important that it's as easy as possible for people to reuse and repair.

Manufacturers should also be prepared to take products back and return them to their original state, if feasible – a process known as 'remanufacturing', which benefits both the economy and society.

Another way of extending lifespans is to embrace retail models which provide services or rent out products – thereby sharing resources, and facilitating repairs and upgrades. We've seen this happen with the growing popularity of car club businesses like Zip Car: there are also companies of long standing whose business model rests on renting out machinery, including for DIY use.

To encourage this, actions we will take include:

2.2.1 Extending product lifetimes through warranties and disclosure

The Consumer Rights Act 2015 says goods should be of satisfactory quality and fit to do the job intended. Yet whilst a consumer has up to six years to assert their rights, there is uncertainty as to the duration for which a consumer can expect a product to last. When a product becomes broken or faulty, even after a short time, consumers may feel they have no option but to replace.

Guarantees and extended warranties, whilst not affecting a consumer's statutory rights, can help address the problem. A guarantee is usually a free promise by the manufacturer or retailer to fix or replace the problem, whereas an extended warranty is offered on a voluntary basis, and usually at a premium, by manufacturers, covering consumers against the cost of repairs and replacements. These frameworks cover manufacturer faults, for example mechanical or electrical failure, though generally not accidental damage.

Wider use of such systems can promote resource efficiency. They will encourage manufacturers to design and manufacture products that last longer and will support re-use and repair activities. They can help combat early obsolescence of products and support more resource efficient business models, such as leasing or shared ownership.

We will explore the role that guarantees and warranties can play in ensuring products stay in use longer and maintain their value. We will consider options including mandatory disclosure of expected product lifetimes, mandatory extended warranties, and incorporating warranties into

labelling, for example a 5 year warranty label. In conjunction with industry and other stakeholders, we will explore reform to consumer rights law and ecodesign legislation to make use of these systems where the market is not delivering the necessary outcomes.

2.2.2 Addressing barriers to reuse at Household Waste Recycling Centres and consulting on further measures to boost reuse, including reporting and reuse targets

We want to keep viable products in active use for longer. This preserves our stock of natural resources and minimises the impacts of dealing with waste. It also helps those who are less able to afford new possessions, and avoids the carbon emissions caused when new products are made and distributed.

When items arrive at Household Waste Recycling Centres (HWRCs) it's an opportunity to identify and segregate good quality products that are suitable for reuse. Some local authorities already do so to excellent effect, and there are also good examples of collaborative working with charities. Overall, however, there is considerable scope for being more ambitious.

It's in the interests of local authorities to promote more reuse, for instance through onsite shops at HWRCs: they receive more income from selling on quality working goods than recycling them. A pushbike might be sold second-hand for around £10-15 compared to the 80p or so it would fetch in scrap value, for example[66]. Similarly, selling or even allowing residents and small businesses to take such items can save local authorities on the cost of disposal, including landfill tax. The further benefits to society, in terms of creating local jobs and skills training, are explained in a number of research reports[67].



We are conscious that current legislation may appear to create barriers to reuse. Waste is defined with reference to the end-user's intentions, an intention to discard, and this is sometimes regarded as prohibiting local authorities from identifying items that can be reused. Local authorities are also often rightly concerned about risk and liability.

We will amend waste regulation so that HWRCs perform a more effective role in resource efficiency, for example by clarifying the duty as to re-use. We will also explore further measures, such as providing further guidance, setting reuse targets for local authorities, requiring them to set their own targets, or requiring reporting to encourage provision of reuse facilities. In reviewing and consulting on extended producer responsibility for new waste streams, we will consider how to encourage

66 WRAP (2012) http://www.wrap.org.uk/sites/files/wrap/INH0449_HWRC_Guide_%20final2_0.pdf

67 WRAP (2018) http://www.wrap.org.uk/content/environmental-and-economic-benefits-re-use

greater reuse, in particular for textiles and large household items, including furniture. In this way, we will work towards ensuring that measures which impact on local authorities are aligned with the waste hierarchy, so that reuse is where it should be in day-to-day management of waste and resources.

2.2.3 Encouraging collaborative working on reuse

Collaborative action, especially with third-sector organisations, is an important part of effective support for reuse. Second-hand clothing collections for example, largely by the charity sector, have been very successful in the UK with approximately 323,000 tonnes going through charity shops in 2016/17[68]. A considerable proportion of clothing and textiles, however, continues to go to landfill, particularly when they are of insufficient quality for reuse. Considering the water and energy used in producing textiles, from growing cotton to the manufacturing process, the impact of doing so cannot be ignored, and more can be done in partnership with others.

WRAP has produced advice for local authorities including the Household Waste Recycling Centre Guide[69], which is aimed at encouraging more partnerships between local authorities, waste management companies and third sector organisations. It also hosts a local authority household waste prevention webpage[70] with good practice case studies[71] and communications materials.

We will explore how the role of the third sector in reuse can be maintained and enhanced, including through promotion of best practice through guidance. We will consider how to boost collections for clothing, including encouraging further charity sector action as well as exploring separate collections by local authorities.

Case Study: Business in the Community's Circular Office initiative

Business in the Community's (BITC) Circular Office initiative[72] is a means of bringing businesses and other organisations together to learn about and implement circular opportunities. Almost all organisations have an office whose construction and contents - from walls and furniture to IT equipment, food, uniforms, lighting and carpets - depend on a vast range of natural resources. The Circular Office initiative is about changing the way we design, use and operate in the places we work to eliminate waste and create more efficient, resilient spaces which contribute to the long-term sustainability of businesses, the environment and the wider economy.

68 Charityretail.org (2017) https://www.charityretail.org.uk/wp-content/uploads/sites/3/2018/01/CRA-A5-Digital-Flyer.pdf

69 WRAP (2012) http://www.wrap.org.uk/sites/files/wrap/INH0449_HWRC_Guidance_2015_7%20FINAL.pdf

70 WRAP (2018) http://www.wrap.org.uk/content/household-waste-prevention-hub

71 WRAP (2018) http://www.wrap.org.uk/content/how-case-studies-and-videos-0

72 BITC (2018) https://www.bitc.org.uk/sites/default/files/circular_office_guide_final_3.pdf

2.2.4 Supporting consumer campaigns to promote reusable alternatives, such as encouraging water companies and retailers to provide more free public refill points



Reuse is not just about making use of products which others no longer need – it's also about replacing single-use or short lifetime products with re-usable alternatives. Re-usable water bottles and coffee cups, for instance.

We want to make this an easier option for consumers, be they in coffee shops, in other retail outlets or on the public transport network. We are therefore pleased to see new refill points being installed in every major city and town in England - there are now over 14,000 refill points on City to Sea's free Refill app, and they aim to double this by 2020. Water UK is also committed to expanding to areas outside of city centres and including more options for rural communities. We continue to work closely with Water UK, which represents water companies, on this initiative and welcome the industry's investment in this area through the City to Sea charity.

National Refill Day was launched in September 2018 to raise awareness for reusable plastic bottles and encourage the public to reduce plastic waste. We will continue to support initiatives from business and civil society where doing so drives further improvement and explore other avenues for progress in consultation with stakeholders.

2.2.5 Supporting the market for remanufactured goods, including by developing quality assurance schemes to boost consumer confidence

If products aren't suitable for reuse, for example because they are damaged, they may be suitable for remanufacture. Sometimes called reconditioning, this process restores a product either to its original state or very close to it, preserving its value and extending its life. It's a market we want to support, given the benefits offered by remanufactured products. As well as the more obvious environmental benefits, the economic benefits are considerable – with remanufacturing potentially contributing up to £5.6bn to the UK economy[73].

While some companies are already shifting into this market, there are barriers. Distribution and reverse logistics systems aren't set up to support consumers' return of used products for remanufacture – something our producer responsibility reforms aim to address.

73 All-Party Parliamentary Group on Sustainable Resource Use (APSRG) report, (2014) https://www.policyconnect.org.uk/apsrg/sites/site_apsrg/files/apsrg_-_remanufacturing_report.pdf

We will explore whether a product assurance scheme, with a certified mark, would boost consumer confidence and whether this would stimulate the market for remanufactured goods. The mark would show that products had been tested, and fully complied with standards for an equivalent new product.

We will work with BSI and other key partners to explore the development of such a scheme, and the creation of industry working groups to recommend standards for remanufacture. We will also consider further actions to support remanufacture, engaging stakeholders and consulting on options.

2.2.6 Supporting large-scale reuse and repair through national planning policy

For large-scale reuse and repair, it is important that the National Planning Policy for Waste[74] (NPPW) continues to embrace circular economy thinking, and integrates resources and waste management to maximise reuse in accordance with both the waste hierarchy and paragraph 8 of the NPPW (including sharing and renting products and goods, as well as recycling). We will continue to work across Government to ensure that the planning system helps deliver our objectives.

2.2.7 Exploring the development of a scheme for companies to report on their reuse, repair and recycling

As part of our wider work on metrics and reporting, we will explore ways to further incentivise companies to reuse, repair and recycle. This will include how companies can be asked to report on their efforts around reuse and repair, and recycling – this in light of the progress that has been made on mandatory carbon reporting by companies. Reporting on resource usage is more complex, and we will begin by exploring the relevant metrics.

74 UK Government services and information (2014) https://www.gov.uk/government/publications/national-planning-policy-for-waste

2.3 Appropriate disposal at end of use

Recycling, as it stands, is confusing for citizens. It must be made clearer and easier for individuals and organisations to know which objects can be recycled, and which is the correct bin for disposing of them. The same is true of 'on the go' recycling away from the home, at school or in the office where, for example, what's acceptable to put in bins can be unclear. A more streamlined system will help cut littering and fly-tipping, and capture higher quality materials.

Websites such as Recycle Now[75] are full of useful consumer advice about how and where to recycle, and why it's important - helping people do the right thing. Information like this helps to ensure that resources end up in a place where their value can be captured, helping to preserve our stock of natural resources.

Chapter 3 sets out our detailed proposals for standardising recycling collections from households and businesses. In addition, further actions we will take include:

2.3.1 Introducing a Deposit Return Scheme (DRS) for single-use drinks containers, subject to consultation



UK consumers go through an estimated 14 billion plastic drinks bottles, 9 billion drinks cans and 5 billion glass bottles a year[76]. The reported recycling rates are significantly lower than many other major developed economies at around 70%, leaving around 4 billion plastic bottles, 2.7 billion cans and 1.5 billion glass bottles not recycled every year.

This tells us that valuable recyclable material is being lost to landfill or incineration - or, worse, ends up in the open environment where it can have a serious impact on ecosystems and local people. Indeed, single-use drinks containers, or parts of them, regularly feature among the top ten items found on UK beaches[77]. It is therefore important that we encourage changes in behaviour to stop littering at source and capture more recyclable resources.

A 2018 report into drinks container recycling and litter reduction, commissioned by Defra from the Voluntary and Economic Incentives Working Group, found that plastic drinks bottle collection/recycling in some European countries with a DRS and some form of kerbside/household recycling collections can be as high as 95-98%. It also found that some rates of collection/recycling of aluminum, steel and glass drinks containers in countries with a DRS can be between 87 and 97%.

75 www.recyclenow.com is the national recycling campaign for England, supported and funded by Government, managed by WRAP and used locally by over 90% of English authorities.

76 Voluntary and Economic Incentives Working Group (2018) Voluntary and Economic Incentives Working Group report 2018

77 Marine Conservation Society (2017) Marine Conservation Society, Great British Beach Clean 2017 Report

How does a DRS work?

Consumers are charged a deposit up-front when they buy a drink in a single-use container. This can be redeemed when the empty container is returned. In international schemes consumers can either return containers through a reverse vending machine or manually to a retailer/outlet to redeem the deposit value.

We will introduce a DRS in England for single-use drinks containers, subject to consultation. The consultation will look at how the scheme might sit alongside other measures to boost recycling and how it would operate – including administration and governance arrangements, and the setting of deposit levels. Along with our proposed reforms to packaging waste producer responsibility regulations, our proposals will ensure that more recycled materials are used, and packaging is reprocessed and recycled more often.

Our preference is to adopt a UK-wide approach to DRS if it is introduced. Waste and recycling policy is a devolved matter but we will continue to work closely with the Devolved Administrations on this policy area.

2.3.2 Developing measures to reduce the environmental impacts of disposable cups

Many of those who responded to the Government's call for evidence on single-use plastic waste highlighted disposable cups as a problem, highlighting that they are often not recycled due to their plastic lining and are often littered. The Government recognises this is a problem. As set out in the 2018 Budget, the Government has concluded that a levy on all disposable cups – for both hot and cold drinks – would not, at this point, deliver a decisive shift from disposable to reusable cups across all beverage types. Businesses are already taking steps to limit their environmental impact, but we expect industry to go further and will return to the issue if sufficient progress is not made. In the meantime we will consider other options and our forthcoming consultations will consider whether or not we could drive further progress by:

- Including disposable cups filled at the point of sale in a deposit return scheme;
- Using the reformed packaging producer responsibility system to provide a strong incentive for business to provide cups that are easy to recycle;
- Setting targets to encourage higher levels of recycling.

This list of potential options beyond a levy is not exhaustive – the Government wants to hear views on these and any other ideas to address this problem.

2.3.3 Producing consumer guidance for the recycling, resale, reuse and disposal of consumer internet-connected devices

The Internet of Things is a rich source of digital home improvements – products that allow people to switch their boiler off or their lights on, or see who's ringing their digital doorbell, from anywhere with an internet connection. We are all buying more consumer internet-connected devices – smart TVs, printers, smart kitchen appliances and so on. WRAP predicts that each household will host 15 such devices by 2020[78] – all of them storing users' personal data after they have connected to the home Wi-Fi. And that's the catch. At present there is limited guidance for stakeholders or consumers on how to safely recycle or dispose of smart devices in line with data protection regulations and cyber security best practice. As a result, people may hold on to devices longer than they strictly wish or need to.

Government is moving to rectify this. The Department for Culture, Media and Sport (DCMS) 'Secure by Design' report[79] contains draft proposals to improve the cyber security of consumer internet-connected products and associated services in the home, such as a Code of Practice for manufacturers and guidance on recycling, resale, reusing and disposal. The BEIS 'Consultation on Proposals for Smart Appliances'[80] also set out the Government's intention to consider data handling with respect to recycling, reusing and disposing of smart devices.

We will compile evidence and produce guidance for consumers on the recycling, resale, reuse and disposal of devices. This will be supported by a targeted awareness campaign following discussions with campaign groups, industry and academia, to be launched in spring 2019. We will also review and update the guidance produced for local authorities, producer compliance owners, recyclers (industry/commercial) and waste managers to include internet-connected products. The guidance will take account of the Data Protection Act 2018 and outline measures to prevent unauthorised access or theft when devices are recycled.

78 WRAP (2017) http://www.wrap.org.uk/content/smart-devices-secure-data-eradication-evidence

79 DCMS (2018) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/686089/Secure_by_Design_Report_.pdf

80 BEIS (2018) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/690805/Consultation_on_Proposals_regarding_Smart_Appliances-.pdf

2.4 Leading by example

It is not enough to expect more of consumers without leading by example ourselves.

Actions we will take include:

2.4.1 Procuring more sustainably

More sustainable government procurement can help to generate less waste, and also increase demand for more resource-efficient goods and services and stimulate innovation. The Government is committed under the Greening Government Commitments to buy more sustainable and efficient products and services with the aim of achieving the best long term, overall value for money. We are establishing a more strategic and robust approach that puts social value[81], including environmental considerations, at the heart of our procurement policy – which will also help support UN Sustainable Development Goal 12 on sustainable consumption and production.

Our Industrial Strategy sets out our aim for broader outcomes, including whole life value rather than simply up-front cost, to be considered at the design stage of major projects. It also ensures that UK supply chains and SMEs will be in the best position possible to compete for public sector contracts. Our ambitions are reflected in our Procuring for Growth Balanced Scorecard, a tool which enables sustainability to be considered and balanced against cost. It is aimed at major government procurement projects in construction, infrastructure and capital investment, and includes environmental impacts and benefits. The upshot is that procurements are not awarded on price alone[82].

Case study – Thames Tideway Tunnel – waste minimisation



The way that we design major projects can be critical to the waste that is ultimately generated. The £4.2 billion Thames Tideway Tunnel will prevent millions of tonnes of untreated sewage flowing into the River Thames every year by embracing Building Information Modelling (BIM), to help avoid inefficiencies such as a lack of coordination in the design of major construction projects. BIM allows all parties involved in the construction to collaborate early on, using 3D digital models to solve design problems through joint-working in a virtual environment. This helps make the process as efficient as possible, saving time and resources at the design

81 The Public Services (Social Value) Act 2012 (the 'Social Value Act', or SVA) requires authorities to consider how what is proposed to be procured might improve the economic, social and environmental well-being of the relevant area, and how, in conducting the process of procurement, it might act with a view to securing that improvement. The table on page 3 of the Commissioner Guidance provides examples of some environmental benefits of social value in practice. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/690780/Commissioner_Guidance_V3.8.pdf

82 UK Government services and information (2018) https://www.gov.uk/government/publications/procurement-policy-note-0916-procuring-for-growth-balanced-scorecard

and build stage of major projects. BIM also makes it easier to build new infrastructure in a 'modular' way: the constituent parts can be built offsite before being assembled at pace on-site. The potential resource efficiency gains are significant. Five Whitehall departments are working closely on developing a presumption in favour of off-site construction by 2019.

From 2019 we will focus on providing greater social value through government procurement by:

- Extending the requirements of the 2012 Social Value Act in central government to ensure that all major procurements explicitly evaluate social value where appropriate, rather than just consider it;[83]
- Requiring all departments to report on the social impact of major new procurements, and;
- Training all 4,000 commercial buyers in how to take account of social value and procure from social enterprises.

A light-touch '*Balanced Scorecard*' will be developed to assist with this.

Central government procurement is only a small part of total public sector procurement. In setting out our position here, we seek to encourage other public sector bodies to do the same. In the future, we will:

- Use existing procurement networks within central and local government, and elsewhere, to promote the 'Balanced Scorecard' approach across the public sector;
- Work across government departments to ensure the market is ready to meet new requirements and bid for contracts effectively - including meeting environmental standards, particularly for voluntary, community and social enterprise organisations and SMEs;
- Wherever appropriate, look at embedding demand for more resource efficient goods and services into CCS commercial agreements, passing on savings for customers across the board.

2.4.2 Delivering on the Greening Government Commitments, including removing consumer single-use plastics from our estate by 2020

The Greening Government Commitments (GGCs) require departments run their estates and operations more sustainably, and have already driven improvement[84]. By 2020, departments must cut the proportion of waste sent to landfill to 10% or less of the total. They must also improve recycling and cut paper consumption. We are discussing future arrangements that commit government departments to make further, continuous improvements.

A key commitment is to remove consumer single-use plastics from central government buildings by 2020, with individual departments going faster and further where possible. This extends to our

83 When they procure goods, services and works over the EU procurement threshold value.

84 By 2016/17, compared to a 2009/10 baseline, government as a whole had reduced waste by 32%, diverted 87% of waste from landfill and recycled 59% of total waste

global operations, with the Foreign and Commonwealth Office (FCO) announcing that they would eliminate the use of avoidable single-use plastics from UK operations by the end of 2018, and from global operations by 2020.

Case Study: Reuse of Government Assets Pilot

Prompted by the 2020 Greening Government Commitments challenge to reduce waste, sustainability practitioners across government developed the 'Reuse of Government Assets' pilot scheme – which proved remarkably successful and is still used in a number of government departments. During the 18-month pilot, which went live in April 2016, fourteen Whitehall departments and agencies joined up to manage their surplus stationery, office furniture and equipment more sustainably. Using the Warp-it digital platform, unwanted items were advertised free of charge across all organisations taking part. Any items left after a couple of months were then advertised to other public sector users of the Warp-it system, charities and third sector groups.

The pilot saved an estimated £103,000 in procurement costs and 55 tonnes of CO_2e, and diverted 26 tonnes of assets from landfill. A review showed that the pilot was successful because senior leaders had pushed for new working practices to happen quickly, because the scheme had enough resources to keep momentum going, and because the benefits that would result were clearly communicated to key stakeholders.

Chapter 3

RECOVERING RESOURCES AND MANAGING WASTE



'No matter what we do, we will generate waste... Even those materials that can be given a new life by reuse or reprocessing will eventually reach a point of such little value that they need to be disposed of'

Report of the Government Chief Scientific Advisor,
'From waste to resource 'productivity'

Waste is a very costly misuse of our natural capital. We want to prevent waste occurring in the first place – this is a key principle of this Strategy. But, as the above makes clear, some amount of waste is inevitable. So, where it does continue to occur, we need to manage it in the most resource efficient way possible, in keeping with the waste hierarchy.

The roles of local authorities and the waste sector are critical at this stage of the lifecycle. As Government we must set clear expectations, giving them the confidence to invest in infrastructure to deal with waste and to promote UK-based recycling, and this chapter aims to do just that. And we must, and will, ensure that local authorities are resourced to meet new net costs arising from the policies in this Strategy, including up front-transition costs and ongoing operational costs.

Our long-term ambition is to move away from weight-based recycling targets. Developing the metrics and indicators which will allow us to do this will take time, as is set out in Chapter 8. In the meantime, we will continue to work towards weight-based targets where it makes sense to do so. Our goal is for at least 65% of municipal waste by weight to be recycled by 2035, with no more than 10% ending up in landfill.

We also have an overarching commitment of working towards eliminating food waste to landfill by 2030, which will tackle the problem of landfill emissions head on.

This chapter sets out how we will:

- **Improve recycling rates by ensuring a consistent set of dry recyclable materials is collected from all households and businesses**
- **Reduce greenhouse gas emissions from landfill by ensuring that every householder and appropriate business has a weekly separate food waste collection, subject to consultation**
- **Improve urban recycling rates, working with business and local authorities**
- **Improve working arrangements between and better support performance of local authorities**
- **Drive greater efficiency of Energy from Waste (EfW) plants**
- **Address barriers to the use of recycled materials**
- **Encourage waste producers and managers to implement the waste hierarchy in respect of hazardous waste**

3.1 Better waste collection and recycling

We want comprehensive and frequent waste collection systems that capture as much material as possible, promote householder and business participation, and ensure that high levels of quality recyclable or compostable materials are available for reprocessing. This will preserve our stock of natural resources by ensuring as much used material as possible gets made into products again.

Recycling rates in England have improved since the turn of the century; rising from around 11% to nearly 45% for waste from households[85]. However, progress in England has recently stalled for both domestic and business waste recycling. There has been insufficient action to drive better quantity and quality in recycling. We must make it easier for households, businesses and local authorities to recycle.

Recycling makes the material content of products that can no longer be repaired or reused available to be used in new products. It spares the environment the carbon impacts of extracting and processing virgin materials, and of managing wastes through energy recovery or landfill.



Householders want to recycle more but current arrangements are confusing. A good quality collection service, properly explained, is the answer. This will help to capture more environmentally and economically valuable material, and to improve the quality and quantity of materials that are collected.

For various reasons, including uncertainty about quality, lack of information and high costs when collections are inconsistent, the benefits of using recycled materials are not fully realised at present. Leaving the EU provides us with an opportunity to review and streamline the regulatory environment to overcome these barriers.

Therefore, actions we will take include:

3.1.1 Improving recycling rates by ensuring a consistent set of dry recyclable materials is collected from all households and businesses

Households

Subject to consultation we will legislate to allow Government to specify a core set of materials to be collected by all local authorities and waste operators. Timings for introduction will be subject to discussions at spending review.

We will consult on which materials should comprise this core set, and which collection systems would be most effective at preserving material quality. The consultation will be carried out in parallel with the consultation on reforms to the existing packaging waste regulations.

85 Defra (2018), UK Statistics on Waste https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/683051/UK_Statisticson_Waste_statistical_notice_Feb_2018_FINAL.pdf



To support higher levels of recycling by local authorities we will also consult on whether introducing non-binding performance indicators for the quantity of materials collected for recycling and minimum service standards for recycling would support this outcome. Subject to consultation these performance indicators and service standards would consider the different circumstances and potential for higher recycling that local authorities experience and would be reviewed regularly to drive performance. Minimum standards for recycling services would help to improve the quantity and quality of what is recycled. Having comprehensive and frequent collection services (including weekly separate food waste collections, on which we will consult) will ensure more reliable services for householders while retaining local flexibility where this is necessary. New statutory responsibilities for local government would be subject to an assessment of new burdens.

For packaging waste, reform of extended producer responsibility will ensure that the costs of collection and recycling are borne appropriately by those that produce packaging and place it on the market. Local authorities and waste operators will be able to use this support to collect all recyclable packaging waste and drive high quality recycling.

Businesses

Recycling rates in businesses are often lower than households – it frequently costs businesses more to separate packaging or food waste for recycling. **We will take action, including, where necessary legislating, to ensure that businesses present recycling and food waste separately from residual waste for collection and publish or make available[86] information on what is recycled.**

There are some good examples of shared collection services operating for all businesses along a high street or within a business district, which can help to reduce their costs. **We will investigate these service options alongside other measures to help cut costs, particularly for SMEs.**

Increasing quality



Last year over 467,000 tonnes of household recycling in England was reported as rejected from recycling plants. Whilst this represents less than 5% of all recycled waste, in some areas levels of contamination are significantly higher; contamination reduces quality and can damage the profitability of recycling. Collection of a core set of materials and clarity over what can and can't be recycled should help improve quality.

86 Where publishing may breach commercial confidentiality.

Greater collection of glass separate from paper and separate food waste collections would also help to improve quality, increase revenue for local authorities and ensure more packaging can be recycled in closed loop applications (cans to cans and paper to paper). **As part of establishing a core set of materials for collection, we will review the effectiveness of current arrangements for reporting of quality, and for determining when separate collection is necessary to achieve high quality. This will also take into account reforms to the packaging waste regulations and changes to provisions on technical, environmental and economic practicability in the new Circular Economy Package.** We will consider the need for further guidance, as called for by a number of stakeholders[87].

Case Study: Somerset Waste Partnership

Somerset Waste Partnership has been operating a multi-stream collection of dry recycling (the different materials are separated by the householder into several containers) alongside separate weekly collections of food waste since 2004. Working as a partnership to provide a consistent 'kerbside sort' service across the whole county area for such a long time has led to a participation rate of 85%. Somerset adopted multi-stream collections due to the quality of recyclate this approach enables them to collect, allowing them to be confident that what they collect can be fully recycled – ideally in the UK and in closed loop processes. In 2017/18 52% of waste from the county was recycled, with 91% of this recycled in the UK – providing high quality raw materials to UK industry.

Encouraging householders to minimise waste and recycle more

We will maximise the value of our reforms by encouraging behaviour change alongside them. We have previously promoted behavioural measures such as providing rewards or recognising householders' efforts to recycle. Such incentives and nudges, when they accompany good services and communications, can make a real difference to people's engagement in recycling. We will explore new ways to engage positively with the public about recycling, building on the work of charities and non-governmental organisations.

3.1.2 Reducing greenhouse gas emissions from landfill by ensuring that every householder and appropriate businesses have a weekly separate food waste collection

Subject to consultation, we will legislate to ensure that this is in place from 2023. The consultation will also explore whether households with gardens should have access to free garden waste collections. New duties will be assessed to account for new burdens, and funded appropriately.

Food waste collections

UK households produce around 7 million tonnes of food waste each year, of which 5 million tonnes is categorised as still edible, with 2 million tonnes being inedible, requiring treatment through the waste system. Edible food that would otherwise be wasted should be made available to be redistributed and only recycled when it is no longer fit to be redistributed or fed to animals.

87 For example in the Defra (2018, forthcoming) 'Post Implementation Review of the Waste (England and Wales) Regulations 2011' on legislation.gov.uk.

Whilst some local authorities in England operate food waste recycling schemes[88], the majority of food waste ends up in residual waste. Extending separate food waste collections to more households should increase recycling and composting rates by about 5 percentage points over current levels[89], and divert waste from incineration or landfill. Separate food waste collection also leads to higher yields of food waste collected than if it is captured mixed with garden waste[90].

Food waste treatment

Anaerobic digestion (AD) represents the best environmental outcome for food waste that cannot be prevented[91] or be redistributed to others or, if this is not possible, used as animal feed. It provides both low carbon renewable energy and digestate, which can be used as fertiliser, compost, or soil improver.



What is anaerobic digestion?

Anaerobic digestion (AD) involves the breakdown of biodegradable material in the absence of oxygen by micro-organisms called methanogens. It is already widely used to treat wastewater in the UK and can also be used to treat other organic wastes, including domestic and commercial food waste, manures and biofuel crops[92].

Since the publication of the Anaerobic Digestion Strategy in 2011, AD growth has been supported by measures such as feed-in tariffs and renewable heat incentives. The number of AD facilities using food waste or farm waste in operation since then has increased from 63 to 420 and energy recovered from anaerobic digestion has increased from 713 GWh in 2013 to 2,470 GWh in 2017. AD also produced 3,500 GWh of heat in 2017. WRAP has estimated that UK food waste sent to AD produces 1,000 GWh[93], enough to power 1 million homes for over one month[94].

88 About 50% of local authorities in England offer a service to collect food waste, albeit only about a third do so separately (http://laportal.wrap.org.uk/)

89 As suggested by our internal modelling.

90 WRAP (2016), Household food waste collections guide. www.wrap.org.uk/sites/files/wrap/HH_food_waste_collections_guide_section_3_how_much_can_be_collected.pdf

91 Parts of food waste that are not suitable for human consumption, such as fruit stones. Cultural context is also important, as what's edible to some may not be to others (vegetable peelings or certain animal parts for example).

92 WRAP (2018) http://www.wrap.org.uk/content/anaerobic-digestion-1

93 WRAP (2017) Estimates of Food Surplus and Waste Arisings in the UK. http://www.wrap.org.uk/sites/files/wrap/Estimates_%20in_the_UK_Jan17.pdf

94 Ofgem (2006), Electricity generation: facts and figures https://www.ofgem.gov.uk/data-portal/electricity-generation-mix-quarter-and-fuel-source-gb https://www.ofgem.gov.uk/ofgem-publications/76160/13537-elecgenfactsfspdf

AD growth has also increased the amount of digestate available to be spread to land to improve soil or as a fertiliser. This helps to reduce dependency on inorganic chemical fertilisers and their higher carbon footprint. Spreading of digestate to land can lead to ammonia emissions, a significant air pollutant which must be properly managed. WRAP has published research on this and we have published a Code of Good Agricultural Practice (COGAP) that provides guidance on reducing ammonia emissions from farms in England[95]. If necessary we will also consider further measures, including regulations, to minimise emissions.

Garden waste



Garden waste sent to landfill can generate greenhouse gas emissions akin to those from food waste[96]. We will consult on the provision of free garden waste collections for households with gardens and seek views on the impacts and costs for local authorities so these can be taken into account in assessment of new burdens. Garden waste can be treated by open windrow composting[97], which avoids landfill and is cheaper for local authorities than landfill disposal. Compost can also be used to generate additional revenue.

We will work across Government on opportunities to promote synergies between food waste and other bio-waste and renewable energy to support decarbonisation of transport, heat and power. We will carry out and publish a review of policies to support bio-waste recycling through anaerobic digestion and composting to ensure we can maximise the benefits of these treatment options whilst managing the risks. We also want to ensure that where appropriate farms continue to use AD as a treatment option for managing on-farm waste and recycling nutrients into energy and digestate that can be applied back to land.

Quality in recycled food and garden waste

Implementing these policies will significantly increase the amount of recycled food and garden waste available for use as fertiliser or compost. This means that we need to ensure what is recycled is good quality, and that contaminating materials such as metals and plastic are kept within recognised limits. Clear communications by local authorities and waste managers can



95 UK Government services and information (2018)Code of Good Agricultural Practice for reducing ammonia emissions. https://www.gov.uk/government/publications/code-of-good-agricultural-practice-for-reducing-ammonia-emissions

96 On a per tonne basis, food and drink waste to landfill generates 627kg of CO_2 emissions whereas garden waste to landfill generates 579kg of CO2 emissions. Greenhouse gas reporting: conversion factors 2018. (2018) https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018 - Waste disposal tab

97 Windrow composting is used for processing garden waste, such as grass cuttings, pruning and leaves in either an open air environment or within large covered areas where the material can break down in the presence of oxygen.

play a key role in achieving this. It is also important that quality standards for compost and digestate are fully adopted and that they are regularly reviewed to see if they are fit for purpose or can be improved with evidence. **We will work with the Environment Agency and industry to ensure what is put on the market adds value, meets required environmental and quality standards and is applied correctly to minimise environmental impacts.**

3.1.3 Improving urban recycling rates, working with business and local authorities

Recycling rates for urban authorities are often lower than those of rural or suburban authorities. We will work with Metro Mayors, local authorities in urban areas and other relevant organisations and stakeholders to:

- Review collection models for densely populated commercial and residential districts to improve recycling and reduce costs whilst maintaining frequency of collections needed to protect local amenity. This could include piloting shared domestic and business collection rounds or zoned collection services;
- Engage with landlords and estate managers to promote recycling in houses in multiple occupation (HMOs) and other properties where they have responsibility for waste management arrangements;
- Work to align the National Planning Policy for Waste and planning practice guidance with the Resources and Waste Strategy and continue to maintain building regulations guidance to support its objectives;
- Work with transport hubs and other destinations such as hospitals and universities to promote effective and high quality recycling (including on-the-go).

3.1.4 Improving working arrangements and performance between local authorities, especially in 'two-tier' areas

Household waste management arrangements are complex. Around 350 local authorities in England have responsibility for collection and/or disposal of household waste. About 90 of these authorities are responsible for both collection and disposal (Unitary Authorities). The remainder are 'two-tier' authorities where a waste disposal authority (WDA) is responsible for disposing of waste collected by smaller district authorities (waste collection authorities, WCAs).



Both WRAP and Defra's Waste Infrastructure Delivery Programme (WIDP) have demonstrated that efficiencies as well as service improvements can be made through greater joint working between two-tier authorities. There is also evidence from other sources such as the Environmental Services Association that shows that collaboration and joint working can deliver significant savings. Better sharing of assets for handling household and commercial waste would drive down treatment costs and could lower the gate fees paid by local authorities.

Agreed minimum standards for waste collection and recycling across England would reduce many barriers to joint working. It would also increase the quality and quantity of the materials collected for recycling and could increase the bargaining capacity of local authorities when selling secondary materials.

We will review the effectiveness of current arrangements for local authority waste management and joint working and make recommendations for improvement. As we leave the EU we also want to widen the performance measures we use and promote waste minimisation and better quality recycling. We will work with local authorities to develop new performance metrics for waste to complement and move beyond current weight-based targets to ones which recognise environmental benefits of sound waste management.

3.1.5 Investigating amending the recycling credit system used by two-tier authorities

The recycling credits system is there to ensure cost-sharing between Waste Collection Authorities (WCAs), which collect waste, and Waste Disposal Authorities (WDAs), which dispose of it. It should mean that savings from avoided waste disposal costs that accrue to WDAs as a result of recycling by WCAs are shared with WCAs to provide a financial incentive to improve recycling. The current system no longer provides sufficient incentive for many WCAs to put in place services to collect materials such as food waste as the payments are too low to support these services. Some two-tier authority areas are using alternative payment methods to better balance cost and rewards of recycling. Depending on how packaging producer responsibility is reformed, recycling credits and two-tier cost sharing more generally will need to be reviewed.

3.1.6 Reviewing the Controlled Waste Regulations and Household Waste Recycling Centres to ensure they are delivering value for money

Local authorities are under pressure to make savings to their waste management budget, and many are looking to achieve this by reducing opening times of Household Waste Recycling Centres (HWRCs) or by introducing charges for non-household waste items such as rubble. We are aware of a disparity of charging and opening hours across the country and of concerns regarding the future viability of sites. Some fear that changes to opening hours or charging may increase fly-tipping. We want to understand these risks, and to ensure that these services continue to be accessible for householders and any charges applied to non-household wastes are fair and transparent.

The Controlled Waste Regulations set out charging arrangements for different categories of waste, including waste delivered to HWRCs. We want to ensure that they continue to be fit for purpose, and to investigate extending the role of HWRCs as necessary to have in place arrangements for the collection of hazardous household waste and textiles by 2025, subject to consultation and assessment of potential for new burdens.



It's important that local residents are able to dispose of their rubbish in a responsible and convenient manner. We will therefore ensure that charging arrangements in the Controlled Waste Regulations are clear, especially in relation to waste arising from small scale DIY construction activities carried out by ordinary householders with no specialist skills, which Government has been clear should not be charged for. We will review Household Waste Recycling Centre services and the Controlled Waste Regulations and, subject to consultation, will amend them to ensure they remain fit for purpose, charges are fairly applied, and that services are accessible, support high levels of recycling, and deliver value for money. Our review will also explore whether setting minimum service standards for HWRCs would be helpful.

Case study: Renescience by Ørsted

Renescience is a first-of-a-kind technology created by Ørsted that greatly increases recycling rates from both sorted and unsorted refuse. The first plant is being commissioned in Northwich, Cheshire. The technology mixes water and enzymes with municipal waste, breaking down all organic material, such as food waste, labels and food that adheres to packaging and cans. The resulting bioliquid is drained and can be sent to an anaerobic digestor to create green gas (biomethane). The technology also breaks down complex materials such as cardboard-plastic composites. The refuse that comes out the other side is put through a mechanical process to allow the materials, such as cans and plastic packaging, to be sorted.

The technology is able to recover high levels of recyclable material and can be used to recycle unsorted waste in areas with low rates of sorting refuse (such as those with high-density housing). It can also be used in areas with sorted refuse as the technology is able to recycle the substantial amount of organic and recycling material that the sorting process is unable to capture.

3.2 Improved waste management

We want waste to be managed in the most appropriate way to ensure that environmental impacts are minimised, and that the resource value extracted is maximised.

Currently England generates around 29 million tonnes of municipal residual waste per annum (Mtpa[98]). We manage this waste in three main ways: sending it for energy recovery, exporting it as a refuse-derived fuel (RDF), and landfilling it. We also attempt to extract recyclables from this waste where the technology exists to do it, although the quality of this material tends to be poor. Landfill is the least preferred option given its environmental impact and long-lasting nature.

Case study: VinylPlus Initiative



VinylPlus is a European-wide Industry voluntary commitment representing the whole value chain of the PVC industry – from producers through to recycling companies that handle PVC at its end-of-life.

The European PVC industry aims to achieve 800 kilo tonnes recycled by 2020 – which would represent a third of all PVC that becomes waste. The UK is making a significant contribution to Vinylplus' 2020 target, having recycled 22% of all PVC recycled in Europe in 2017. Old window frames were the most commonly recycled items, followed by cables.

The main materials recycled are windows, cables, flooring, pipes and fittings, and rigid PVC films. The construction industry uses recycled PVC in windows, pipes and floorings. Where the PVC is mixed with other polymers or – as in the case of cable scrap – residual metals which cannot be completely removed, it is used in horticulture or for traffic management in the form of cones and speed bumps. All of these are recyclable when they get to the end of their lives.

The proportion of local authority collected waste going to Energy from Waste (EfW) plants[99] increased from 9% in 2000/01 to 41% in 2017/18[100]. In 2017 incineration of biodegradable waste produced about 3.4% of the UK's renewable energy[101], offsetting the use of virgin resources.

98 Million tonnes per annum (Mtpa)

99 This process typically uses heat from burning waste to create steam, which then powers electricity turbines. Some plants also use the heat generated through this process to heat nearby residential or industrial facilities.

100 UK Government services and information (2018) https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables

101 BEIS (2018), Digest of UK Energy Statistics (DUKES): renewable sources of energy. https://www.gov.uk/government/statistics/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes

Thanks to improvements in recycling and sending more waste to EfW, we are less reliant on landfill –with a 72% reduction by weight of local authority collected waste sent to landfill since 2010/11[102]. But more progress can be made. We will explore moving away from weight-based targets towards natural-capital based targets, but in the meantime are committed to bringing the amount of municipal solid waste sent to landfill down to no more than 10% of the total by 2035.

Actions we will take include:

3.2.1 Driving greater efficiency of Energy from Waste (EfW) plants by encouraging use of the heat the plants produce

England has around 40 EfW plants. Eight operate in Combined Heat and Power (CHP) mode, delivering greater efficiency[103] than solely generating electricity. We want to help the companies that run EfW plants to use the heat produced to improve their efficiency, and to help industry make the right decisions over infrastructure investment.

Work is underway across Government to make the remaining plants more efficient, by assessing and removing barriers to making use of heat produced when incinerating waste[104]. The Department for Business, Energy and Industrial Strategy (BEIS) has a Heat Networks Investment Project[105], with a £320m capital fund, and we are working to ensure that this project helps to utilise EfW plants as a source of heat for district heat networks where possible. As part of the review of the Waste Management Plan for England[106] in 2019, Defra will work with the Ministry of Housing, Communities and Local Government (MHCLG) to ensure that the Waste Management Plan for England and the National Planning Policy for Waste and its supporting planning practice guidance reflects the policies set out in this Strategy. This will consider how to ensure, where appropriate, future plants are situated near potential heat customers.

In addition, we will work closely with industry to secure a substantial increase in the number of EfW plants that are formally recognised as achieving recovery status, and will ensure that all future EfW plants achieve recovery status[107].

102 UK Government services and information (2018) https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables

103 This means that the plants can generate electricity and supply heat to nearby residential and/or industrial buildings. The gross efficiency of electricity-only facilities is about 27%. Much higher efficiency levels – typically of around 40% – can be achieved if EfW plants harness their heat offtake in addition to generating electricity. Many plants are already CHP-enabled but cannot find a customer for the heat that they produce.

Defra (2013) Incineration of Municipal Solid Waste.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/221036/pb13889-incineration-municipal-waste.pdf

104 UK Government services and information (2018) https://www.gov.uk/government/publications/heat-networks-developing-a-market-framework

105 UK Government services and information (2018) https://www.gov.uk/guidance/heat-networks-overview

106 UK Government services and information (2013) https://www.gov.uk/government/publications/waste-management-plan-for-england

107 'R1' Recovery status acts as a proxy for the energy-generating efficiency of facilities. Facilities which achieve the status are classed as a recovery operation for the purposes of the waste hierarchy and so are a level up from the bottom rung of 'disposal'.

3.2.2 Continuing to monitor England's waste infrastructure capacity and associated infrastructure requirements, intervening where necessary

We cannot increase resource efficiency without the right waste infrastructure[108]. Waste infrastructure is used to extract value from items considered worthless by others and limits the burden that waste places on the environment.

Domestic recycling infrastructure

Through the Waste Infrastructure Delivery Programme, the Government is committed to spending £3bn by 2042 on developing new waste infrastructure. This programme has helped to give the private sector the confidence to invest in waste management projects, including facilities to help improve recycling, such as Anaerobic Digestion plants.

Nevertheless, there is still a need for greater domestic reprocessing capacity – particularly in recycling. Throughout this Strategy, we have committed to taking actions which will help stimulate private investment in reprocessing and recycling infrastructure.

We want to significantly increase UK capacity by both increasing investors' confidence and improving the competitiveness of UK reprocessing through:

1. Providing a large and stable supply of recyclable waste materials;
2. Increasing the quality of the waste materials to be recycled;
3. Improving demand for recycled materials and market stability;
4. Levelling the playing field for UK reprocessors – minimising illegal waste exports.

We will do this through:

- New policies such as Extended Producer Responsibility (EPR) and Deposit Return Schemes (DRS) for drinks containers (on which we will consult), which would help to guarantee that waste products have a value at end of life, increase the quality and quantity of materials available to recyclers, and stimulate demand for secondary materials.
- Raising recycling targets for packaging across a number of materials and waste streams to increase recycling and improve environmental outcomes. Our consultation on packaging EPR will encourage better design for recycling and more recycling of all packaging materials including plastics. And a tax on plastic packaging with less than 30% recycled content will provide a clear economic incentive for businesses to use recycled material in the production of packaging which in turn will create greater demand for this material.
- Exploring options to ensure fair competition for all reprocessors. Chapter 4 sets out our policy intentions for managing waste exports. Our primary aim is to process more waste at home. We also want to ensure, however, that any waste which we do send abroad is fit for recycling, and that it is recycled to equivalent standards as required in the UK. Increased monitoring and enforcement of exports should create a more level playing field for domestic recyclers.

108 In 2016, waste infrastructure in England managed 203Mt of waste, 5Mt of which were hazardous.

- Should wider policies not deliver the Government's waste ambitions in the long-term, we will consider the introduction of a tax on the incineration of waste. Incineration currently plays a significant role in waste management in the UK, and the Government expects this to continue. However, Budget 2018 set out the Government's long term ambition to maximise the amount of waste sent to recycling instead of incineration and landfill. Any consideration would take into account how such a tax would work alongside Landfill Tax and the possible impacts on local authorities.

What is chemical recycling?

In the UK most plastic is currently recycled through a mechanical recycling process, a multistep process in which the chemical composition of plastic is not changed. In contrast, chemical recycling refers to a family of treatment technologies where waste plastic is chemically treated in a way that recovers the base chemical constituents of which it is made.

Our long-term objective is to design 'difficult to recycle' plastics out of the system completely. In the meantime, chemical recycling has the potential to provide a complementary route for recycling such plastics where mechanical recycling is either impractical or uneconomic. In all cases, it is important to consider the overall sustainability of the proposed process, including the environmental, economic and social costs and benefits.

Domestic residual waste infrastructure

England has approximately 10.5Mt of EfW operational capacity dedicated to treating municipal and/or industrial and commercial waste[109], enough to treat around 36% of municipal residual waste at current levels[110]. We expect an additional 2.0Mt[111] of EfW capacity to come on stream by 2020 from plants which are in construction. Greater waste prevention, reuse and a 65% municipal waste recycling rate, delivered through policies in this Strategy, will mean that municipal residual waste is expected to decrease to around 20.0 Mtpa by 2035[112].

Given our projections we continue to welcome further market investment in residual waste treatment infrastructure. We particularly encourage developments that increase plant efficiency, minimise environmental impacts whilst upholding our existing high standards of emissions control, and progress technologies that produce outputs beyond electricity generation where these are demonstrated to be environmentally sound and economically viable. We recognise that there is an ongoing role for landfill in managing waste, particularly for inert waste that cannot be prevented or recycled, but want to see its use minimised as much as possible.

109 Environment Agency (2017), Waste Management England 2016. https://www.gov.uk/government/publications/waste-management-for-england-2016

110 Total waste managed in 2016 was 203mt. Actual throughput to EfW was 9.6mt (out of the 11.4mt capacity).

111 According to Defra internal monitoring.

112 For more detail please see evidence annex page 78.

Case Study: Renal Dialysis Bottle Compacting



Barts Health NHS Trust has succeeded in reducing its waste disposal costs by £2.8million over the past four years. The dramatic savings were achieved after it focused on segregating recyclable materials from domestic waste, working in partnership with Skanska Facilities Services. Innovation was built into its contract as a tender requirement, meaning Skanska was able to focus on innovative ways to handle their waste.

The problem centred on Barts Health's four Renal Units, where over half a tonne of six-litre waste bottles were being generated each month. They took up space in waste areas, failed to crush flat in rubbish compactors (meaning the compactors could not meet their maximum weight/lift load) and had to be moved between two hospital sites on domestic waste carts, increasing transport emissions.

The solution was to design and build a 'reverse vending' machine that compacted the bottles, the first of its kind to be used in a hospital environment. The machine, made by the Reverse Vending Corporation, opened up the material rebate market as a potential revenue-earner for Barts Health as well as making waste clearance itself cheaper and more efficient. They also help the Trust to comply with waste handling regulations.

Two machines are now in place at Renal Units in Whipps Cross University Hospital and Newham University Hospital, both in London. They crush each bottle until it loses 40% in volume – a space-saving that has halved the number of internal domestic waste cart trips. As well as lessening the environmental impact of road transport miles, emissions and congestion, the machines are likely to save £13,000 in lower waste transport costs over a decade. After the first year of operation each machine will be cost neutral, assuming rebates for the virgin material are applied.

3.2.3 Exploring new ways to ease the environmental impacts of legacy landfill sites



Landfilling has been a mainstay of waste management for over a century. Sites vary widely by age and waste composition. Waste already deposited in landfill will continue to pose a risk to the environment for many years.

We commissioned a scoping study into ways we can deal with the issues legacy landfills create and will be undertaking research and analysis to support new approaches to landfill aftercare

management. We are also working with industry, local authorities, and other partners, to provide clarity around surrender criteria[113], explore potential alternative sources of revenue, and optimise passive landfill management technologies.

3.2.4 Making the process for achieving 'end of waste' easier for businesses

The process for turning end-of-life materials into commercially viable products should be made as easy as possible. For a waste material to become a non-waste material, it must undergo a recovery operation such as recycling, complying with certain criteria. The point at which it ceases to be waste is known as 'end of waste.' Businesses depend on clear guidance on end of waste, so that more useable products can be made from wastes. However, the current legal framework is sometimes perceived as burdensome to businesses, and a barrier to achieving end of waste. We are working to improve our processes so that they are proportionate to the risks involved and to increase support for businesses so that they can use more waste-derived products.

Article 6 of the EU Waste Framework Directive specifies when and how end of waste is achieved. This has been amended under the Circular Economy Package[114] (CEP). We will transpose these amendments in a way that causes as little disruption as possible to recyclers and producers of waste-derived products. We will continue to work with industry to ensure that conformity with any new requirements is as simple as possible, and will provide guidance where necessary for any changes to end of waste criteria.

Our current guidance on end of waste is some of the most comprehensive in Europe. According to estimates from the Environment Agency, the 13 technical guidance documents, known as Quality Protocols (QPs)[115], on end of waste that have been published to date, have saved businesses in England, Wales and Northern Ireland, on average, £122 million a year through reduced waste management costs[116]. It is estimated that the QPs generate a further £495 million a year through the sale of waste derived products that would otherwise have remained waste.

For materials that do not fall under the 13 QPs, the newly reopened 'Definition of Waste Service' is helping to clarify end of waste, by providing businesses with case by case decisions at low cost. This is a fee-paying service that businesses can use to request a judgment from the Environment Agency on whether their material is classified as a waste anymore. This service can also be used to determine whether a material is classed as a by-product or as a waste. Businesses may also apply, through the service, for a 'generic framework' – a guidance document, similar to a Quality Protocol, for their specified material. The framework is developed with the Environment Agency, owned by the requestor, and can be used to determine when end of waste has been met for a

113 The Environment Agency (2010) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/296512/LIT_8220_108e62.pdf

114 The European Commission (2018) http://ec.europa.eu/environment/waste/target_review.htm

115 The Environment Agency (2015) Quality protocols: converting waste into non-waste products https://www.gov.uk/government/collections/quality-protocols-end-of-waste-frameworks-for-waste-derived-products

116 Environment Agency (2018), Turn your waste into a new non-waste product or material https://www.gov.uk/guidance/turn-your-waste-into-a-new-non-waste-product-or-material#definition-of-waste-assessment

specific material or product. We will continue to promote the Definition of Waste Service, and encourage businesses to apply for generic frameworks.

We will review the end of waste criteria and tests that are currently laid out in the Waste Framework Directive. We will review our current Quality Protocols to see where they need to be updated and will continue to update and improve our digital tools to support the digital transformation project to make it easier for businesses to apply for the relevant permit.

We will also publish step-by-step guidance to help local authorities, businesses and charities improve collection facilities, and increase collection for reuse and remanufacture, in accordance with end of waste requirements.

3.2.5 Addressing information barriers to the use of secondary materials as inputs

The waste from one business can be useful material for another. Enabling material flows in this way will increase our resilience to material shortages and price fluctuations as well as keeping costs down and avoiding environmental impacts.

A national materials 'Datahub', as described in Chapter 1, could help address some of the barriers that are preventing this happening. We will draw on the experience of the National Industrial Symbiosis Programme (NISP) and others, and materials databases around the world, to identify effective ways of providing information on the availability of materials, to enable their easy sale and purchase.

We will also explore the introduction of product-related information requirements known as 'product passports'. These could provide information on disassembly, recyclability, and critical raw material content for relevant products.

3.2.6 Encouraging waste producers and managers to implement the waste hierarchy in respect to hazardous waste

We will consult on our approach to transposing the new requirements of the Waste Framework Directive that relate to the management of hazardous waste. We will implement these new requirements in a way that strengthens record keeping mechanisms and furthers the application of the waste hierarchy whilst minimising any additional burdens on businesses.



In addition to this, we will consult in summer 2019 on further ways to encourage hazardous waste producers to implement the waste hierarchy. The development of clear guidance on the Best Overall Environmental Option (BOEO) for problematic wastes would promote the adoption of waste management practices that make sure hazardous chemicals in wastes do not pose a continuing risk to human health and the environment and don't end up

contaminating secondary raw material streams. In our discussions with the waste management industry they argue that there are few or no incentives that encourage the management of hazardous waste at the higher end of the waste hierarchy. Therefore, we will work with producers and waste management companies to explore these issues and consider how we can encourage producers to implement the waste hierarchy in respect to hazardous waste alongside actions to implement the Best Overall Environmental Option for problematic wastes. This may include seeking views on requiring producers of hazardous waste to report annually on how much hazardous waste they produce, send for recycling or recovery, send for disposal and the steps they have taken to drive the management of hazardous waste up the waste hierarchy.

Chapter 4

TACKLING WASTE CRIME



Waste crime damages the environment, causes distress to communities, and costs the taxpayer money to sort out the consequences. It significantly reduces resource efficiency, leading to an over-use of our natural capital, and cannot be allowed to undermine our ambition.

This chapter sets out how we will:

- **Improve the transportation, management and description of waste by reforming existing regulations**
- **Strengthen intelligence sharing and engagement to tackle illegal activity**
- **Prevent illegal activity being hidden through waste exemptions by reforming the existing regime**
- **Mandate the digital recording of waste movements, subject to consultation**
- **Create a Joint Unit for Waste Crime**
- **Toughen penalties for waste criminals**
- **Increase awareness of waste regulations and publicise positive work of enforcement bodies as they tackle waste crime**

Our ambition: to eliminate crime and poor performance in the waste sector

What is waste crime and poor performance?

Waste crime is anything that intentionally breaks the law relating to the handling and disposal of waste. It includes large scale illegal dumping, not complying with the duty of care, and falsifying records for producer responsibility notes. It is more than just small scale fly-tipping. Poor performance is careless or thoughtless practice by the waste sector. While it isn't intentionally breaking the law, people and the environment are put at risk by the failure to comply with rules for transporting, storing or disposing of waste.

The impacts of waste crime and a poor performing waste sector



Waste crime and poor performance damages the natural environment, causes harm to local people and costs the taxpayer money. Illegal and poorly performing waste sites are one example. They can pollute the air, water and land, as well as causing smells, attracting vermin and hosting fly infestations. They can also catch fire, damaging the local environment and disrupting everyday activities. The economic, as well as social costs are high: over £600m a year in England alone in 2015[117]. Fly-tipping is another example. It can cause pollution, attract antisocial behaviour and cost landowners considerable amounts of money to deal with. Local authorities alone dealt with nearly one million fly-tipping incidents in 2017/18[118] . In 2016/17 local authorities spent an estimated £57.7 million clearing up fly-tipping.

Motivators of waste crime and poor performance

The motivators of waste crime are varied, but are often financial. It is often cheaper to dump waste illegally than dispose of it correctly. A waste operator can evade a significant portion of their landfill tax liability by misclassifying waste. A company that produces waste can save money by not checking that their waste will be disposed of properly. People may find the cheapest option is hiring a fly-by-night contractor to take away their waste. They are mostly unaware that failing to exercise their duty of care in respect of waste is breaking the law. Other factors are also at play. It is cheaper and easier to dump an old sofa on a street corner than to take it to the tip, particularly if you don't have a large enough car. People think that they won't be caught so they are not deterred. The low barrier to enter the waste sector and the involvement of organised criminal gangs have recently escalated the rise in waste crime.

117 The Environmental Services Association (2017) Rethinking Waste Crime - http://www.esauk.org/esa_reports/20170502_Rethinking_Waste_Crime.pdf

118 DEFRA (2018) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/756306/FlyTipping_201718_Statistical_Release_rev.pdf

Actions taken already

Earlier in 2018, we commissioned an independent review into serious and organised crime in the waste sector[119]. The review set out recommendations which we take forward in this Strategy.

Since 2015, six legislative changes have been made to enable the Environment Agency to take tougher and timelier action. For example, the Agency can now restrict access to problem waste sites, by locking gates and barring access.

Local authorities now have the power to issue fixed penalty notices for small-scale fly-tipping, and both the EA and local authorities have stronger powers to seize and destroy vehicles involved in waste crime.

Environment Agency waste crime budgets have risen by £60m, for 2014-22. For every £1 extra spent on tackling crime there is £5 in return[120]. This has started to pay off. The Agency has:

- Closed down more than 820 illegal waste sites in 2016/17 alone
- Prosecuted four companies for a multi-million pound fraud involving misdescribing waste in producer responsibility schemes

Earlier in 2018, we also published a consultation on a number of measures to tighten up the permitting and exemptions regime. This will raise the bar to entry, helping prevent criminals from entering the waste sector, in turn driving up the standards of the sector.

HMRC are tackling landfill tax fraud. From April 2018, the landfill tax includes all material at permitted sites unless expressly exempt and all material at unauthorised sites.

A new strategic approach

We set out here a new strategic approach to tackling crime and low levels of performance in the waste industry. Our aim is to eliminate crime and poor performance in the waste sector. We need to **prevent** it from happening in the first place, we need to **detect** it when it does occur and we need to **deter** would-be criminals and poor performers from engaging again. This strategic approach will target criminal activity across the whole resource chain to tackle all forms and drivers of waste crime and poor performance.

119 Independent review into Serious and organised crime in the waste sector (2018) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/756526/waste-crime-review-2018-final-report.pdf

120 The Environment Agency (2017) Waste crime intervention and evaluation programme 2014-2016

OUR APPROACH WILL

PREVENT WASTE CRIME



Regulation



Intelligence sharing

We will prevent waste crime and poor performance happening in the first place by ensuring the regulatory framework is robust, driving up standards in the sector and ensuring intelligence is shared effectively.

DETECT WASTE CRIME



Analysis



Data

We will detect waste crime and poor performance when it does happen, and take swifter action to disrupt it by using improved data and analytical techniques.

DETER WASTE CRIME



Promotion



Punishment

We will deter waste crime and poor performance by making sure that those who commit crimes are caught and suitably punished, as well as promoting good behaviour to help people do the right thing in the first place.

4.1 Preventing waste crime and poor performance

Actions we will take include:

4.1.1 Improve the transport, management and description of waste by reforming regulations for duty of care, carrier/broker/dealers, hazardous waste, and international waste shipments

Current regulations have been introduced in a piecemeal fashion over the last 30 years. We will modernise, simplify and harmonise regulations and registers to make them fit for purpose. We will ensure that all waste is only carried, brokered or dealt by bona fide, properly regulated companies. Businesses, from SMEs to large construction firms, will be made more accountable for their waste when it is passed from one waste company to another along the resource chain.

We know these changes are supported broadly across the industry and by a number of other stakeholders[121]. To inform legislative changes, we will launch a consultation on:

- Improving the performance and credibility of the carrier, broker, and dealer regime, and consolidating it under one regulatory system;
- Mechanisms to ensure waste is properly and consistently described through the resource chain;
- Strengthening the responsibilities of businesses along the resource chain, and the links between them;
- Looking at the technical competency requirements of those who transport, manage and describe waste;
- Exploring the financial disincentives and penalties that should be issued for the misdescription of waste;
- Exploring ways to improve the quality of wastes exported for recycling, for example through increased monitoring of international waste shipments, and the introduction of a financial provision system for exports to cover costs of waste repatriation if needed;
- Enabling the Secretary of State to direct waste carriers to collect and transport waste in emergency situations.

We will make it easier for householders to understand and comply with their duty of care. We have also legislated to enable local authorities and the Environment Agency to issue fixed penalty notices (FPNs) to householders who breach their duty of care, for example by passing their waste to unauthorised operators who go on to dump it illegally. The penalties will come into force on 7th January 2019. We have also published guidance for local authorities on the use of the FPN which emphasises the need for proportionate enforcement. In order to get tough on rogue behaviour, it's important that local residents are able to dispose of their rubbish in a responsible and convenient

121 For example: CIWM (2018) https://ciwm-journal.co.uk/new-regime-needed-for-waste-carriers-brokers-dealers/, the recent independent review into serious and organised crime in the waste sector (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/756526/waste-crime-review-2018-final-report.pdf) and the Defra (2018, forthcoming) 'Post Implementation Review of the Waste (England and Wales) Regulations 2011' on legislation.gov.uk.

manner. We will also ensure fixed penalty notices can be varied through legislation to reflect the changing costs of waste disposal.

These measures will implement recommendations of the independent review into serious and organised crime in the waste sector. It will give regulators enforcement powers at all points in the resource chain, allowing them to tackle misdescription, illegal transport and dumping of waste at home and abroad.



4.1.2 Strengthening intelligence sharing and engagement to tackle illegal activity

The independent review into serious and organised crime in the waste sector made it clear that intelligence sharing is vital to prevent and disrupt waste crime. The Environment Agency will strengthen intelligence sharing between organisations, including the police, local authorities, HMRC and the waste industry, to prevent illegal activity. In doing so, the Environment Agency will identify appropriate shared IT platforms, such as the Police National Computer and Police National Database, and explore any requirements for further access so information is shared frequently and rapidly. The Environment Agency is developing an intelligence sharing agreement with the waste industry to tackle illegal waste operators and other criminal activity. The Environment Agency and Police and Crime Commissioners will establish effective relationships to strengthen engagement between the police and Environment Agency. The Environment Agency will also continue to engage with its counterparts in Wales, Scotland and Northern Ireland to ensure coordination across the UK.

4.1.3 Launching a 'fly-tipping toolkit'



Adopting good practice and collaborating with others can make a big difference to preventing, detecting, disrupting and deterring waste crime. Local authorities, police, EA, landowners, landlord and tenant associations, and community groups all have a role to play in preventing fly-tipping, and working together locally makes it more likely to succeed. The 2014 'National Framework for England for Tackling Fly-Tipping through Local Partnerships'[122] already promotes such collaborative working, but the National Fly-tipping Prevention Group report that this sort of collaborative working is not commonplace. There are examples of good practice that can be drawn on, for example the Hertfordshire Waste

122 DEFRA (2014) http://www.tacklingflytipping.com/Documents/NFTPG-Files/20140410%20Fly-tipping%20framework%20FINAL.pdf

Partnership which brought together a range of organisations to agree on a common approach to tackling fly-tipping and sharing intelligence, which saw an 18% fall in incidents between 2016/17 and 2017/18. Evidence suggests that a lack of knowledge and experience sharing is contributing to the problem. We will therefore create a 'fly-tipping toolkit', a web-based tool hosted by the National Fly-tipping Prevention Group to help tackle the issue. It will cover:

- How local authorities can set up and run an effective fly-tipping partnership;
- How to use new technology to report fly-tipping;
- Examples of existing good practice to prevent fly-tipping;
- How to deal with fly-tipping associated with unauthorised encampments;
- How to best share intelligence within a partnership and with other partnerships;
- How to present robust cases to the courts to ensure tougher penalties;
- How to best promote the duty of care for individuals and businesses.

4.1.4 Preventing illegal activity being hidden through waste exemptions, by reforming the existing regime

We will prevent exemptions being used to hide illegal activity by changing the ten waste exemptions most identified with illegality. In line with a recommendation of the independent review into serious and organised crime in the waste sector, we will amend the conditions for operating under exemptions to make it easier to spot and stop illegal activities. Other exemptions will be removed from the regime altogether so that those activities will need a full environmental permit to continue.

4.1.5 Considering the case for introducing tax-registration status checks for people operating in the waste sector ("conditionality")

At Budget 2018, the Government announced that it will consider legislating at Finance Bill 2019-20 to introduce a tax registration check linked to the licence renewal processes for waste carrier, broker and dealer registrations in England and Wales. Applicants would need to provide proof they are correctly registered for tax in order to be granted these licences. This would help to raise regulatory standards and improve tax compliance in this sector.

4.2 Detecting waste crime and poor performance

Actions we will take include:

4.2.1 Mandating the digital recording of waste movements, subject to consultation

All businesses that produce or handle waste are already required by law to complete a written description of waste when they transfer it to someone else. We have listened to stakeholders' views in this area[123], and will consult on our intention to legislate to make these records, including on international waste shipments, digital and mandatory[124]. In doing so, we will implement a recommendation of the independent review into serious and organised crime in the waste sector. We will also ensure that the system is backed by adequate enforcement to ensure compliance. Among other things, digital records will allow the Environment Agency to detect:

- Waste that doesn't reach the next stage, which implies illegal dumping;
- Waste descriptions that change , which implies Landfill Tax or regulatory regime avoidance;
- Strange patterns of waste transfers, which may indicate fraud.

We will fund the development of a proof-of-concept models for the digital recording of waste movements in early 2019, financed through the GovTech Catalyst competition.

Defra's GovTech Catalyst Challenge: Smart Waste Tracking

The GovTech fund[125] is designed to incentivise Britain's tech firms to come up with innovative solutions to public sector problems and improve services for citizens. Tech firms bidding to the fund will have free rein to create and pitch innovative solutions to problems facing Government.

Government has announced the first round of challenges to be tackled through the fund, including Defra's Smart Waste Tracking challenge[126]. The challenge is to track individual movements of waste through the economy so that we know more about the types and amounts of waste generated, what is done to it, where it ends up, and in what form. We will shortly announce the winning bids into this challenge and award up to five companies a maximum of £80,000 to further develop their ideas.

123 These views are reflected in the recent independent review into serious and organised crime in the waste sector and the Defra (2018, forthcoming) 'Post Implementation Review of the Waste (England and Wales) Regulations 2011', legislation.gov.uk.

124 The Government Chief Scientific Adviser's report on the value of waste recommended that building blocks of data gathering and analysis should be put in place to ensure we know the types, amounts and quality of waste, and where it is generated and ends up.

125 UK Government services and information (2018) https://www.gov.uk/guidance/the-govtech-catalyst-challenge-process

126 UK Government services and information (2018) https://www.gov.uk/government/publications/smart-waste-tracking-digital-challenge

4.2.2 Developing data and analytical tools to monitor waste operators so that we can intervene if performance begins to deteriorate

The receipt of streamlined data from waste businesses will allow the Environment Agency to detect issues at regulated waste sites more quickly. Improved analytical and modelling capability will enable Agency analysts to quickly pick up on trends that suggest possible sustained poor performance, allowing the Agency to require sites to improve, or, if necessary, enabling them to suspend or ultimately revoke a permit.

4.2.3 Creating a Joint Unit for Waste Crime

A key recommendation from the independent review into serious and organised waste crime is to create a Joint Unit for Waste Crime. The Unit will gather and share information relating to waste crime and coordinate a multiagency response to the most serious cases. The Unit will sit within the Environment Agency with input from the waste industry, HMRC and the police. A dedicated disruption team will be set up that will use intelligence to take quick action against waste criminals on the ground. The progress and success of the Unit will be reviewed after approximately 12 months.

4.2.4 Equipping the regulator with the powers it needs to pursue and disrupt organised crime

The Environment Agency has powers to regulate the waste industry to protect the environment and local communities. We will consult on our intention to legislate to bolster the Agency's powers further to ensure it is equipped to deal with the threat of serious and organised gangs. The consultation will cover powers to seize evidence and equipment and search premises without delay during investigations. We will separately explore the need for further powers for the Agency to access communications data. We will also explore in due course how to make it easier for the EA to immediately stop activities that are harming the environment and for the police to seize vehicles involved in waste crime.

4.2.5 Developing an abandoned sites action plan

The Environment Agency's abandoned sites action plan will help its staff detect early signs[127] of a site being abandoned so that risks to the environment and communities can be managed properly. The plan will set out how Environment Agency officers should act to mitigate risks from the abandonment of waste sites. This will ensure that it acts quickly and comprehensively, with partners where appropriate, to protect the environment and local communities.



127 Early signs include stockpiling (waste coming in but not going out) and repeated compliance issues.

Additionally, at 2018 Budget we committed £10m across 2019/20 and 2020/21 to deal with certain specific high-risk abandoned waste sites. This will be used by the Environment Agency to pilot an approach to pay for the landfill tax due from clearance of these abandoned waste sites. The Environment Agency will identify the highest priority sites that represent the greatest risk to the public, environment and business.

4.3 Deterring waste crime and poor performance

Actions we will take include:

4.3.1 Tightening the waste permitting regime by introducing financial provision

We will consult on the detail of a financial provision system. It will require an operator to make a payment, the level of which will be based on the risk of the site being abandoned and the potential damage caused by abandonment. This money that will be drawn down if an operator or owner abandons a site.

This will implement a recommendation of the independent review into serious and organised crime in the waste sector. The system will deter an unscrupulous operator from deliberately stockpiling waste and then abandoning the site, and will ensure that barriers to entry are not too low. It will also deter poor performance as operators will be incentivised to meet their permit conditions or risk losing the financial provision.

4.3.2 Toughening penalties for waste criminals



The rise in waste crime suggests that tougher penalties are needed to act as a deterrent. Already there is no limit on the maximum fine available in legislation. But the fines actually imposed for waste crimes, especially in magistrates' courts where most fly-tipping cases are heard, are often low, sometimes even lower than the price of legal disposal. Community sentences for waste offences are also rarely given for more serious offences where fines are not sufficient.

We have previously worked with the Sentencing Council to amend sentencing guidance for magistrates to ensure that they are aware of local fixed penalty levels for these offences. But more can be done to strengthen sentences, especially in magistrates' courts, so fines are higher and more community sentences are given where fines are not sufficient. The most serious waste crimes must continue to attract prison sentences. We will do this by:

- Increasing magistrates' awareness of the prevalence and importance of waste crime;
- Working with the Judicial Office so magistrates are effectively trained in the Environmental Offences: Definitive Guideline on sentencing[128];
- Helping local authorities improve the quality of cases, making a longer sentence more likely;

128 Sentencing Council (2014) https://www.sentencingcouncil.org.uk/publications/item/environmental-offences-definitive-guideline/

- Working with the Sentencing Council to ensure the Environmental Offences Definitive Guideline is kept up-to-date. This will help secure higher fly-tipping fines, especially at magistrates' courts;
- Reviewing offences on mismanaging hazardous wastes, including misclassification.

4.3.3 Exploring all options for funding future action on waste crime

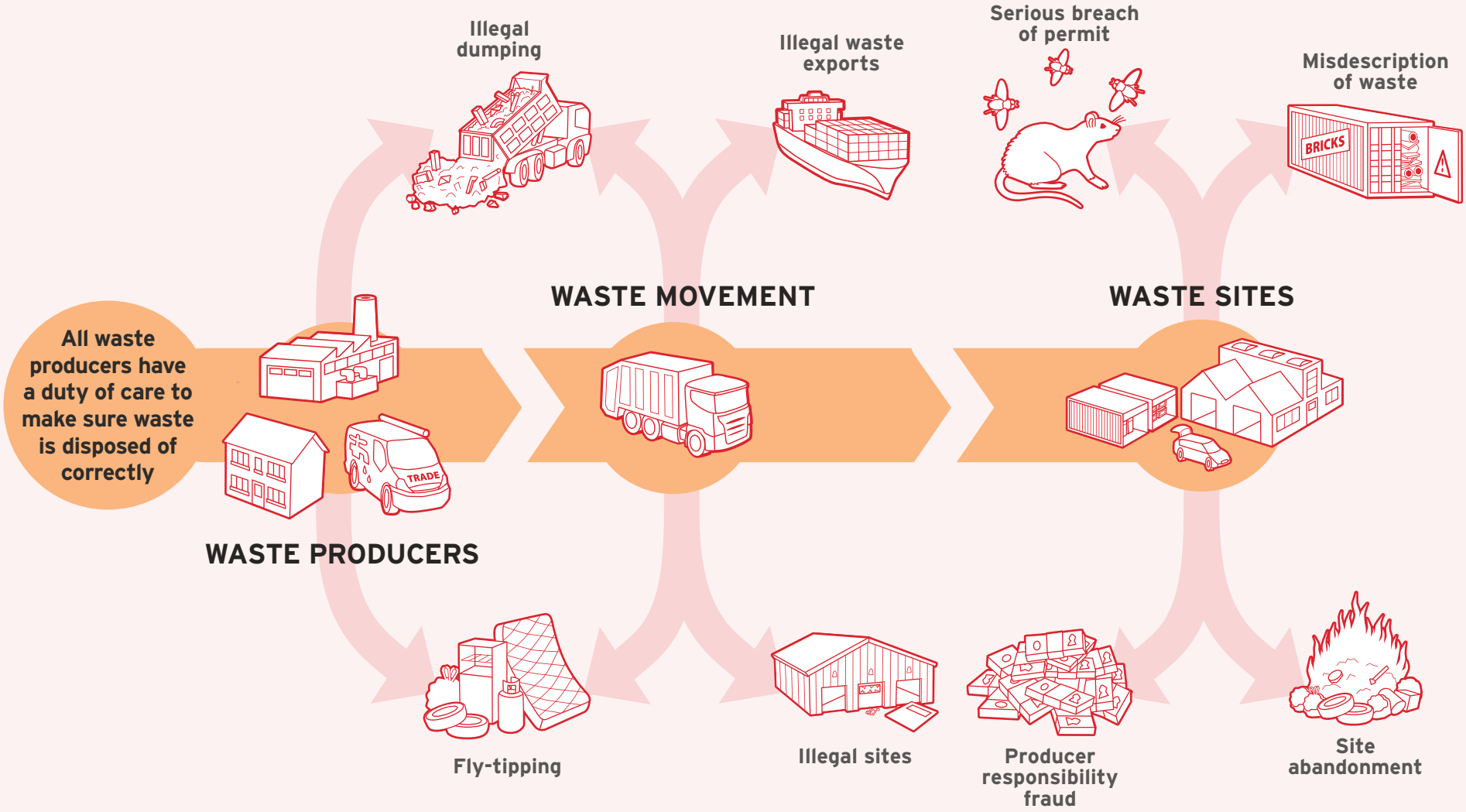
The independent review into serious and organised crime in the waste sector highlighted a number of options to fund waste crime work. This included committing a proportion of Landfill Tax receipts to Environment Agency waste crime efforts, redefining what the charges from the permitting regime can be used for, and placing a voluntary levy on industry. We will explore the options with the aim of ensuring that the Environment Agency is resourced to tackle waste crime and address any legislative barriers to funding regulatory activities, including enforcement.

4.3.4 Increasing awareness of waste regulations, publicising positive work of enforcement bodies as they tackle waste crime, and recognising high performing operators

There is a role for communications in tackling crime. It facilitates the building of knowledge, for example informing people and companies of their legal duty of care to ensure waste is disposed of properly enables them to do the right thing. It can also act as a motivator: for example, naming and shaming waste criminals deters reoffending and stops others offending. And it can set expectations, for example by showcasing good practice. We will:

- Support the waste industry's 'Right Waste, Right Place' campaign;
- Highlight successful prosecutions of waste criminals by the Environment Agency and local authorities;
- Support local authorities to increase householders' awareness of their duty of care;
- Publicise performance data to recognise the best operators of permitted waste sites.

WASTE CRIME AND POOR PERFORMANCE



Chapter 5

ENOUGH IS ENOUGH: CUTTING DOWN ON FOOD WASTE



Nobody likes to see good food go to waste. It's morally wrong, environmentally damaging, and costs money. In the UK alone, an estimated 10 million tonnes of food and drink are wasted annually after the farm gate, worth around **£20 billion**.

The environmental case is clear. If the total global annual emissions from food waste – some 3.3 billion tonnes – were released by a single country, that nation would be the world's third largest polluter behind China and the United States[129]. In the UK alone, the carbon footprint of food and drink consumed is estimated to be equivalent to one fifth of UK emissions[130].

The UK has long recognised the need to tackle food waste, and is an international leader on the issue. Since 2007, we have approached the problem from numerous angles, including through a series of voluntary agreements that have reduced per capita food waste by 14%. The latest agreement, the Courtauld Commitment 2025, aims to reduce per capita UK food waste by a further 20%, between 2015 and 2025.

We are also fully committed to meeting the UN Sustainable Development Goal 12.3 target, which seeks to halve global food waste at consumer and retail levels by 2030. Together, these commitments support our broader ambitions to eliminate avoidable waste by 2050 and to work towards eliminating food waste to landfill by 2030.

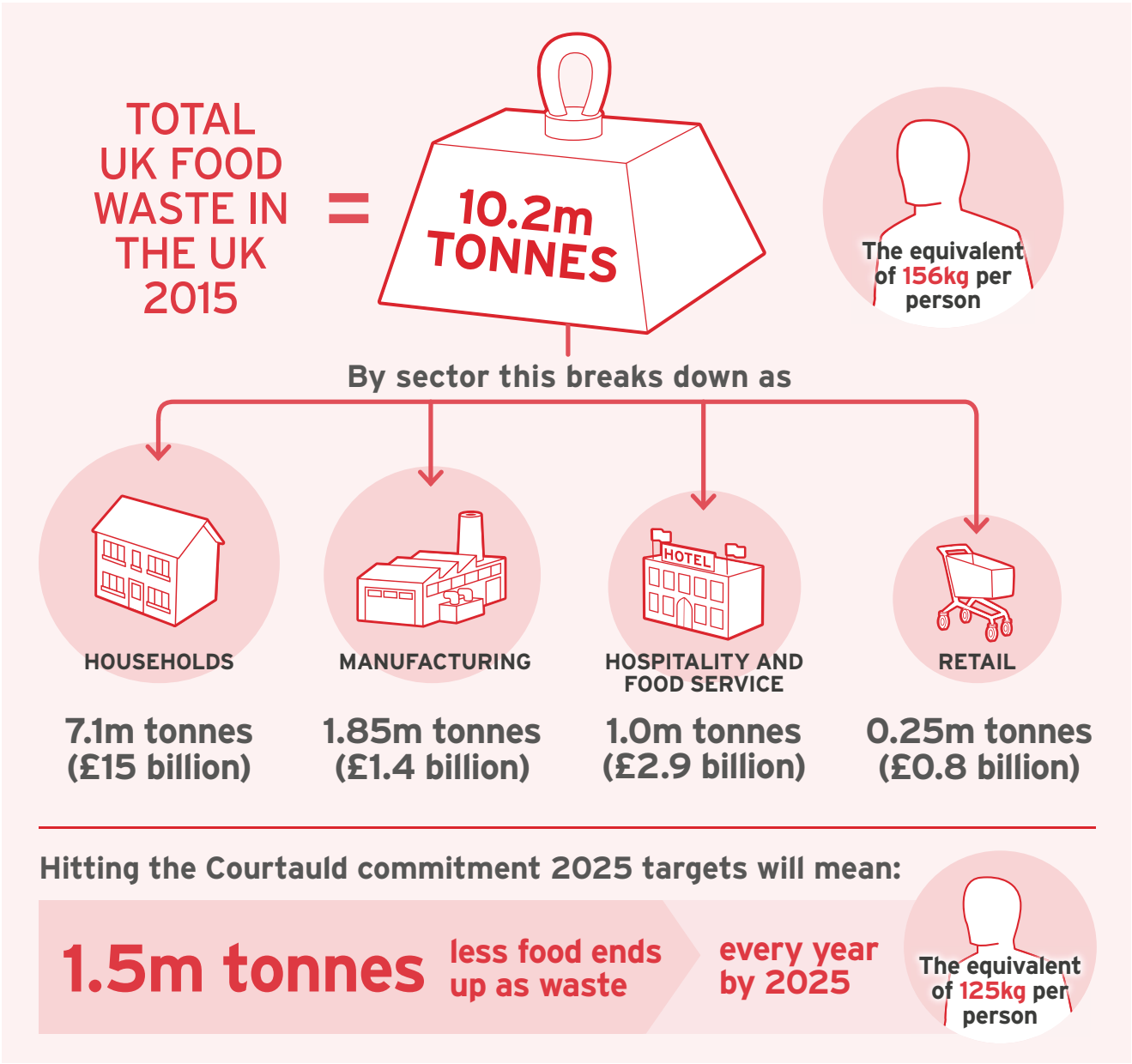
Our determination to cut food waste has not been matched by progress, which in recent years has plateaued. A new approach is needed.

This chapter sets out how we will:

- **Reduce food waste through a £15 million pilot fund**
- **Consult on annual reporting of food surplus and waste by food businesses**
- **Consult on legal powers to introduce mandatory targets for food waste prevention**
- **Publish a new food surplus and waste hierarchy**
- **Promote awareness of the issue by appointing a new Food Surplus and Waste Champion**
- **Support cross sector collaboration through the Courtauld 2025 agreement**

129 Champions 12.3 (2017) The business case for reducing food loss and waste. https://champions123.org/wp-content/uploads/2017/03/report_-business-case-for-reducing-food-loss-and-waste.pdf

130 WRAP and WWF (2011) The water and carbon footprint of household food and drink waste in the UK. http://www.wrap.org.uk/sites/files/wrap/Water%20and%20Carbon%20Footprint%20report%20Final,%20Nov%202011_0.pdf



5.1 Less food waste from businesses

If the UK is to meet its ambitious national and international targets, food companies must do more to make their supply chains more efficient, and prevent food waste from happening in the first place.

To achieve this, actions we will take include:

5.1.1 Reducing food waste through a £15 million pilot fund

Even the most efficient food system in a developed economy will produce a surplus. The best outcome is that this is redistributed before it becomes waste.

WRAP has identified 205,000 tonnes of food that could potentially be redistributed[131] rather than going to waste. A little under half of this – enough food for about 250 million meals a year - is edible and readily available, yet goes uneaten by humans. Instead, it is sent for generating energy from waste, anaerobic digestion, or given to animals as feed.

The Government will set up a pilot scheme to reduce food waste, supported by a £15 million fund. The pilot scheme will be developed in collaboration with businesses and charities and will launch in 2019.

We will continue to monitor how much food is redistributed and report back to the public.

Case study: Food Waste Reduction Fund – successful grant recipients

Eight charities and not-for-profit groups are receiving grassroots grants from the Government's £500,000 **Food Waste Reduction Fund**[132] to expand their operations. Together, the grants – administered by WRAP – will see an extra 2,500 tonnes of quality food redistributed to people in need. The eight organisations are based across England - from Devon in the south-west to County Durham in the north-east- and include:

- **Action Homeless** – which is hiring a part-time food co-ordinator, buying a new vehicle to redistribute food, leasing a shared storage unit and improving its overall facilities.
- **His Church** – which is setting up more programmes for children and families, and developing facilities for food collection and storage.
- **FareShare** – whose pilot to increase freezer capacity will see it distribute more frozen food.
- **FareShare Yorkshire** – which is buying a 7.5-tonne lorry so it can intercept bigger quantities of food that cannot currently be collected, and meeting additional staff costs and training.
- **Feedback Global** – which is setting up a community-led 'gleaning' network – gathering crops left after the harvest - to increase by 36 the number of days they can glean each year[133].
- **Food in Community** – which is opening a Pay-As-You-Feel café, piloting a surplus produce delivery scheme, and promoting gleaning activities and cookery courses.
- **Nuneaton & Bedworth Healthy Living Network** – which can now double to 280 the number of community groups it services, and also double the number of breakfast clubs it runs.
- **REfUSE** Durham – which is creating a food redistribution hub and increasing the capacity of its existing operations by introducing new projects like a Pay-As-You-Feel café and buying a walk-in fridge-freezer.

131 WRAP (2018), Surplus food redistribution in the UK; 2015 to 2017 http://www.wrap.org.uk/sites/files/wrap/Food%20Surplus%20Redistribution%20Estimate%202017%20-%20Information%20sheet.pdf

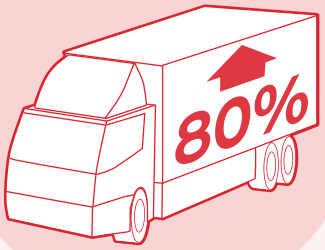
132 WRAP (2018) http://www.wrap.org.uk/content/uk-food-redistribution-increase

133 Gleaning is the act of collecting leftover crops from farmers' fields after they have been commercially harvested.

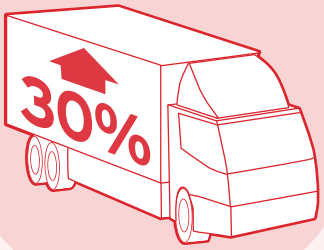
UK SURPLUS FOOD REDISTRIBUTION

Significant increases in redistribution between 2015-2017

Charities

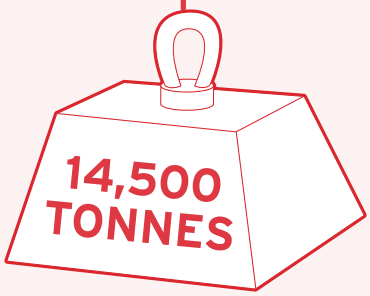


Commercial sector



Combined increase is equal to

2015
28,500 Tonnes redistributed



2017
43,000 Tonnes redistributed

In 2017 surplus food redistribution...

Was equivalent to:



Was worth:



With potential for:



5.1.2 Consult on annual reporting of food surplus and waste by food businesses and on seeking legal powers for food waste targets and surplus food redistribution obligations



The UK was one of the first countries in the world to publish comprehensive data on food waste in line with international best practice. The EU is now following our lead by committing to annual reporting of food waste data. The need to report data is shown to spur companies into taking the necessary targeted action.

To help food businesses do this, WRAP has introduced a Food Waste Reduction Roadmap – so far adopted by 89 companies that have signed up to a range of ambitious milestones. The roadmap gives businesses directions on cutting waste in their own operations, and on how they can replicate this with their suppliers and consumers.

We would like to see larger food businesses use these resources to set a reduction target in line with UN SDG 12.3 and to report their food waste transparently on an annual basis[134]. We will consult in 2019 on introducing regulations to make reporting mandatory for businesses of an appropriate size. We will also consult on seeking powers for mandatory food waste prevention targets for appropriate food businesses and for surplus food redistribution obligations to be introduced subject to progress made by businesses to reduce food waste.

5.1.3 Publishing a new food surplus and waste hierarchy

Our priority is to stop surplus food from becoming waste. We have a tiered approach to managing it which is known as the food surplus and waste hierarchy.



Ideally, surplus food should be redistributed for people to eat. The next best outcome is that it is used in the production of animal feed or for bio-material processing. In both these managed scenarios, the food surplus is not food waste. If neither scenario is possible, food waste should be treated through recycling by anaerobic digestion, or through composting when it is mixed with other bio-waste (such as garden waste). If anaerobic digestion or composting are not possible, it should be treated via energy from waste in preference to landfill.

The new guidance on GOV.UK offers advice on how to comply with the hierarchy and tools to do so[135]. We expect more surplus food to be redistributed as a result, leading to better environmental outcomes. We will review the implementation of this guidance in 2020.

134 Businesses have the option to report their food waste using the online tool Atlas, the world's first universally accessible online tool to capture global food loss and waste data in one place. This offers an option for transparent reporting. WRAP (2018) http://www.wrap.org.uk/content/food-waste-atlas

135 UK Government services and information (2018) https://www.gov.uk/government/publications/food-and-drink-waste-hierarchy-deal-with-surplus-and-waste

Before then, in 2019, the EA will review the current rules around permits for food waste storage facilities. This will support further redistribution of surplus food.

5.1.4 Promoting awareness of the issue by appointing a new Food Surplus and Waste Champion

The Food Surplus and Waste Champion will work with business leaders to ensure that this issue remains at the top of their agendas. He or she will vigorously support the commitments set out in the 25 Year Environment Plan and the policies laid out in this Strategy.

5.1.5 Supporting cross sector collaboration through the Courtauld 2025 agreement

The latest voluntary agreement, the Courtauld 2025 Commitment, aims to reduce per capita UK food waste by a fifth between 2015 and 2025. It supports collaborative action to address food waste across supply chains from farm to fork. As we continue to support Courtauld 2025, we urge business to:

- Identify food waste hotspots across the supply chain and see how they influence each other;
- Understand barriers to reducing food waste and improving resource efficiency;
- Agree practicable solutions, within the context of technical or commercial constraints;
- Develop best practice for industry-wide adoption, and any associated guidance.

Case study: Identifying the biggest opportunities to cut milk waste along the value chain

Fresh pasteurised milk is a staple of supermarket shelves and most homes but too much of it is going to waste – a problem flagged by leading businesses within the Courtauld Commitment 2025. Research showed that they were right to be concerned: waste directly attributable to milk processing and handling amounts to around 330,000 tonnes per year, worth more than £150million. Ten times more milk was wasted in homes than anywhere else across the supply chain.

Work by WRAP has shown that milk waste can be cut by around 90,000 tonnes (or more than £40million) a year[136]. Simply lowering the average temperature of fridges in UK homes will save over 50,000 tonnes of milk that might otherwise have gone off – leading WRAP and industry to develop a 'Chill the Fridge Out' public awareness campaign.

Chillthefridgeout.com[137] is an online tool that helps people set their fridge to the right temperature. Using information from over 20 of the biggest fridge manufacturers, it lets users select their brand and model, and tells them how to set the dial below 5°C. There are also tips on keeping the fridge at the optimal temperature.

136 WRAP (2018) http://www.wrap.org.uk/content/opportunities-reduce-waste-along-journey-milk-dairy-home
137 Chillthefridgeout.com (2018) https://www.lovefoodhatewaste.com/article/chill-fridge-out

5.1.6 Producing and promoting food waste strategies for the hospitality and public sectors

The hospitality sector

Food waste from the hospitality sector amounts to one million tonnes per year, worth some £2.9 billion. We will produce guidance for the sector to support their actions to prevent food waste, including best practice examples such as offering a range of portion sizes and a take-home service for leftovers.

The public sector



Around 30% of hospitality and food service food waste stems from catering in schools, hospitals and other public sector institutions[138]. We are ambitious about improving this, recognising the demand for sustainable, locally sourced, nutritious and palatable food, and the Plan for Public Procurement provides a strong framework[139]. It uses a balanced scorecard which incorporates the government Buying Standards for Food and Catering (GBSF), and is mandatory for use in central government departments[140].

In the future we will work with the NHS Estates and Facilities Team at NHS Improvement to support the creation of a new 'food standard' which will be introduced across NHS hospital trusts in 2019, keeping sustainability and food waste as key priorities. To tackle food waste in schools, WRAP guidance will be developed and widely promoted.

5.1.7 Seeking powers through the Agriculture Bill to protect producers and cut wastage

So far we have focused on food waste after the farm gate. But at the primary production stage of the supply chain there is also significant scope to prevent waste food – and tangible financial, environmental and efficiency benefits to be had. A conservative estimate for the whole sector suggests that around 2.5 million tonnes a year, worth around £800 million, is lost – in some cases through unfair contractual practices.

We are seeking powers through the Agriculture Bill to introduce sector-specific statutory codes of contractual conduct to protect producers from exposure to unfair practices which are often the cause of viable produce going to waste. Practices such as late changes to product specifications, or order cancellations with insufficient notice for a producer to find an alternative commercial outlet for their goods, can mean perfectly good food never even reaches the shop

138 WRAP (2018) http://www.wrap.org.uk/category/materials-and-products/food

139 UK Government services and information (2014) https://www.gov.uk/government/collections/food-buying-standards-for-the-public-sector-the-plan-toolkit

140 UK Government services and information (2014) https://www.gov.uk/government/publications/sustainable-procurement-the-gbs-for-food-and-catering-services

shelf. Furthermore, we have also committed to explore with industry how the collection and dissemination of market data can help drive greater efficiency and therefore prevent food waste, and are seeking powers in the Agriculture Bill to facilitate this.

We are also currently developing a £10 million collaboration fund, open to groups of producers interested in pursuing joint business models: this could include funding for joint initiatives seeking alternative commercial outlets for non-specification goods, or support to establish short supply chains.

Agricultural plastics

Plastic is of concern in the agricultural sector in two main ways:

- Large amounts of plastic film are used by farmers, to protect their crops from bad weather and pests. Attempts to collect this material for recycling have often been unsuccessful, due to high levels of contamination making the recycling process uneconomic.
- Organic household waste such as food and garden waste can be composted or sent to anaerobic digestion, producing a solid compost or digestate (a liquid soil conditioner) respectively. Both of these are potentially suitable for agricultural use. In each case, however, if the household waste included plastic contaminants, these may end up in the resultant end product. Such contaminants need to be minimised if the compost or digestate is to meet the relevant quality standard (PAS 100 and PAS 110 respectively) and provide farmers with a high quality product.

We are exploring how Government policy can address these issues. This includes through WRAP's Food Waste Recycling Action Plan, bringing together industry and trade associations to minimise plastic pollution in compost and digestate.

5.2 Making it easier for people to waste less food

Retailers and food businesses play a key role in influencing household food waste, as well as in their own operations. Government will continue to provide guidance on best practice, and we will check food businesses' progress through regular surveys, the first of which will take place in 2019.



To achieve a reduction in consumer and business food waste, actions we will take include:

5.2.1 Working with industry to determine the most appropriate approaches to labelling

Information is a major influence on consumers, whose decisions on whether to use or dispose of food are swayed by:

- The choice of date that is applied (for example, 'Best Before' rather than 'Use By');
- The length of time between purchase and the expiry date;
- Advice on how long a product can be consumed once it's opened;
- Optimal storage/freezing advice.

Defra, the FSA and WRAP published **food labelling** guidance in November 2017[141] , which we expect to be fully implemented by all food businesses.

In 2019, we will review the current recommendation for most pre-packed uncut fresh produce to carry a 'Best Before' date. Government's expectation is that before the review, industry will provide evidence about changes to fresh produce date labelling (including the removal of 'Best Before' advice), both in store and at home, as a move towards a consistent approach across the sector.

5.2.2 Advising retailers whether to sell fresh produce loose or packaged



The 25 Year Environment Plan sets out our commitment to work with retailers and WRAP to explore introducing plastic-free supermarket aisles in which all the food is sold loose. Aisles such as these are popular with some shoppers – but it is also the case that packaging protects and extends the shelf life of many items. Nonetheless, we believe a balance can be struck which respects both the desire to cut packaging, and the desire to cut food waste.

141 WRAP (2017) http://www.wrap.org.uk/food-date-labelling

WRAP is consulting on a new technical report on the evidence for providing fresh produce loose without significantly increasing food waste. This report will inform future published guidance and is intended to be used alongside retailers' plans to reduce plastic.

5.2.3 Identifying progress made by all retailers and brands to implement best practice

In autumn 2019, the Government, through WRAP, will conduct a survey to assess how far retailers and food businesses have come in implementing key industry guidance and best practice on food waste. The survey will look at their progress on:

- Date labelling;
- Storage advice;
- Pack sizes;
- Functionality and relative pricing;
- Consumer advice;
- Provision of loose produce.

The results of the survey will be published transparently.

5.2.4 Supporting WRAP's strategy to prevent citizen food waste



We have had considerable success in reducing food waste at the household level in the past. Between 2007 and 2012, household food waste fell by 17% but progress has since plateaued[142].

WRAP will continue to engage and help businesses and the public through its platform 'Love Food Hate Waste'. Part of the new strategy is aimed at starting a national conversation about food waste. To support the public WRAP are working with businesses to improve product design to tackle food waste, including through the use of re-sealable packs, and through pack sizing and labelling that helps people plan and use up food sensibly.

We call on food businesses, local authorities and the third and public sectors to:

- Actively support the development and use of WRAP's national messaging to promote food waste prevention among citizens;
- Play an active part in piloting interventions and in scaling-up those pilots which prove most successful.

142 WRAP (2018) http://www.wrap.org.uk/content/courtauld-2025-baseline-and-restated-household-food-waste-figures

Government will play its part by incorporating food waste messages into wider communications on related topics, including health and education[143].

Case study: Lidl Consumer messaging

Lidl UK has made innovative efforts to help its customers waste less food, and value it more. New guidance on labels lets shoppers know how to store products correctly, keeping them fresher and extending their life. It comes after Government urged retailers to use clearer labels, including a 'Little Blue Fridge' icon for items such as apples that people might not realise are best stored under 5C. Motivational messaging on Lidl's fresh produce and bakery packaging, meanwhile, tells customers about their food's journey from farm to fork, piquing their interest in what they are taking home to eat. Lidl has worked with WRAP on best practice labelling, and continues to monitor customer feedback.

"We are passionate about reducing food waste, both at store level and in the home," said Mark Newbold, CSR Manager at Lidl UK. "We hope that this latest innovation will help our customers to make the most of the food they buy, as well as tackling the two million tonnes of food wasted each year from UK homes because it's not used in time. The Little Blue Fridge icon will indicate at a glance if a product should be kept cool. We're also providing information about the journey of food and handy hints to reduce waste. For example, the wheat for our bread takes 10 months to grow, yet 20 million whole slices of bread are binned by UK households every single day - so freezing it for later is a great way to make the most of every slice."

143 For instance the Department for Education has strengthened the requirements on schools to teach children about food, nutrition and healthy eating, how to cook a repertoire of dishes and have a greater understanding of where food comes from.

Chapter 6

GLOBAL BRITAIN: INTERNATIONAL LEADERSHIP



The unsustainable use of resources is a global problem which requires a global solution. With 7 billion people using resources and creating large volumes of waste every day, tackling this issue is vital for global sustainable development. That is why resource efficiency is recognised within the Sustainable Development Goals (SDGs) and is a key driver of success to ensure sustainable consumption and production patterns.

Systems that regulate life on earth – for example terrestrial ecosystems, the world's oceans, freshwater resources and the climate – exist in feedback loops. No environmental issue demonstrates this fundamental truth more visibly than marine plastic pollution. Over 90% of marine plastics originate from land-based sources[144], yet once in the ocean these plastics can circulate widely and pose a grave threat to marine life far from where they entered the ocean.

The UK has long recognised the importance of international coordinated action to address these issues. That is why we work closely with our international partners to enable and encourage action across the board to reduce environmental damage and degradation.

This chapter sets out how we will:

- **Promote the goals of our Resources and Waste Strategy internationally**
- **Drive international political commitments through the ground-breaking Commonwealth Clean Oceans Alliance**
- **Support developing nations to tackle pollution and reduce plastic waste, including through UK aid, private/public partnerships and sharing of expertise**
- **Improve the quality of plastics exported for recycling through the Basel and Stockholm Conventions**
- **Tackle international barriers to a circular economy**
- **Establish cross-government oversight of the UK's natural resource security**

144 Chartered Institution of Wastes Management and Waste Aid (2018) From the Land to the Sea, https://wasteaid.org/wp-content/uploads/2018/04/From-the-Land-to-the-Sea.pdf

6.1 Leading by example

We operate in a global economy where resources are traded internationally to meet demand. Waste generated anywhere on earth can be circulated in rivers and oceans and end up polluting other locations far from where it originated. We want to share our understanding and skills so that the impact of actions we take here in the UK is magnified globally.

New Plastics Economy Global Commitment

In October 2018 at the Our Oceans conference the UK Government, alongside many of the world's largest packaging producers, retailers, recyclers and NGOs, signed the Ellen MacArthur Foundation's New Plastics Economy Global Commitment[145]. It brings Government, cities and businesses together to address the root causes of plastic waste and pollution, with a particular focus on packaging.

In signing up the Government has endorsed a common vision and committed to put ambitious policies in place well ahead of 2025 in key areas: (1) elimination of problematic or unnecessary plastic; (2) encouraging reuse models; (3) incentivising the use of reusable, recyclable, or compostable plastic; (4) increasing collection, sorting, reuse, and recycling rates, and (5) stimulating demand for recycled plastics. **We hope to inspire other countries to follow our lead and commit to action in these 5 areas.**

To achieve this, actions we will take include:

6.1.1 Promoting the goals of our Resources and Waste Strategy internationally through UN Conventions, bilateral partnerships and other opportunities for sharing best practice and information

We will continue to engage actively with our neighbours, sharing experience and best practice. And we will continue to be reliable partners, willing allies and close friends with countries in Europe and around the world, as we work towards increasing resource efficiency and minimising waste for all.

Our leadership is respected in part because of our enduring commitment to high standards, domestically and internationally, and the depth and quality of our scientific and analytic expertise. We will lead by example on the crucial environmental challenges addressed through this Strategy.

145 The Ellen Macarthur Foundation (2018) https://www.ellenmacarthurfoundation.org/news/a-line-in-the-sand-ellen-macarthur-foundation-launch-global-commitment-to-eliminate-plastic-pollution-at-the-source

Securing a Green Brexit

Leaving the EU means we will take back control of environmental legislation. This presents a unique opportunity to design a set of policies to drive environmental improvement and growth tailored to the needs of our country. Our vision is for a green Brexit in which environmental standards are not only maintained, but enhanced. The EU (Withdrawal) Act 2018 will ensure existing EU environmental law continues to have effect in UK law after we leave the EU, providing businesses and stakeholders with maximum certainty. This includes any commitments from the Circular Economy Package (CEP) in relation to waste and recycling that are part of UK legislation when we leave.

The Government recognises that governance arrangements for the environment will change once we leave the EU. We have consulted on a new, independent statutory body to hold government to account on its delivery of environmental law following EU exit; and on the development of a new policy statement on environmental principles. Ensuring that there is transparency and accountability in how we achieve our resources and waste ambitions will be a priority in this work.

Circular Economy Package

The EU's CEP proposals include amendments to six waste-related directives, part of measures to promote a more circular economy. The package includes targets to reduce the amount of waste going to landfill (no more than 10% by 2035) and sets higher targets for recycling of various everyday materials, including plastic, paper, cardboard and glass packaging. Municipal waste recycling targets are set at 55% by 2025, 60% by 2030 and 65% by 2035, with a review clause in 2028. Overall packaging waste recycling targets are set at 65% by 2025 and 70% by 2030. Additionally the package looks to extend separate collection requirements to bio-waste (by 2023) and textiles and hazardous household waste (by 2025).

As we implement and deliver this Strategy we will explore whether more stretching targets, over and above those proposed by the EU, can be developed that will deliver the most effective approach to recycling. These won't just target weight but will also consider the environmental impacts of waste, though in doing so will ensure that the frequency and scope of household waste collections is not undermined. Should they be preferable, we will present proposals to the UK Parliament following the UK's departure from the EU. Further detail is set out in Chapter 8.

6.1.2 Driving forward discussions on the development of metrics for resource efficiency

The shift to a more resource efficient global economy requires countries the world over to be able to measure progress and to use consistent metrics to do so.

We have supported the adoption by the G7 of the "5-year Bologna Roadmap"[146], to advance common activities on resource efficiency. The Roadmap has been adopted as a living document to prioritise actions that advance lifecycle-based materials management across the supply chain.

We will continue to develop our joint capability to measure and monitor resource efficiency outcomes and impacts, building on our domestic work set out in Chapter 8. Building on the expertise of the OECD, the International Resource Panel (IRP), the G7 statistical institutes and other relevant bodies, we will review and share existing practices, identify gaps in measurements as well as develop possible new global, regional and national indicators, and advance existing ones, where needed. This work will inform our domestic project on exploring mandatory reporting by businesses which will be an important step in terms of monitoring on a sectoral and national level. In 2019 the UK will host an international workshop focused on improving resource efficiency metrics, for other signatories to the Bologna Roadmap.

146 G7 (2017) http://www.g7italy.it/en/environment-ministerial-meeting

6.2 Collaboration to solve global waste issues, beginning with a focus on marine plastics and waste management in developing countries



Badly managed resources not only present a serious threat to the world's ecosystems and economies, but also to human health. This is particularly true in developing countries, in which there are an estimated two billion people living without waste collection and three billion people without controlled waste disposal. The impacts of this can be disastrous, for example by facilitating the spread of infectious diseases. Around nine million people per year die of diseases linked to mismanagement of waste and pollutants – twenty times more than die from malaria – 92% of which occur in low and middle income countries[147].

With just twenty countries responsible for over 80% of the plastic debris discarded into the ocean[148], we need to work internationally to solve the problem. Increasing the extent and improving the quality of waste management, particularly in developing countries, is one of the most important immediate steps towards doing so.

Britain is committed to helping the world's poorest – this means taking on global challenges like pollution and climate change, which go hand-in-hand with the fight against poverty.

To achieve this, actions we will take include:

6.2.1 Driving international political commitments through the ground-breaking Commonwealth Clean Oceans Alliance

As Commonwealth Chair-in-Office from 2018 to 2020 the UK is driving forward ambitious action to reduce plastic pollution in our oceans. The ground-breaking Commonwealth Clean Oceans Alliance (CCOA) with our partner Vanuatu calls on Commonwealth countries to pledge action, whether by banning microbeads in personal care and cosmetic rinse off products, committing to cutting down on single-use plastic bags, or taking steps to eliminate plastic waste. With over a third of the Commonwealth pledging support to the CCOA, we have a significant opportunity to drive forward ambitious global action.

Up to £66.4 million of UK Aid has been committed to tackle plastic pollution through the Commonwealth, which will help developing countries stop plastic pollution from entering the oceans in the first place. Working with NGOs and businesses, we will provide technical assistance and share expertise on waste management, work with industry and establish public-private partnerships, and invest in research and innovation to create new solutions.

We expect that through addressing the causes of marine pollution, wider benefits will accrue to populations from better prevention and management of waste.

147 Edugreen (2017) http://edugreen.teri.res.in/explore/solwaste/health.htm

148 "Managing Marine Plastic Pollution: Policy Initiatives to Address Wayward Waste". Environmental Health Perspectives, Vol 123, No 4, 2015.

Our commitment to the Sustainable Development Goals

The Sustainable Development Goals[149] (SDGs) are a universal call to action to end poverty, protect the planet and make sure that all people enjoy peace and prosperity. Delivering the relevant environmental aspects of the UN Sustainable Development Goals (Agenda 2030[150]) for the UK requires cross-government, cross-industry and individual participation.

The UK Government is firmly committed to delivering the goals both at home and around the world. Delivering the aims of this Strategy, including through our international leadership, helps us move closer to achieving these goals. Resource efficiency principles and practices contribute directly to 21 of the SDG targets, and indirectly to 28 additional targets. The strongest contributions are to SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 12 (Sustainable Consumption and Production), and SDG 15 (Life on Land). Resource efficiency indirectly helps deliver additional goals, SDG 1 (No Poverty) and SDG 2 (Zero Hunger) and SDG 14 (Life Below Water)[151].

There is a huge socio-economic and environmental dividend to be gained through SDG implementation[152], presenting Government with the opportunity to create the right market conditions for them to be realised. A substantial increase in resource efficiency is essential to meet the SDGs and associated targets and climate goals in a cost-effective manner.

6.2.2 Supporting development of country action plans and investable solutions through the Global Plastic Action Partnership



As part of the funding package, Defra have allocated £2.4 million of UK Aid funding for the Platform for Accelerating the Circular Economy (PACE) Global Plastic Action Partnership, launched in 2018[153]. The project will build an ambitious global public-private partnership to tackle plastic pollution of rivers, deltas and the ocean, and will convert commitments into action by fast-tracking resource and waste solutions in coastal countries.

The first collaboration is with the Government of Indonesia. The world's largest archipelago is suffering a crisis of plastic waste and the government has a national plan to reduce it by 70% by 2025. Collaborations in two other coastal nations (one in West Africa and a small island developing state) will be announced by the end of 2019.

149 UN (2016) https://www.un.org/sustainabledevelopment/sustainable-development-goals

150 DFID (2017) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/603500/Agenda-2030-Report4.pdf

151 Schroeder, Anggraeni and Weber Journal of Industrial Ecology (2018) https://doi.org/10.1111/jiec.12732

152 The Business & Sustainable Development Commission has estimated that the economic prize to business of implementing the SDGs could be up to US$12 trillion (£9 trillion) globally by 2030.

153 After UK Government investment, the initiative has since received and CAD6 million ($4.6 million) from the Government of Canada. The Coca-Cola Company, Dow Chemical and Pepsico Foundation have jointly contributed more than $2.4 million.

The Partnership aims to have investable solutions in place by 2020, which can then be adapted and implemented in other countries. The Partnership provides an opportunity to mobilise significant private sector effort and finance.

6.2.3 Supporting developing nations tackle pollution and reduce plastic waste, including through UK Aid

Research and innovation to tackle plastics and manufacturing pollution

The Sustainable Manufacturing and Environmental Pollution programme will tackle the problem of pollution and environmental degradation generated by manufacturing processes in DFID priority countries across Africa and Asia.

Over five years (2018-2023) DFID will back a £20 million research programme to generate evidence and practical solutions to address the problem of environmental pollution including plastics from manufacturing sources.

In April, BEIS set out its intention to work with others across the Commonwealth to develop a Marine Plastics Research and Innovation (R&I) Framework and announced that it would contribute £25 million. This Framework will encourage researchers from a broad range of disciplines across the Commonwealth to look at the issue of marine plastics from a scientific, technical, economic and social perspective. It will support interdisciplinary work across a range of relevant issues, including (but not exclusively):

- Developing a circular economy, including upstream solutions, to prevent plastics from becoming waste and getting into the oceans in the first place;
- The development of low carbon sustainable alternative to plastic; and,
- Sustainable options for cleaning up the marine environment.

The Framework aims to drive a step change in evidence to support action on marine plastics and, through sharing new knowledge and solutions, make sure that the whole Commonwealth benefits from this latest thinking.

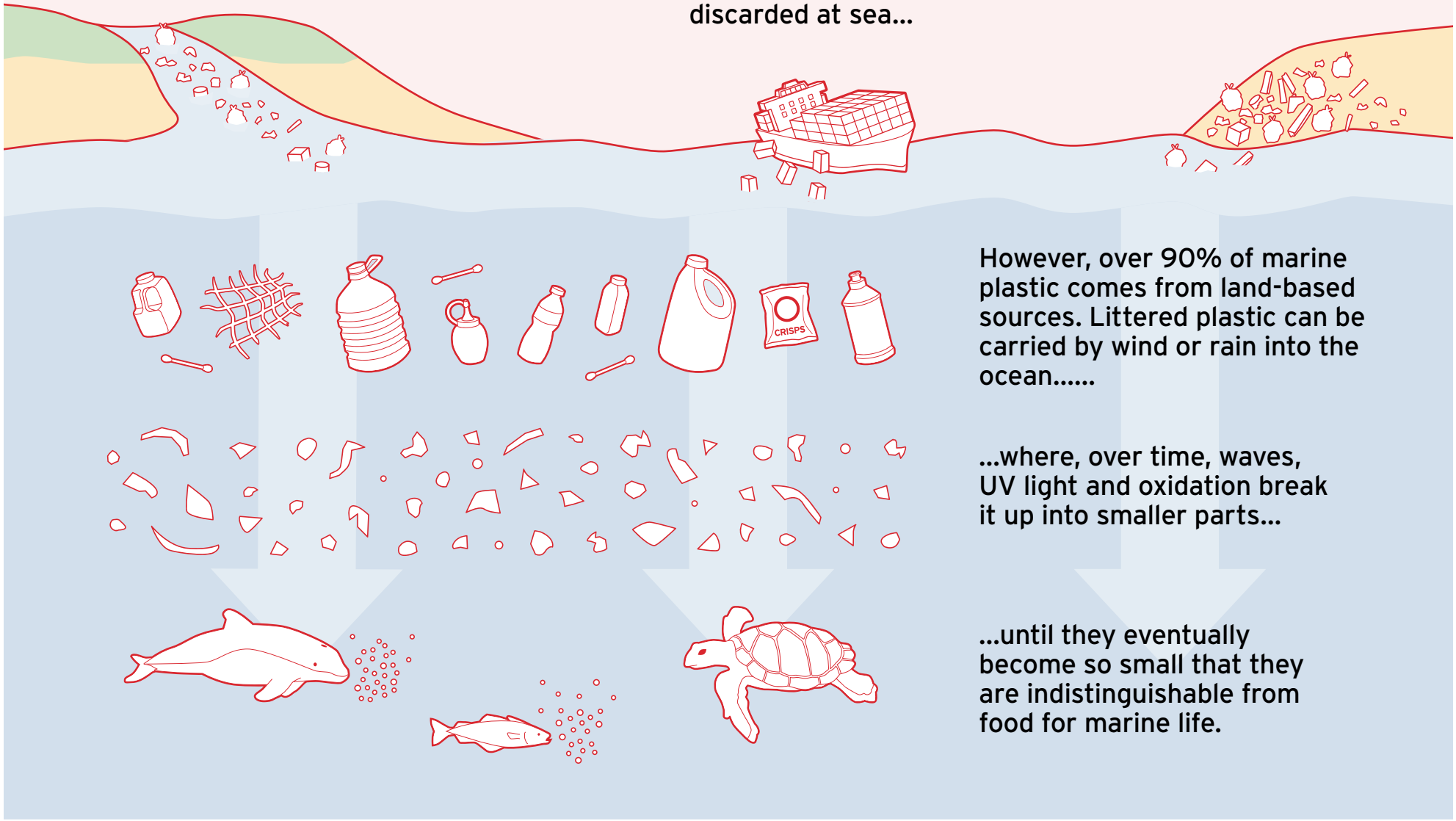
Build capability and capacity

Working with Commonwealth countries across the full spread of the development spectrum, DFID and Defra will fund up to £10 million and £6 million respectively, to provide bespoke technical assistance and facilitate knowledge sharing. This will help governments across the Commonwealth improve their capability to deliver policies that tackle plastic pollution and improve waste management, as well as support them to develop Marine Litter Action Plans through Defra's £6 million Commonwealth Litter Programme.

DFID will spend up to £3m of UK Aid on pilot projects in cities in developing countries, including Ghana, Bangladesh and Uganda, with a focus on improving recycling and cost recovery from waste plastics.

Taking advantage of the diversity of the Commonwealth, we will share the successes of this work to act as a blueprint for countries around the world.

OCEAN PLASTIC BREAKDOWN



6.3 Addressing international barriers to a circular economy

Management of resources according to circular economy principles requires co-operation and movement of materials across boundaries. Where we export resources and waste to other countries we must do more to make certain it is fit for recycling and that it is managed in a manner that protects human health and the environment. Different national interpretations of waste regulations for the same material and legal ambiguities around the status of reprocessed materials hamper cross-border trade in secondary resources.

To achieve this, actions we will take include:

6.3.1 Improving the quality of plastics exported for recycling through the Basel and Stockholm Conventions, launching a call for evidence in 2019

We will continue to actively engage in international activities to promote the environmentally sound management of hazardous and other wastes, and compliance with international controls on the shipment of those wastes through the Basel Convention[154]. Undertaking activities to improve legal clarity and address illegal traffic will support implementation of the Convention. By contributing to scientific and technical activities such as the development of technical guidelines on specific waste streams (e.g. persistent organic pollutants and nanomaterials), the UK supports other Parties to manage their wastes in an environmentally sound manner.

6.3.2 Better managing waste to reduce risks from chemicals without hampering the functioning of secondary materials

We will launch a call for evidence in 2019 to inform our Chemicals Strategy and to help us:

- Define substances of concern – under the REACH (Restriction, Evaluation, Authorisation of Chemicals) Regulation hazardous substances of very high concern are identified but these are not the only substances that can create barriers for recycling;
- Identify and track chemicals in products across global supply chains;
- Consider different rules for chemicals in primary and secondary materials;
- Facilitate better communication between recyclers and designers so that hazardous components are designed for easier dismantling, and destroyed to increase safe recycling operations.

154 The Basel Convention addresses the environmentally sound management of wastes and covers many of the issues at the heart of reducing marine pollution from plastic. www.basel.int

6.4 Improving UK and global resource security

Increasing global demand is leading to strains on supplies of some raw materials upon which our economy relies, creating risks in terms of supply chain vulnerabilities. For example, 94% of the global supply of niobium derives from a single mine in Brazil, yet is essential for high-performance steel needed by the UK defence, aerospace, automotive, oil and gas sectors, which supported sales of over £60 billion in 2016.

We recognise the importance of this issue, particularly given its alignment with this Strategy. By using resources more efficiently we can ensure they are reused, re-manufactured or recycled as much as possible. Creating and safeguarding this stream of secondary resources will boost the resilience of UK businesses and enable them to become more competitive in the face of increasing and fluctuating commodity prices.

To achieve this, actions we will take include:

6.4.1 Establishing cross-government oversight of the UK's natural resource security

Several of the actions and commitments made through this Strategy will help safeguard and improve the UK's natural resource security. For example, the creation of a National Materials 'Datahub' could help businesses better understand risks in raw material supply chains and allow them to plan accordingly to mitigate such risks. Furthermore, Extended Producer Responsibility and ecodesign should ensure that valuable materials remain in the economy for longer, thereby increasing resilience to resource security risks.

We want to provide businesses with certainty and the confidence to invest in more resource efficient technology and infrastructure. This means making sure that the economy is resilient against strains to the supply of materials upon which we rely and providing an environment in which businesses are able to understand and address risks. We will do this by establishing cross-government oversight, reinvigorating our Resource Security Action Plan[155] which will involve:

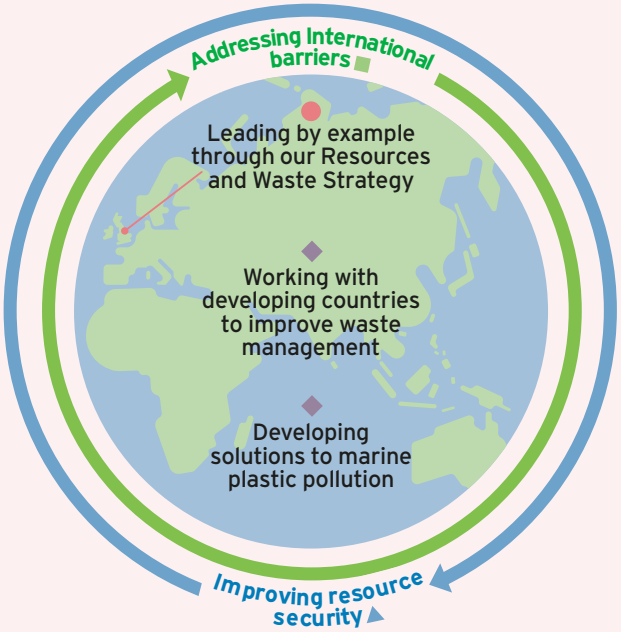
- Oversight of the material supply chains required to meet our wider clean growth targets, such as ending the sale of new conventional petrol and diesel cars and vans by 2040[156], including the capacity to reprocess and manage materials at end of life;
- Oversight of raw materials which are or may become critical to the economy, for which production and/or supply is constrained by technical, environmental and/or geopolitical factors;
- Updating our previous research on 'Future Resource Risks Faced by Business and an Assessment of Future Viability'[157];
- Consideration of the issue of resource nationalism in relation to metal and mineral supplies and implications for the UK.

155 DEFRA (2012) Defra-BIS Resource Security Action Plan https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69511/pb13719-resource-security-action-plan.pdf

156 DEFRA (2018) Draft Clean Air Strategy https://consult.defra.gov.uk/environmental-quality/clean-air-strategy-consultation/user_uploads/clean-air-strategy-2018-consultation.pdf

157 DEFRA (2018) Future Resource Risks faced by Business and an Assessment of Future Viability http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=2&ProjectID=17161

GLOBAL BRITAIN: INTERNATIONAL LEADERSHIP



1. **Leading by example,** magnifying the impact of the UK's actions globally
2. **Working collaboratively to solve global waste issues,** beginning with marine plastic pollution and waste management in developing countries
3. **Addressing international barriers** to a more circular economy
4. **Improving resource security,** both in the UK and globally

world by Adam Wilson from the Noun Project

Chapter 7

RESEARCH AND INNOVATION



"There is a great opportunity for UK businesses to develop innovations and new technologies to support and enhance resource efficiency, becoming market leaders and exporters of expertise to the world".

Report of the Government Chief Scientific Advisor,
From Waste to Resource Productivity[158]

Many technologies and solutions already exist to support the move towards a more circular economy. Yet in some cases these readily available technologies and solutions are not taken up at scale. Whilst incentives, behavioural change campaigns and regulation may help overcome such barriers, there are several resource efficiency challenges for which we do not yet have market-ready solutions. This is where there is a key role for innovation – in the development of novel solutions and improvements in the efficiency, cost and/or effectiveness of existing technologies. This requires Government support due to the higher costs for business in developing new products and solutions, the risks and uncertainty involved, and the possibility that individual businesses will not derive the full market benefits from doing so.

This chapter sets out how we will:

- **Support further investment and innovation in resource efficiency, working with UK Research and Innovation (UKRI) on our Areas of Research Interest**
- **Launch a call for evidence on the development of standards for bio-based and biodegradable plastics**
- **Provide Government funding for innovation and seek ways to support further investment in resource efficient technologies, including through the Industrial Strategy Challenge Fund**
- **Support the Waste and Resources Action Programme**
- **Encourage innovative waste treatment technologies that create transport fuels through the Renewable Transport Fuels Obligation (RTFO)**

158 UK Government services and information (2017) https://www.gov.uk/government/publications/from-waste-to-resource-productivity

7.1 Innovation which delivers greater UK resource efficiency faster

Innovation will help deliver new, cleaner technologies at lower cost, create jobs and increase the competitiveness of UK companies. As a Government we cannot be complacent – we want to create the right policy environment for innovation to flourish.

To drive progress, actions we will take include:

7.1.1 Supporting further investment and innovation in resource efficiency, working with UK Research and Innovation (UKRI) on our Areas of Research Interest

Areas of Research Interest (ARIs) give details about the main research questions facing government departments. Defra published an initial set of ARIs[159] in March 2017. We will continue this strategic approach, providing research councils and the wider research community with clear signals regarding policy-relevant research questions which could have high impact outputs. This will ensure that we are making the best use of evidence and research to understand the challenges we face, to underpin proportionate and targeted action.

In partnership with leading academics, including our Science Advisory Council[160], we have identified five further ARIs focused on resource efficiency and waste:

Extended producer responsibility (EPR)

Alongside our consultation (see Chapter 1), we want to encourage examination of UK-specific issues regarding EPR. How could the current UK systems be improved? What alternative models are available and how would they translate to the UK market? Although packaging is a mature area, what are the costs and benefits for other products for which EPR could be suitable, particularly those products with high environmental impacts, such as fishing gear and clothing? We also want to assess the impact of EPR on product design for packaging, and how lessons could be translated to other sectors.

Resource efficiency and the circular economy

While we have reasonable data for individual sectors, we need to increase our understanding of the macroeconomic benefits of increased resource productivity across the UK, and develop metrics and measurement techniques that allow comparison between sectors. This will allow better assessment of the effectiveness of interventions and of the benefits for the UK as a whole. We also want to increase our understanding of methods for increasing the circularity of production, through increased recyclability and durability, especially for small and medium-sized enterprises.

159 UK Government services and information (2017) https://www.gov.uk/government/publications/defra-group-areas-of-research-interest

160 UK Government services and information (2018) https://www.gov.uk/government/organisations/science-advisory-council

Minimising environmental impacts of waste

We need to better understand the composition of the waste we generate, now and in the future, particularly from the commercial and industrial stream and variation between different sectors. This will allow us to target sectors where the biggest improvements can be made. We also need to increase our understanding of future waste infrastructure requirements, including the demand for and viability of alternative waste management technologies, such as biotechnology solutions for treatment of bio-waste[161]. Finally, we need to find innovative ways to reduce the long-term costs and environmental impacts of legacy landfilled waste.

Food waste

Although we have a significant evidence base around food waste reduction, we want to encourage further research into methods of translating increased awareness of the issue into positive action. We are also interested in improving the tracking and reporting of food waste, particularly during the pre-farm gate section of the supply chain, and methods of decreasing the environmental impacts of food production. In light of the increased drive to reduce plastic packaging, we want to encourage further examination of the trade-offs between plastic packaging reduction and increased food waste and where packaging can be reduced without adverse effects on food waste generation.

Plastics

We want to encourage analysis of the issues surrounding reducing the use of plastic and investigation of new alternative materials, including the environmental trade-offs involved in transition. Our call for evidence next year (see below) will explore this. We also want to understand how we can improve plastic recycling through rationalising the range of polymers on the market, improving sorting and separation technologies, including cost-effective analytical tools that identify hazardous chemicals and substances of concern, and by gaining a better understanding of the technical issues surrounding the manufacture and use of recycled plastic.

7.1.2 Launching a call for evidence on the development of standards for bio-based and biodegradable plastics

Producers and packagers have begun to use an array of new plastic materials, to try to address the issues associated with plastic pollution. These are both fossil-based[162] and plant-based, and react differently in distinct environments: there is no one way to use and dispose of them. Were a consumer inadvertently to dispose of them in the wrong waste stream – sending non-biodegradable plastics into bio-waste streams, for instance – it would increase both contamination rates and costs. Concerns also persist about the risks and impact of degradable plastics appearing in new products that include recycled plastic.

161 Biowaste is a form of biomass. It is waste material capable of decomposing under anaerobic or aerobic conditions. Commercial sources of biowaste include forestry and agricultural residues, animal waste and manure, sewage sludge and commercial food waste. Household sources of biowaste include kitchen scraps and garden waste, paper and cardboard, as well as natural textiles.

162 Fossil-based (conventional) plastics are made from petrochemicals. Fossil-based is a generic name for certain synthetic or semisynthetic materials that can be moulded or extruded into objects or films or filaments or used for making e.g. coatings and adhesives.

Innovative new packaging types could help reduce the environmental impact of plastic, if disposed of in the right way. We want to make this easy for people. One potential solution could be to introduce new standards for them. We will work with UK Research and Innovation, and industry, to examine the demand, benefits and implications, starting in 2019 with the launch of a call for evidence.

As this sector is growing fast, we have set out below some key terms which people may find useful.

Biodegradable plastics

Biodegradable plastics are those which are capable, when conditions are right[163], of being broken down through the action of micro-organisms (bacteria and fungi) into simple compounds, such as water and carbon dioxide. Whilst such innovative solutions could help reduce the environmental impacts of plastics if disposed of in the right way, Defra's own research and a number of international studies have concluded that there is currently insufficient evidence to support claims that the widespread uptake of biodegradable plastics will increase resource efficiency or reduce waste. If littered, or otherwise released into the environment in an uncontrolled way, plastics which are claimed to be biodegradable may not degrade quickly[164] or at all, and can only be composted[165] if they meet relevant standards.

The Government is concerned that, in the absence of standards, claims about the biodegradability of plastic-based products cannot be verified. So our call for evidence will explore how this can be rectified, and we are providing support for research and development of biodegradable plastics through the Industrial Strategy Challenge Fund (see 7.2.1). Plastics placed on the market which claim to be biodegradable should be clearly labelled as such so that they can be separated from conventional plastics at end of life and sent to an appropriate treatment option.

Oxo-degradable plastics

These are conventional plastics which include additives designed to promote the deterioration of the material to the point that it becomes brittle and fragments into smaller, microplastic pieces. These fragments may then be biodegradable, as described above. Defra's research and various international studies have concluded that there is currently insufficient evidence to support claims that oxo-degradable plastics will fully biodegrade, or do so within a reasonable timeframe if they are littered, if they are disposed of in landfill, or if they end up in the marine environment[166].

163 Factors such as light, humidity, oxygen and temperature determine the degradation rate: EU Commission (2018) http://ec.europa.eu/environment/circular-economy/pdf/oxo-plastics.pdf (section 2). There is a lack of evidence on how both biodegradable and compostable plastics react under different environmental circumstances, particularly in water.

164 In theory almost all materials ultimately may biodegrade, even in the open environment, though some will do so only after hundreds of years or more. There is currently no consensus as to how quickly a plastic should biodegrade to be considered 'biodegradable'.

165 Compostable plastics are plastics that meet specific composting standards (for example EN13432). Not all biodegradable plastics meet these standards and so can't be sent for composting. Compostable plastics can also be sent to AD, but operators of wet AD systems must include a pre-treatment composting step.

166 EU Commission (2018) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52018DC0035

Bio-based plastics

Bio-based plastics are made using polymers derived from plant-based sources such as starch, cellulose, or lignin. They can be engineered to be biodegradable, though are not always. They will normally have a lower carbon impact than fossil-based plastics[167], and have the potential to provide a more sustainable alternative to conventional plastics. However, as this is an emerging market, they are generally more expensive than conventional plastics and their market share in the EU is currently small (less than 1%[168]). Further research is needed to evaluate their overall sustainability – for example, whether they will be more sustainable if manufactured from plant waste rather than from plants that would otherwise have been used for food production.

7.1.3 Investing in the development of, and pioneering innovative approaches to, boosting recycling, finding alternative materials, and reducing litter



Government intervention can set direction and make sure innovation delivers better environmental outcomes. The Areas of Research Interest (ARIs) mentioned above, the £20m Plastics Research and Innovation Fund[169], and the £20m Plastics and Waste Investment Fund aim to do just this.

Plastics Research and Innovation Fund

We pledged £20 million to the Plastics Research and Innovation Fund (PRIF – co-ordinated by Innovate UK and EPSRC[170]) which aims to reduce the environmental costs of plastic and litter. Our sights are set on problematic plastics such as cigarette filters and chewing gum, which contain single-plastic polymers, and blight our streets and seas.

The fund will seek to deliver strategic networking and research that will coordinate existing knowledge across the UK, catalysing new ideas and rapid solutions. It will support the polymer, packaging, retail and waste sectors as well as local government responsible for waste collection[171].

UKRI will work with WRAP to network and connect this fund with initiatives across business, government and the research and innovation community, to encourage knowledge exchange, and to identify future research and innovation priorities. Funded activities will be focused around developing solutions to reduce plastics entering our environment, funding for smart waste tracking

167 Understanding plastic packaging and the language we use to describe it, WRAP, July 2018, page 8. http://www.wrap.org.uk/sites/files/wrap/Understanding%20plastic%20packaging%20FINAL.pdf

168 A European Strategy for Plastics in a Circular Economy, European Commission, January 2018, section 4.3, footnote 53.

169 UK Government services and information (2018) https://www.gov.uk/government/news/strong-public-backing-bolsters-fight-against-blight-of-plastic-waste

170 Engineering and Physical Sciences Research Council (EPSRC)

171 Engineering and Physical Research Council (2018) https://epsrc.ukri.org/newsevents/news/plasticsresearchinnovationfund/

data collection, storage and reporting services, for smart local energy systems, and for technology which advances the UK's low carbon automotive capability.

Plastics and Waste Investment Fund

At Budget 2018 we announced a further £20 million of funding. £10 million will complement the PRIF, focusing on research and development to help business transition away from polluting plastics. This will include exploration of new packaging materials, new recycling processes and packaging waste management. The other £10 million will pioneer innovative approaches to boosting recycling and reducing litter. This funding will be made available during the 2019/20 financial year.

Future funding and investment

Innovate UK offer various other funding streams which are open to any innovations, regardless of industry, and we are confident that these funding streams will help any truly game-changing technology to develop and flourish. WRAP's Accelerating Growth Fund also invests in new projects and technologies which will help England to move towards a more circular economy.

We are also investigating possible fiscal incentives for the development of advanced conversion technologies[172] which deliver better environmental outcomes than conventional energy-from-waste technology.

7.1.4 Continuing to support the Waste and Resources Action Programme

The Waste and Resources Action Programme (WRAP) is a UK charity which works with governments, businesses and consumers to deliver practical solutions to improve resource efficiency, both in the UK and across the world.

WRAP's mission is to accelerate the move to a sustainable, resource-efficient economy by:

- Re-inventing how we design, produce and sell products;
- Re-thinking how we use and consume products;
- Re-defining what is possible through reuse and recycling.

WRAP receives the majority of its funding from the UK Government, the Welsh Government and the Northern Ireland Executive. It also works on projects funded by the European Union and other global organisations, as well as the businesses it works with.

Much of WRAP's impact is achieved by working with producers (and others) through voluntary agreements such as the Courtauld Commitment, the Sustainable Clothing Action Plan (SCAP) and the UK Plastics Pact. In each case, WRAP catalyses action by producers to re-design their products for longer life and greater resource efficiency.

172 Technologies that convert waste to energy such as gasification or pyrolysis.

WRAP has also worked with colleagues across Europe through the REBus project to pilot Resource Efficient Business Models, demonstrating their benefits to companies and the wider economy.

In 2018/19 we are supporting WRAP with £9.35m to deliver our priorities on resources and waste in three key programmes:

1. Food and drink focusing on household food waste and the Courtauld 2025 voluntary agreement.
2. Waste and resources management focusing on increasing recycling rates and the quality of recycling, plus work to reduce avoidable plastic waste.
3. Clothing, focusing on driving resource efficiency and waste prevention through a collaborative agreement with the clothing sector (the Sustainable Clothing Action Plan).

With support from Government WRAP has helped deliver campaigns to reduce food waste and packaging, consumer and business advice to support recycling, and encouraged businesses to move to more sustainable products.

By working collaboratively to unlock these benefits, organisations working in the sector can also contribute to the delivery of national targets for waste and recycling, fulfilling UK and international responsibilities to the environment.

7.2 Resource efficient clean growth

Clean growth means growing our national income whilst cutting greenhouse gas emissions. This includes taking action towards increasing the resource productivity of the UK and moving towards a more circular, low carbon economy.



The Government is taking action to accelerate clean growth on a number of fronts. The Clean Growth Strategy is our plan for continuing to decarbonise the UK economy through the 2020s, setting out our commitment to comprehensive action on climate change, resource efficiency and the environment.

Clean Growth is also one of the four Grand Challenges of the UK's Industrial Strategy. Grand Challenges seek to put the United Kingdom at the forefront of the industries of the future. Through the Clean Growth Grand Challenge we will maximise the advantages for UK industry from the global shift to clean growth – through leading the world in the development, manufacture and use of low carbon technologies, systems and services that cost less than high carbon alternatives. This includes growth of our 'bioeconomy' – the use of renewable biological resources from land and sea to produce food, chemicals, materials and energy.

Resource productivity in the bioeconomy

The displacement of fossil fuel-derived resources with renewable biological alternatives could play an important role in the transition to clean growth and a more circular economy[173]. Organic wastes, for example, can be used to create fertilisers and soil conditioners and as a source of energy, chemicals or materials.

We need to make sure the transition from fossil-based to bio-based resources is truly sustainable. Our Bioeconomy Strategy[174] sets out the Government's approach to building a world-class bioeconomy.

The Industrial Strategy also commits to raising the resource productivity of businesses, including through the promotion of recycling and strong secondary materials markets where products are designed with efficiency and recyclability in mind.

There are significant opportunities for UK industries to become global leaders in clean, green technologies. By showing leadership and supporting the development of technologies and

173 Resource Recovery from Waste (2018) https://resourcerecoveryfromwaste.files.wordpress.com/2018/10/rrfw-ppn-the-organic-waste-gold-rush-web.pdf

174 HM Government (2018) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/761856/181205_BEIS_Growing_the_Bioeconomy__Web_SP_.pdf

solutions that maximise the value we get from resources and minimise waste, we can achieve strategic ambitions more quickly, as well as increase the UK's competitiveness and opportunities for trade as we leave the EU.

To drive progress, actions we will take include:

7.2.1 Supporting further investment in resource efficient technologies, including through the Industrial Strategy Challenge Fund

The Industrial Strategy announced four grand challenges currently facing the UK, including clean growth. To help deliver on this grand challenge, several funds have been set up which include innovations in resource efficiency within their scope. The Industrial Strategy Challenge Fund (ISCF), which has so far invested over £1.7 billion, aims to strengthen UK science and business innovation and take on the biggest challenges that society and industry face today, and we are also supporting sector productivity through Sector Deals.

Through the third round of ISCF funding, two bids, including potentially up to £126m of Government funding, are being developed with industry, which would help deliver this Strategy as well as significant resource efficiency savings.

Smart sustainable plastic packaging

This aims to establish the UK as a leading innovator in smart and sustainable plastic packaging for consumer products, such as biodegradable plastic bags, delivering cleaner growth across the supply chain, with a dramatic reduction in plastic waste entering the environment by 2025. It will aim to develop a new generation of advanced and sustainable plastic packaging, including through academic and industry-led research and demonstrator projects.

Transforming foundation industries

This aims to transform our foundation Industries[175] so that they are internationally competitive in manufacturing products vital for our economy in an environmentally sustainable way. The focus will be on four key themes:

- Developing new recycling technologies that use less virgin materials and improve supply chain resilience;
- Bringing to the market new materials and services that reduce environmental impact;
- Trialling and researching process technologies that reduce resource use;
- Addressing cross cutting themes that affect the industry.

175 These sectors include metals, ceramics, glass, chemicals and cement, and are worth £52b annually to the UK economy, but in doing so are by far the UK's biggest industrial polluters: around 50 million tonnes of CO_2 per year, or 10% of the total CO2 emitted by UK homes and businesses.

7.2.2 Encouraging innovative waste treatment technologies that create transport fuels through the Renewable Transport Fuels Obligation (RTFO)

The Renewable Transport Fuels Obligation (RTFO)[176], administered by the Department for Transport (DfT) is a regulatory tool for ensuring the production and sale of sustainable, renewable fuels for use in transport. Fuel suppliers who produce over 450,000 litres of fuel in the UK each year are obligated to supply a specified amount of renewable fuel. They can meet this obligation by supplying renewable fuels themselves or by trading with specialist suppliers. Between April 2016-2017, 1,541 million litres of renewable fuel were supplied under the RTFO – the greenhouse gas saving of which is equivalent to taking around one million cars off the road. The scheme has been so successful that countries around the world are emulating this model, and DfT are considered world leaders on sustainability and verification of biofuels.

The introduction of the RTFO has driven considerable innovation in finding and processing alternative fuel sources that meet the criteria to be considered renewable and sustainable, such as used cooking oil and food waste. Sustainable waste materials are eligible for double RTFO certificates, meaning that conversion of waste to transport fuel is especially appealing to fuel companies.

The RTFO was revised in April 2018 to build on these successes, specifically to extend the obligation out to 2032. This will see the current volumes of renewable fuel used in transport doubled by 2020, allow renewable aviation fuel to claim support under the RTFO for the first time and place a cap on the use of crop-based biofuels. Furthermore, from 1 January 2019 the RTFO will also include an advanced fuels target for certain fuels that are of strategic importance to the UK. This advanced fuels target is designed to also encourage further innovation in sourcing new waste feedstocks that can be converted into transport fuels. DfT is considering the potential of fuels made from waste feedstocks of fossil origin that cannot be reused or recycled, sometimes known as recycled carbon fuels.

Two competitions in the creation of innovative transport fuels have also been launched. These are made up of a £15m 'Advanced biofuels demonstration' competition and a £22m 'Future Fuels for Flight and Freight' competition (F4C). In the first competition, the two winning projects were Advanced Plasma Power Limited and Nova Pangaea Limited. Construction of the two plants is progressing. These companies will take waste products (residual waste and biomass respectively) and use new and eco-friendly technologies to convert these into transport fuels.

The F4C is split into two stages. There were seven stage one winners[177] all of whom received a share of £2m for project development; this stage ended in November 2018. Stage two, which is only open to successful stage one winners, runs from Spring 2019 to November 2021 and sees £20m available for capital funding.

176 https://www.gov.uk/guidance/renewable-transport-fuels-obligation

177 Energy & Environment, future fuels for flight and freight competition (2017) https://ee.ricardo.com/transport/case-studies/f4c)

Chapter 8

MEASURING PROGRESS: DATA, MONITORING AND EVALUATION



High quality data, information and insight are essential for effective policymaking. This chapter, divided into 3 parts, sets out:

- Our strategic approach to transform gathering and reporting of **data**;
- Our approach to **monitoring** progress;
- Our approach to **evaluating** the success of policy interventions and feeding back learning into future policy development.

8.1 Data

Data is powerful in our digitally-driven economy. The 2016 report From Waste to Resource Productivity[178] states:

"Data has the power to transform behaviours. Simply making all those in the production and consumer chain aware of the amount and type of waste they generate can unlock important social and commercial dynamics that lead to waste reduction." p.12

But data on materials is currently patchy and unreliable. Although there are pockets of in-depth knowledge[179], there are few systems in place for systematising, collating and converting this knowledge into data.

This situation has changed little in 20 years. It hampers the proper functioning of market incentives and stifles those trying to become more resource efficient. If you can't measure it, you can't manage it – and this lack of basic data prevents us from reaping the benefits of resource efficiency. We have a great opportunity to lead the world in the transition towards circularity, but we need to invest in data to enable it to happen.



We need to quantify the primary and secondary materials we use to make products and deliver services. Once products have been used we need to know where they go and whether they are reused, repaired, recycled or confined to waste. High quality data needs to be collected over time so we can understand changes in how products and materials are used. This data will not only support policy-making in central Government but will help businesses make better investment decisions and tell local planners where additional waste treatment capacity is really needed.

178 The Government Office for Science Report of the Government Chief Scientific Adviser (2016) "From Waste to Resource Productivity" https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/667476/from-waste-to-resource-productivity-final-report.pdf

179 For example, individual waste reprocessors know in great detail how much recyclate they receive, where it comes from and its quality.

Data on waste collected by local authorities has radically improved through the creation of WasteDataFlow. As a result we have been able to set targets for household waste recycling and monitor progress. It has also enabled comparisons to be made of performance in different parts of the country, helping local authorities to make improvements. We now need to make a similar step change to produce data on resource inputs, stocks and flows, and expand our knowledge of commercial, industrial, construction and demolition wastes.

We want robust, effective and transparent systems to collect and report data, to enable everyone to reap the benefits of a move to a more circular economy.

To achieve this, actions we will take include:

8.1.1 Continuing to work with our partners and stakeholders to develop a shared vision and bold new approach to data on resources and waste

Government acknowledges the seriousness of this national deficiency in data, and that a bold new approach is needed. In line with the 'polluter pays' principle, responsibility for collecting and reporting data must lie with those who use resources and produce waste, although parts of that responsibility may be delivered by organisations providing chargeable services to them[180].

The problem cannot be tackled alone. Defra has a role to play in bringing stakeholders and key players together in pursuit of the greater vision. We will:

- Take a stronger leadership and coordination role where that is required to drive progress;
- Work with the Devolved Administrations to ensure efforts are coordinated in order to maintain the functioning of the UK Internal Market;
- Work closely with the Office for National Statistics and others to improve national datasets;
- Work with the Environment Agency and funded bodies such as WRAP to ensure information and knowledge supplied to them by resource users, waste-producing businesses and the resources and waste industry is collected and stored in ways which enable data to be created and shared whilst respecting confidentiality;
- Work with local authorities so they continue to report high quality waste data on behalf of local communities;
- Work with the resources and waste sector to ensure data captured routinely in collecting, treating and disposing of waste can be safely shared without compromising confidentiality or market positioning;
- Facilitate innovation by working with new partners.

180 This might be the Environment Agency for fee-paying regulated businesses, local authorities for Council Tax paying households, and the resources and waste industry for organisations paying for a waste collection service.

8.1.2 Moving away from weight-based targets and reporting towards impact-based targets and reporting, focusing initially on carbon and natural capital accounting

The current focus on weight is a good basis for measuring resource use and waste; after all it is a common currency. But using weight data as the basis for making policy, setting targets and monitoring progress can lead us in inappropriate directions. Some lightweight materials have large environmental footprints, like plastics, while some heavy materials have small footprints, like aggregates. This can encourage behaviours that do nothing to help meet our goals. We will therefore develop new indicators and metrics that help us understand and act more in line with our strategic aims, focusing particularly on greenhouse gas emissions and natural capital; a principle supported by a number of our stakeholders[181]. Some new thinking will be required to achieve this.

8.1.3 Moving away from a focus on waste towards a focus on resources

As set out in section 8.2 below, we will fundamentally shift the focus of monitoring away from waste and towards resources, including a refocusing on measuring waste higher up the waste hierarchy. This will help Government understand how to better support the shift towards a more circular economy in which products and materials are reused, repaired and remanufactured. Importantly, it will also help businesses make better decisions, for example by considering relative carbon emissions from reuse rather than disposal of a product, or from constructing a new, energy-efficient building versus upgrading and repairing an existing building. We have included a new strategic indicator on raw material consumption which marks the start of this journey (see section 8.2).

Reuse, repair and remanufacture are not clearly defined sectors, making it difficult to identify them in national statistics. We will work with stakeholders to identify cost-effective ways of gathering better data on the size of these sectors, the contribution of different facilitators (such as charities) and how much waste they prevent.

We will explore the provision of figures to enable an assessment to be made of the trade-offs between new and reused products. This will build on Defra's on-going work on consumption-related emissions, which already involves reporting on embodied carbon.

8.1.4 Maintaining the coverage and quality of data on local authority collected waste and improving data collection to meet future needs

WasteDataFlow is the existing public dataset on local authority collected waste. When launched in 2004 it represented a major breakthrough in our understanding of how much waste was produced, treated and disposed of. A single online system for this data provides a key source of analysis for industry, local authorities and government. It is also used for statutory reporting of targets.

We will undertake periodic reviews and make necessary improvements to WasteDataFlow so it continues to provide a user-friendly service and valuable data.

181 For example in the Defra (2018, forthcoming) 'Post Implementation Review of the Waste (England and Wales) Regulations 2011' on legislation.gov.uk.

8.1.5 Working with tech firms to develop innovative digital solutions for tracking waste and consulting on options to mandate the digital recording and sharing of waste movement data

As outlined in Chapter 4, Defra has successfully secured GovTech Catalyst funding. This fund will award up to £80,000 to five tech firms to scope out innovative digital solutions for tracking individual movements of waste, including hazardous waste and international shipments. We will use this to identify the best technological solution for tracking waste.

Currently the only business waste data for England comes from a patchwork of sources, including returns from permitted sites, voluntary initiatives and costly one-off surveys. These datasets are time-consuming and challenging to combine because they have different scopes, purpose and coverage. Mandatory digital reporting to tackle waste crime, as described in section 4.2.1, will enable consistent national datasets to be created. We will ensure the consultation takes account of national reporting requirements as well as a focus on tackling crime, so we get the best value from reporting efforts.

8.1.6 Ensuring data on the composition of residual waste is regularly updated

Residual waste is the mixed material that is typically incinerated for energy recovery or landfilled. Much of the products and materials contained in this waste could have been prevented, reused or recycled. This is inefficient not only because materials that hold value are being lost, but also incineration and landfill are the most expensive ways to treat waste. Understanding waste composition is fundamental to the Strategy's objectives of eliminating avoidable plastic waste over the lifetime of the 25 Year Environment Plan, working towards eliminating food waste to landfill by 2030 and eliminating avoidable waste by 2050. It will enable us to estimate the carbon content of mixed waste. Future compositional analyses will be required to monitor progress. We will ensure the dataset is updated regularly and seek to expand it to industrial and construction waste.

We only have a partial understanding of how much value is lost in residual waste because we do not know enough about the composition of the waste. Compositional studies do exist but are neither recent nor comprehensive in coverage. Our current mechanism to fill this data gap only applies to household waste and involves a synthesis of data from recent local authority-based household waste composition analyses. WRAP is commissioning fieldwork to fill gaps for non-household municipal waste and commercial waste. We hope this approach will also incorporate data that waste management companies have promised to share with us.

Going forwards, we will combine data from regularly updated composition studies, the waste tracking system and data collected by the Environment Agency, in the course of its regulatory duties, to generate far more reliable data than ever before on the amounts and types of commercial and industrial waste. This will include, but not be limited to:

- Quantities of waste produced, by type and by sector, including that found in mixed waste;
- Quantities and proportions of waste (by type) managed through different routes, including reuse, recycling, energy from waste and landfill, by sector;
- Recycling, reuse and recovery rates for key materials, for example paper, card, plastics, metals and glass, by sector.

8.2 Monitoring progress

We have developed a suite of indicators to measure progress against the Strategy's objectives. We cannot establish some of these indicators immediately because the data does not yet exist. Part of our bold new approach will include determining how we will get this important data. Also, given the long-term nature of the Strategy, new indicators might become more relevant in future years, for example metrics based on natural capital or other environmental or social impacts. In line with stakeholder requests, we will regularly update and publish progress against the indicators.[182] The first publication will be in 2019.

Figure 8.1 shows the indicators framework, the key strategic indicators, and the metrics that we propose to adopt. The strategic indicators feed upwards into the 25 year goals of the 25 Year Environment Plan, namely 5 (using resources from nature more sustainably and efficiently), 7 (mitigating and adapting to climate change) and 8 (minimising waste). Each Key Strategic Indicator has one or more metrics associated with it, which are described below.

182 For example in the Defra (2018, forthcoming) 'Post Implementation Review of the Waste (England and Wales) Regulations 2011' on legislation.gov.uk.

Figure 8.1: Indicator Framework for Monitoring the Resources and Waste Strategy

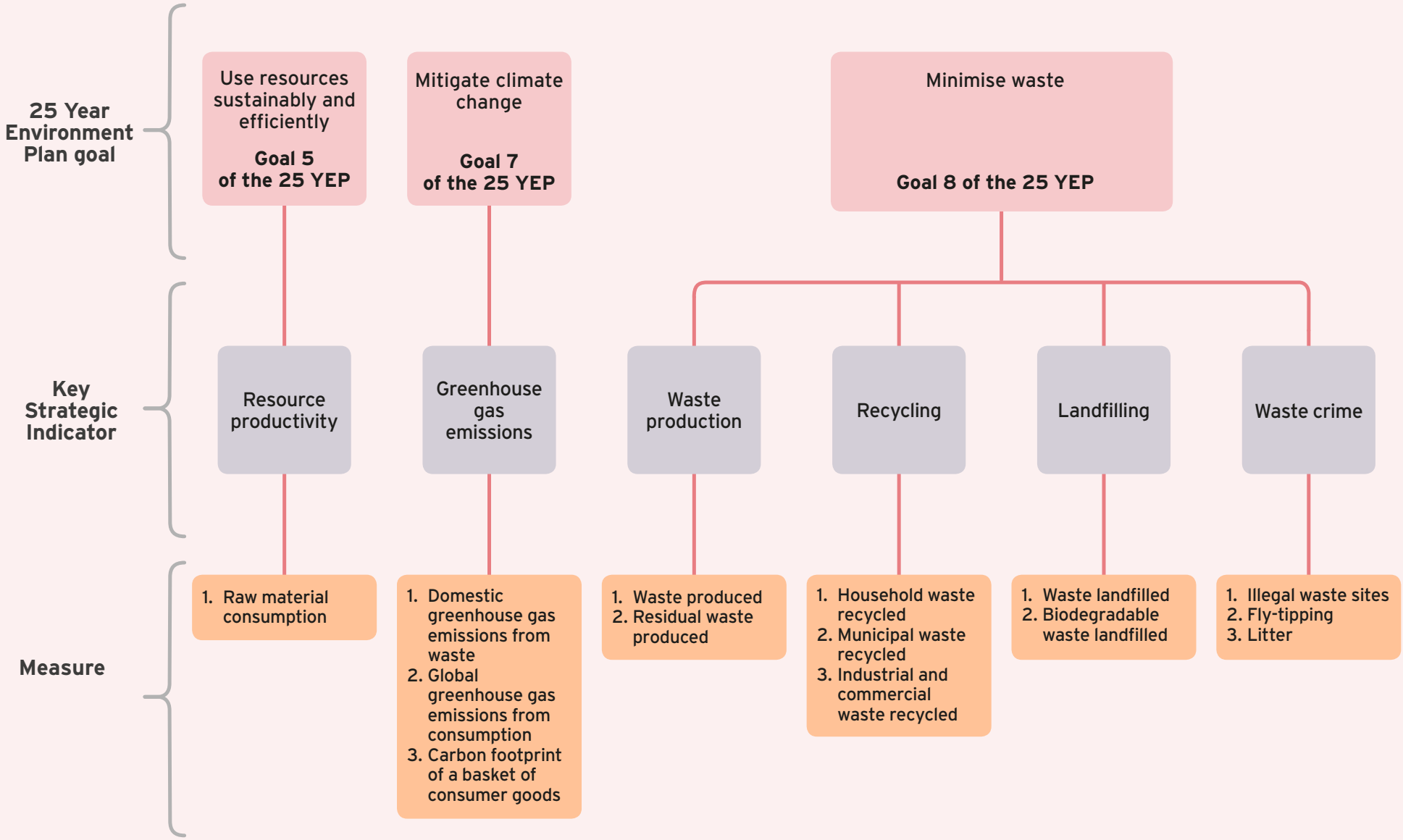


Table 8.1: Indicators of resource productivity

Strategic Indicator	Tells us ...	Why we need to know	Metrics	Desired direction of travel
Raw material consumption	How well we are managing our use of raw materials by using them efficiently and decoupling consumption of them from wealth.	We need to guard against consuming finite raw materials and use them efficiently. This is echoed by the commitment in the 25 Year Environmental Plan to double resource productivity by 2050.	Tonnes per capita £ GVA[183] per tonne	↓ ↑

Table 8.2: Indicators of greenhouse gas emissions

Strategic Indicator	Tells us ...	Why we need to know	Metrics	Desired direction of travel
Carbon footprint of waste (defined in line with carbon budget definitions)[184]	How much domestic waste-related carbon is associated with each unit of wealth the economy generates	We need to ensure that we stay on track to meet the 4th and 5th carbon budgets.	Unit of footprint per capita £ GVA per unit of footprint	↓ ↑
Carbon footprint of consumption	How much global lifecycle carbon is associated with each unit of wealth the economy generates	We need to ensure that we minimise the level of emissions associated with each unit of wealth we create	Unit of footprint per capita £ GVA per unit of footprint	↓ ↑
Carbon footprint of shopping basket of consumer products	How much lifecycle carbon is associated with the products we typically purchase	We need to ensure that the level of emissions associated with what we typically consume declines over time to reflect reductions in the carbon intensity of materials and successful design for longevity and circularity.	Index	↓

183 We can measure a sector's contribution to the economy in terms of its gross value added (GVA), i.e. how much value a sector adds. This is done by taking away input costs from the value of the sector's output. The GVA of a sector can be increased by reducing input costs or finding new, higher value markets for the output of the sector.

184 This includes emissions from landfill, waste-water handling, waste incineration without energy recovery, composting, anaerobic digestion, and mechanical biological treatment. Incineration with energy recovery is excluded from scope not because it is unimportant but because it is covered elsewhere within the emissions inventory.

Table 8.3: Indicators of waste production

Strategic indicator	Tells us ...	Why we need to know	Metrics	Desired direction of travel
Total waste generated	How much waste we are generating	We want to minimise the amount of waste we create because a portion of it will be lost to the circular economy and so have to be replaced by using virgin materials with associated carbon emissions. Or, where it is recycled, it will entail emissions that could have been avoided if the waste had not been generated in the first place.	Tonnes per capita	↓
Total residual waste generated per capita	How much waste we are generating that is treated as residual waste	We want to minimise the amount of residual waste that we create because it is a loss to the circular economy and so will have to be replaced by using virgin materials with associated carbon emissions. Residual waste is also an indicator of avoidable waste in that residual waste will include material that could have been recycled.	Tonnes per capita	↓
Household waste recycling	How well we are doing at increasing recycling from households	Successful recycling results in less raw materials being used and with fewer carbon emissions.	Recycling rate (tonnes recycled as a proportion of all waste)	↑
Municipal waste recycling	How well we are doing at increasing municipal waste recycling	Successful recycling results in less raw materials being used and with fewer carbon emissions.	Recycling rate (tonnes recycled as a proportion of all waste)	↑
Commercial and industrial waste recycling	How well we are doing at increasing recycling.	Successful recycling results in less raw materials being used and with fewer carbon emissions.	Recycling rate (tonnes recycled as a proportion of all waste)	↑

Strategic indicator	Tells us ...	Why we need to know	Metrics	Desired direction of travel
Landfilling	How well we are doing at reducing reliance on landfill	There is an ambition within the 25 Year Environment Plan to divert more waste away from landfill.	Tonnes	↓
Landfilling of biodegradable waste	How well we are doing at reducing landfilling of biodegradable waste	Biodegradable waste is a key driver of methane emissions from landfill. We need to continue to reduce methane emissions from landfill and our ambition in the 25 Year Environment Plan is to work towards no food waste entering landfill by 2030.	Tonnes	↓

Table 8.4: Indicators of crime

Strategic Indicator	Tells us ...	Why we need to know	Metrics	Desired direction of travel
Illegal waste sites	How well we are doing at reducing the number of illegal waste sites.	Illegal waste sites are a key form of waste crime. They can cause considerable environmental damage. The 25 Year Environment Plan says we are seeking to eliminate waste crime over the lifetime of the Plan.	Number of sites	↓
Fly-tipping	How well we are doing at reducing fly-tipping	Fly-tipping causes significant environmental damage, as well as incurring costs for local authorities and other landowners.	Tonnes	↓
Litter	How well we are doing at reducing litter	Litter causes local environmental impacts and costs local tax payers money to remove.	To avoid duplication, we will use the dashboard set out in the litter strategy.	

8.3 Evaluation

The world is complex. Despite our best efforts, we cannot always accurately predict what will happen when we implement policies. As individuals and organisations interact with one another and the policy, unpredictable things can happen. So we will ensure we learn, genuinely and openly, about the effects we have had, and adapt our programmes accordingly.

All significant policies, programmes and projects should be subject to comprehensive but proportionate evaluation[185]. Monitoring is essential for performance tracking and accountability; evaluation provides a higher level of feedback and is useful for learning and improvement. Evaluation findings can identify what works, for whom, and in what context; characterise problems that arise; showcase positive outcomes and good practice; pinpoint unintended and unanticipated results; and demonstrate value for money and return on public investment. Evaluation findings can be fed back into the policy design process to improve future decision-making.

Our evaluation plan

Our plan follows guidance in The Magenta Book and the Cabinet Office's Open Policy Making Toolkit[186]. We have developed simplified theories of change[187] for each of our key policies. We will focus evaluation effort on testing whether these theories are holding once the policy is implemented. Outcomes are likely to be emergent and unpredictable so we will look for unintended as well as intended effects. We will not dogmatically prefer certain methods over others but will use the method most likely to provide insight at an acceptable level of reliability.

Where policies are implemented through regulation, a **post-implementation review** (PIR) is required. PIR is a process to assess the effectiveness of a regulation after it has been implemented and operational for a period of time. A PIR provides the analysis required to establish whether, and to what extent, the regulation has achieved its original objectives, has objectives which are still valid, is still required and remains the best option for achieving those objectives; and can be improved to reduce the burden on business and its overall costs. We will learn from the findings of PIRs as we design new policies and amend existing ones.

We will not restrict our evaluation efforts only to those policies that require a PIR. We have looked across the actions set out in this Strategy and prioritised the key ones. We will focus on evaluating the most important and high profile policies in depth rather than undertaking a cursory and unsatisfactory evaluation of all actions set out in this Strategy.

The table below sets out our headline evaluation plan, the detail of which will be worked up over the coming months as part of a Resources and Waste Strategy Evaluation Plan to be published in spring 2019. The Plan cannot be published sooner because it depends on the outcome of forthcoming consultations.

185 HM Treasury (2011) The Magenta Book: Guidance for Evaluation

186 The Cabinet Office (2016) Open Policy Making Toolkit

187 The way in which an intervention is hypothesised to work, specifically the way in which benefits are expected to be caused.

Policy to be evaluated	Likely approach
The new provisions for extended producer responsibility on packaging waste	Multi-method approach involving process and impact evaluation to feed into the required post-implementation review Initial process evaluation to start 2024, depending on speed of implementation Initial impact evaluation to start 2026, depending on speed of implementation
The new provisions on a deposit return scheme	Multi-method approach involving process and impact evaluation to feed into the required post-implementation review Initial process evaluation to start 2024, depending on speed of implementation Initial impact evaluation to start 2026, depending on speed of implementation
The effectiveness of Resources & Waste Strategy actions on plastic	Wide-ranging, theory-based impact evaluation deploying both qualitative and quantitative methods. It will look across Government at actions targeting plastics to draw conclusions about successes Scoping to take place in 2019. Start date 2026, depending on speed of implementation of key actions
The effectiveness of the requirement for consistent collections	Potential trial-based approach, else theory-based approach combined with possible modelling. This will build on lessons from similar studies carried out by WRAP and others. It will also build on the evaluation of consistency pilots, being carried out currently It will focus on quantitatively assessing the impact of the policy. A quantitative study may be preceded by a more qualitative process evaluation Start date 2025, depending on speed of implementation of key actions
Analysis of the contribution the Resources & Waste Strategy has made to observed changes	Theory-based study utilising contribution analysis or realist impact evaluation techniques. It will focus on describing qualitatively the context, mechanisms and outcomes of interventions included in the Resources and Waste Strategy to devise a contribution story Start date 2028/9

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