Waste Prevention Programme for England
Evaluation and description of potential waste prevention measures

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Purpose of paper

This evaluation addresses the requirements of regulation 4(1)(a) and regulation 5(c)(iv) of the Waste (England and Wales) Regulations 2011 which requires the appropriate authority (the Secretary of State in relation to England) to:

a) evaluate the usefulness of certain waste prevention measures) and any other appropriate measures the Secretary of State thinks fit;
b) describe where relevant the contribution of those measures set out as examples in Part 6 of Schedule 1 of those Regulations.

It sets out in brief the current evidence base on waste prevention in England, focusing on the usefulness and possible impact of the policy measures listed. The policy measures referred to in regulation 4(1)(a) of and Parts 5 and 6 of Schedule 1 to the Regulations are combined and grouped for ease of reference. **It is not a statement of policy and the inclusion of, or reference to, any given policy should not be taken to imply that it has, or will be, endorsed by Government as an option for England.**

Outline of Evidence

The original Waste Prevention Programme published in 2013 ("WPP 2013") relied on the following studies:

- Household Waste Prevention Evidence Review (HWPER),[1]
- Business Waste Prevention Evidence Review (BWPER),[2,3]
- Waste Prevention Actions for Priority Wastes: Economic Assessment through Marginal Abatement Cost Curves (the MACC report)[4] and
- A Comparative Study on Economic Instruments for Promoting Waste Prevention.[5]

Some of this evidence remains relevant and is explained briefly here. We also rely on evidence obtained over the past few years by Defra in relation to waste prevention and specific policy tools including Extended Producer Responsibility.

The Household Waste Prevention Evidence Review (HWPER) summarised findings from a large-scale strategic review of the international use of policy options for waste prevention. The HWPER found very few studies that explored the impact of policy measures, either singly or comparatively, though it found a great deal of descriptive information on what policies exist. The HWPER identified impacts for a number of different policy measures using estimates based on modelling and approximation where actual impacts were not available.

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[1] http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16161 (2008–2009)
[2] The BWPER considered waste from construction, food and drink, hospitality, retail and automotive sectors, and office-based services
[3] http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=17499 (2010–2012)
[4] RM (2013) Waste Prevention Actions for Priority Wastes: Economic Assessment through Marginal Abatement Cost Curves, a report for Defra (completed December 2012)
[5] Eunomia Research & Consulting (2011) A Comparative Study on Economics Instruments for Promoting Waste Prevention, a report for Bruxelles Environnement

The HWPER also noted that international experience suggests that the most effective and most frequently applied waste prevention policy measures come in a package including measures such as: waste prevention targets, producer responsibility, public sector funding for pilot projects, and collaboration between public, private and third sector organisations, supported by long-term and intense public intervention and communication campaigns.

In addition to the general observation above about effective international practice, the international module of the HWPER[1] noted that countries that had made a significant impact on municipal waste growth had in place a wide range of instruments and initiatives aimed (directly or indirectly) at waste prevention. In terms of policy instruments, these measures included the following: product eco-taxes; eco-labels; container reuse/deposit-refund schemes; high landfill taxes; and disposal bans on certain materials.

This evaluation is informed by a number of reports including the 'Review of the waste prevention programme for England 2013' ("Review of WPP 2013") published in July 2020.[6] The review included actions undertaken so far and their impacts. The report found that across the six years since the programme was published in 2013, significant improvements were made by Defra and industry partners in measuring and monitoring waste, especially within the commercial and industrial sectors. It is also informed by earlier research, prior to the Waste Prevention Programme 2013 ("WPP 2013").

The review suggests the WPP 2013 was most successful where Government and industry worked in partnership to prevent waste. In areas where less progress was made, stakeholder feedback indicates that this was often due to limited uptake by industry and/or where the set of measures were insufficient to address the fundamental barriers to preventing waste, for instance the Waste Prevention Loan Fund. There were also some cases where projects that were successful at the pilot stage, for instance some of the Innovation in Waste Prevention Fund projects, were not continued or rolled out further due to lack of ongoing funding or because Government's focus was diverted to other issues. We have included findings from this review in the sections below.

Since the previous evaluation in 2013, Defra has developed a new Resources & Waste Strategy for England[7] and an Evidence Annex.[8] Evidence has also been developed and impact assessments prepared in relation to specific policies presented and committed to in the Strategy, for example on reforming the packaging producer responsibility regulations. This body of evidence has been used to prepare this supporting statement.

[1] WR1204-L3-m5/2-International Review

[6] https://www.wrap.org.uk/sites/files/wrap/Final%20WPP%20Summary%20Evaluation%20Report.pdf

[7] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

[8] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765915/rws-evidence-annex.pdf

Policy measures[9]

In this section we explain our assessment and describe the benefits of the policies, referred to in regulation 4(1)(a) and of the Parts of Schedule 1 to the 2011 Regulations referenced above, to waste prevention. This is structured around the three cross-cutting themes of the revised draft Waste Prevention Programme.

A. PRODUCT POLICY

1. Promotion of ecodesign

The Resources and Waste Strategy sets out Government's ambition to make the UK a world leader in resource efficiency. The potential to repair, reuse, remanufacture or recycle a product largely depends on its initial product design. If designed using components that cannot be easily replaced or repaired, a product's potential lifetime is reduced. Better design can make products more durable or easier to repair, upgrade or remanufacture. Also, products that are designed to have a long lifespan can enable re-use if the current owner no longer wishes to consume them.

Poorly designed products which break prematurely, or otherwise wear out, and cannot be repaired, lead to unnecessary disposal of products and the manufacture of more products than may otherwise be necessary. This means wasted energy and water as well as greater extraction of minerals and metals than otherwise needed, multiplying the environmental impacts of mining. For example, there is considerable wastage in the value chain of clothing and textile due to fast fashion, dropping quality and relatively low repair and reuse rates.[10] A recent study looked at different reviews that explored the background reasons for discarding of clothing - wear and tear issues along with functionality remained the key reasons for discarding among adults.[11] The impacts are high. WRAP demonstrate the environmental impact associated with clothing lifecycle, with estimated global footprint of UK consumption of clothing to be 23 $MtCO_2e$, 7,060 million m^3 of water and 1.7 million tonnes of waste in 2016.[12] According to a Eunomia study, barriers to a circular furniture sectors are wide and include the lower quality materials and poor design that restricts the potential for a successful second life.[13]

It is also expensive and frustrating for consumers as they do not have affordable and readily available options to extend the lifetime of their products, for example through re-use schemes, repair and remanufacture. Demand for more efficient, high quality products remains prominent amongst consumers. A recent Green Alliance report states that two thirds of people are frustrated by products that do not last; three quarters believe the government should ensure businesses sell recyclable and repairable products; 81 per cent believe businesses should be

[9] Annex IV (rWFD), measure 1 - The use of planning measures, or other economic instruments promoting the efficient use of resources
[10] https://norden.diva-portal.org/smash/get/diva2:1221509/FULLTEXT01.pdf
[11] https://norden.diva-portal.org/smash/get/diva2:1221509/FULLTEXT01.pdf
[12] WRAP (2017), Valuing our Clothes: the cost of UK fashion.
[13] Eunomia (2017), Circular economy opportunities in the furniture sector

required to provide repair, maintenance or disposal support for their products.[14] This evidence suggests that there is a sub-optimal usage of material resources as products are not designed with longevity in mind.

We also regard ecodesign as being about the use of lower impact materials. This includes the use of secondary materials in the production process. This aspect of ecodesign is taken on board in our Environment Bill clauses related to resource efficiency (with regards to requirements in relation to the product itself, as well as information requirements, such as labelling).

Another problem that was identified by Sabbaghi et al. (2016) was information failure (e.g. missing labels indicating whether the product can be repaired or not) and customer perception (e.g. time spent on finding repair services) as key barriers to repair. Providing repair manuals, better information about repair services, and improving product design (e.g. modulated products) should help consumers to repair the products.[15]

The associated negative environmental and economic costs from poor product design are (i) resource depletion due to the demand it places on virgin raw materials during production rather than use of recycled/secondary materials, also a failure to reuse or recycle products like clothing can mean unnecessary water consumption; (ii) environmental pollution associated with unnecessary waste disposal as products are less likely to be repaired and/or recycled, hence waste is either sent to landfill where it pollutes land and generates greenhouse gases (GHGs) or sent to incineration where it emits fossil fuel-based carbon dioxide; and (iii) increased GHGs emissions and water usage: even if materials from products are recycled rather than sent to landfill, this can mean substantial GHG emissions. Evidence suggests that 80% of the damage done to the environment from waste products can be avoided if better 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.[16]

It may mean the unnecessary loss of critical raw materials, used increasingly in high tech products, to landfill or incineration residual waste treatment leaving the UK increasingly vulnerable to the resource price fluctuations and increasing costs of those materials. The electronics and ICT hardware industries turned over around £20 billion in 2011, corresponding to around £8.6 billion GVA. This is approximately 6% of the total GVA for the UK economy and represents a 22% share of the European market for electronics and IT. The sector requires a variety of critical raw materials and although the quantities involved in each product are often small, the area is predicted to grow both in the near- and long-term as new technologies become available, and therefore these critical raw materials are projected to become scarcer. Moreover, the small quantities used per product mean that recycling rates of these critical raw materials have traditionally been low.[17]

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[14] Green Alliance (2018), By Popular Demand, what people want from a resource efficient economy
[15] Sabbaghi et al. (2016), Business outcomes of product repairability: A survey-based study of consumer repair experiences
[16] https://www.wrap.org.uk/sites/files/wrap/Embedding%20sustainability%20in%20design%20%20-%20final%20v1.pdf
[17] Eunomia for Defra (2020) Review of the future resource risk faced by the UK economy

The Nordic Council's report (2018) on ecodesign requirements for furniture and textiles suggests that there are significant waste arisings in the two product groups particularly due to fast fashion, dropping quality and relatively low repair and reuse rates.[18] Most brands do not design for longer lifespans, reparability or recyclability; and a further inhibitor of material recovery can be content from persistent chemicals that may prove harmful to staff in recycling facilities.

In terms of the lifespan of consumer products, results from a study by the German Environment Agency (2017) show that between 2000 and 2010, product lifespans decreased by: 17% in consumer electronics such as LCD monitors and TVs, 10% in IT products like PCs, laptops, and mobile phones and 7.8% for large household appliances.[19]

To date, the main focus of product design regulations has been energy (in the operational phase of the product) rather than resource efficiency. The Department for Business, Energy and Industrial Strategy (BEIS) estimates that better design could lead to GHGs emissions savings from primary energy consumption of 8 MtCO2e per year for the UK.

Other evidence that supports ecodesign includes:

- CIE-MAP and Green Alliance (2018) showed that increased reuse of textiles and carpets, and one-year increase in clothing lifespan would result in UK GHGs emissions savings of up to 1.8 MtCO2e and 2.2 MtCO2e, respectively, between 2023 and 2032;[20]
- WRAP (2013) further suggests that 9 months longer lifetime of all clothing could result in up to 2,000 million m^3 water savings, 400 thousand tonnes waste reduction and £5 billion resource cost savings.[21]
- OECD (2018)[22] and Van der Voet et al. (2018)[23] show that use of secondary materials in production yields lower negative environmental impacts (water, land or air pollution) than primary material production.

Box 1 on the following page shows the main benefits of ecodesign.

The government is seeking powers through the Environment Bill that will enable us to set resource efficiency requirements in order to support durable, repairable, and recyclable products, and we will set out further details on how this will be implemented in the new Waste Prevention Programme.

[18] Nordic Council (2018), Eco-design requirements for Textiles and Furniture.
[19] German Environment Agency (2017): Strategies against obsolescence, ensuring a minimum product lifetime and improving product service life as well as consumer information.
[20] Green Alliance and CIE-MAP (2018) Less in More Out.
[21] WRAP (2013), Design for Longevity: Guidance on increasing the active life of clothing
[22] OECD (2018, forthcoming): Global Material Resources Outlook to 2060: Economic drivers and environmental consequences.
[23] Van der Voet et al. (2018): Environmental implications of future demand scenarios for metals- Methodology and Application to the Case of Seven Metals, Journal of Industrial Ecology.

Box 1: Main Benefits of eco-design

Regulatory standards can help shift businesses to a more resource efficient approach to product design. The Environment Bill powers introduce new provisions to place obligations on producers which will result in the prevention of waste, for instance with the introduction of ecodesign and extended producer responsibility. This could be used to establish more product-specific requirements, including the mandatory inclusion of an "average expected product lifetime".[24]

In addition, existing energy efficiency product regulations can be built on to include new minimum product design requirements.

Product design standards are one tool in a range of wider lifespan extending measures that could be implemented to encourage greater reuse, repair and remanufacturing. The evidence suggests this can be complemented by other policies to increase impact:

- Spare part provision: TechUK (2018) also recommend safeguarding the "repaired as produced principle" for spare parts. The availability of spare parts for electronics is key to ensuring that repair, reuse and upgrades of equipment are carried out economically. Any loss of economic efficiency would be counterbalanced by the environmental benefits of reducing waste;[25]
- Product warranties: Repair can also be regulated by extending product warranties. This could be applied to, for example, white goods, electricals and IT equipment such as laptops, washing machines, fridges and freezers etc. through EPR requirements;[26]
- Consumer rights: The German Environment Agency also suggests possibly rebalancing consumer rights policy to support more repair activity rather than giving consumers the right to refunds or brand-new replacements.[27]

Data and information as to use of secondary materials in industry is also important and that is covered in Part C. Usage of chemicals with proper safeguards is also essential to ensure resource efficiency, and this is being explored further as the Government develops a new Chemicals Strategy.

2. Consumer Information: Ecolabelling and other measures

Environmental labels and provision of information to consumers in other ways can, by bridging the information gap, address the market failure of asymmetric information in relation to product lifetimes and related matters and can therefore be an effective way to promote resource

[24] German Environment Agency (2017) Scientific Opinion Paper
[25] Ibid
[26] Ibid
[27] German Environment Agency (2017) Scientific Opinion Paper

efficiency. This enables consumers and businesses to make well-informed choices and encourages producers to raise their standards.

Consumer information can be provided in different forms:

a) Voluntary Ecolabels: used around the world to show that a product or service meets a certain standard of environmental performance.
b) Mandatory labels: used very often in relation to health and safety but also as to the energy efficiency of products where a ratings system is used.

The evidence suggests that clear, simple labelling schemes, once recognition levels are high, can have a significant impact on consumer decision-making.

According to conclusions of the Green Claims research in the UK, consumers primarily look for and respond to clarity, credibility and comparability in labels.[28] Government-mandated ecolabels schemes would provide customers with a trusted system of quality assurance and protection against private labels that make self-declared, potentially false or misleading environmental claims that consumers cannot verify themselves.

Evidence indicates that mandatory labelling to inform consumers about how they should use and dispose of products can work. This is exemplified by the On-Pack Recycling Label (OPRL) scheme which is used to inform consumers about the recyclability of packaging. It is used by more than 600 brands and retailers and is ground-breaking because it is based on data about what can be recycled in practice not just in theory. Packaging is labelled 'widely recycled', 'check local recycling' or 'not currently recycled', driven by inconsistencies in what is collected for recycling across different local authorities or other service providers.[29]

Findings of a rapid evidence assessment for Defra and WRAP suggest that mandatory information on product performance can and has influenced purchase behaviour and intentions.[30] Although the evidence is weak in some areas and further research needs to be undertaken to strengthen the existing evidence base, these initial findings convey a clear potential for resource efficiency labels to have a positive effect on consumer purchasing decisions, taking on board the direct benefit to a consumer of information as to durability and repairability.

The National Infrastructure Assessment also recommended that a clear two symbol labelling system for all packaging (recyclable or not recyclable) be introduced across the UK by 2022. The issue of unclear recyclability labelling on packaging has also been cited in various reports as contributing to stagnating recycling rates in parts of the UK, increased contamination within collected recyclables and confusion for householders.

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[28] UL Environment, S. (2015), "Claiming Green - The influence of green product claims on purchase intent and brand perception"

[29] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765915/rws-evidence-annex.pdf

[30] WRAP (forthcoming), Environmentally Sustainable Product Purchase Decisions: Expert Interviews and a Rapid Evidence Assessment.

Surveys show that it is an important source of information for consumers about whether an item is recyclable; 46% of households just follow the guidance on packs and using on-pack information is the second most common way to find out what is recyclable. It is especially used by younger adults (WRAP 2018).[31]

3. Extended Producer Responsibility Schemes

Extended Producer Responsibility (EPR) is an environmental policy approach that requires producers to take responsibility for their products once they become waste. EPR Schemes often involve producers taking responsibility for collecting waste products and sorting them before final treatment and recycling. EPR schemes can either require producers to provide necessary financial resources and/or to set up their own collection schemes instead of the municipal sector (e.g. local authorities or wider municipal sector generating household-like waste). They are often accompanied by statutory targets and these could be set to prevent waste as well as to achieve high recycling.

In the UK, a reformed packaging producer responsibility system is currently being developed. This is based on an EPR principle that would mean the full net costs of managing packaging waste is paid by obligated producers. The new regulations should incentivise recyclability of packaging by financially rewarding/penalising producers according to specified criteria, through modulating fees with regard to those criteria. Money raised through the system could fund better and consistent recycling collections and encourage more investment in domestic recycling and reprocessing. This should deliver overall system savings in the longer-term. These savings are also due to the gate fees that are charged for a range of waste treatment, recovery and disposal options and are highest for EfW facilities and landfill (incl. landfill tax).[32] Furthermore, it enables clear labelling that will make it easier for consumers to recycle. Measures related to the presentation of evidence relating to the export of packaging waste for recycling will be tightened.

Other sectors where producer responsibility regulations are in place include for Waste Electrical and Electronic Equipment (WEEE), batteries and End of Life Vehicles (ELV).

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.[33]

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[31] WRAP (2018) Recycling Tracking Survey 2018
[32] https://www.wrap.org.uk/sites/files/wrap/WRAP%20gate%20fees%20report%202019.pdf
[33] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

We have committed to review and consult on EPR for five new waste/material streams, such as textiles, and we set out a timeline for textiles in EPR in the new Waste Prevention Programme for England.

B. SYSTEMS: SERVICES, FACILITIES, GROWING THE SECTOR

1. Promotion of reuse and repair, including better collection

The top of the waste hierarchy is waste prevention, which is about reducing waste in production processes, reducing material content, and also about extending life including through reuse, repair and remanufacture. The second rung of the waste hierarchy is preparation for reuse. This refers to operations such as checking, cleaning or repairing, by which products, or components of products, that have become waste are prepared so that they can be re-used without any other pre-processing.[34]

The evidence suggests that policy measures relating to products in Section A of this paper need to be supplemented by policies that enable those actions because of the complexity of collection, sorting and reverse logistics as well as higher labour costs, consumer perception and trust, and safety considerations.

The products with the greatest potential for repair are small household electricals and mobile devices. WRAP estimate that £220 million in resale value could be realised through the repair, refurbishment and resale of discarded electrical and electronic equipment. This currently ends up as waste, incurring treatment and disposal costs in addition to loss of residual economic value. Small electricals (such as toasters, hairdryers and mobile devices) account for three quarters of this potential economic value that is lost.[35]

This could be primarily because small electrical appliances are more likely to be thrown away than repaired, since it may not be considered efficient or cost effective to repair small appliances. This behaviour leads to large quantities of discarded small electrical appliances ending up in landfill and having huge environmental impacts in addition to loss of economic value.

Barriers to repair are most often cited as the repair costs relative to new product prices, inconvenience and availability of repair options, such as return to manufacturer or repair stations, and the lack of a product guarantee. While new technologies have made repair easier (online tutorials and 3D printing for example), repair is still a labour-intensive activity.

Enabling policies include better use of existing recycling facilities including Household Waste and Recycling Centres (HWRCs) as well as support for businesses that provide a reuse, repair and remanufacture service. The new Waste Prevention Programme for England sets out measures to enable reuse and repair in HWRCs and to support reuse, repair and remanufacture businesses.

[34] https://ec.europa.eu/environment/waste/framework/
[35] WRAP (2011) Realising the Reuse Value of Household WEEE

In relation to better use of existing facilities and services, the review of WPP 2013 identified a number of guidance reports that have been prepared with the aim of increasing reuse. These guidance reports include WRAP's Household Waste Recycling Centre (HWRC) Guidance and additional draft guidance developed by a Government/Industry Working group for operators at household waste recycling centres with the objective of increasing reuse. This was not published as a standalone document. However, revisions were made to the 'Definition of Waste Guidance' published on gov.uk in May 2016. The Resource and Waste Strategy contains a commitment to address the barriers to reuse at HWRCs. As part of this, the draft guidance for operators of household waste recycling centres produced by the working group is being revisited for suitability for publication/further incorporation into existing guidance.

There are clear benefits from collection of other products and materials in terms of reuse potential.

For example, WRAP research on bulky waste assessed that over 20% of furniture collected at the kerbside could be reused in its current condition, with a further 25% assessed as reusable with slight repair.[36] Moreover, just under 50% of the furniture collected at HWRCs was assessed as reusable in its current condition or with slight repair.

In the textile sector in 2017, only 36% (600,000 tonnes) of clothing consumed or placed on the market was collected for reuse and recycling in the UK. Of the clothing collected for reuse/recycling, around 32% is reused in the UK through charity shops and second-hand commercial outlets, while 60% is exported. In 2017, 921,000 tonnes of used textiles still entered the residual waste stream (landfill/EfW) in the UK.[37] If textile collection rates rise to 65 per cent (in line with the target in the Resources and Waste Strategy for 2035), an additional 340,000 tonnes of textiles would be collected for recycling in 2030 and 158,000 tonnes would be reused.

2. Promotion of Reverse Logistics Systems

Reverse logistics is defined as all activity associated with returning a product/service after the point of sale, with the ultimate goal to optimise or make more efficient after-market activity, thus saving money and environmental resources.[38] Making better use of reverse logistics would capture value and avoid wasting resources unnecessarily as producers will be able to repair or remanufacture goods that are taken back to them.

Defra funded a pilot Product Service System (PSS) by the University of Hertfordshire on extending the useful lives of infant mobility products such as car seats and pushchairs. Such products are very difficult to recycle at the end of their lifecycle. Customers took up 1,048 leases, with more car seats being rented than pushchairs. A total of 183 refurbished car seats and 21 refurbished pushchairs were supplied to users. Some car seats were used up to four times. The success of the PSS pilot, especially as far as car seats are concerned, suggests that PSS deserves more attention and further research. Further studies could focus on types and brands of car seats and pushchairs, which are specifically designed to be supplied through

[36] https://www.wrap.org.uk/sites/files/wrap/Furniture%20-%20bulky%20waste%20summary.pdf
[37] WRAP Textiles market situation report, 2019
[38] https://rla.org/site/about

a PSS. Research in different contexts and with different products should also be conducted in order to compare the findings of this project with those in different contexts. This would indicate the transferability of the present study.[39] The project also demonstrated the usefulness of using an Action-based Research Programme approach which related to a commitment in the 2013 WPP to test resource efficient products, business models and supply chain innovations.

The 2020 annual manufacturing report stated that the servitisation model is now open to many more companies as a result of increased digital technologies that offer transparency throughout the supply chain, and therefore greatly enhanced customer communications and service opportunities.[40] Servitisation can bring great benefits to manufacturers who might struggle to compete on price with products from abroad but can now wind and keep customers with superior service-based products.

WRAP have conducted several case studies on the potential of reverse logistics in sectors that are known to produce a lot of waste. For instance, WRAP has investigated the potential benefits to UK construction sites of efficient logistics planning, specifically the potential use of vehicles supplying materials to also collect unused or wasted product and packaging to take back to the supplier. This would enable materials to be reprocessed by manufacturers or reused by builders' merchants, utilise empty vehicles leaving site and reduce the requirement for waste vehicles to visit a site. Maximising the utilisation of the vehicle by delivering to (and collecting from) the same location and maintaining 100% vehicle fill makes the most of this opportunity. The results of the case study show that reverse logistics has the potential to offer savings to contractors. The greatest of these are the diversion of waste from landfill and the reduction in vehicles visiting site. The carbon savings vary depending on the efficiency of supplier logistics, but where there is an opportunity to use vehicles leaving site and returning to the supplier empty, there is a potentially greater carbon benefit to be realised. In addition, the reduction in vehicles visiting site will give improved safety in terms of reduced risk.[41]

3. Working with local authorities: Land–use planning and other policies

Effective land-use planning at a regional and local level determines the ease of finding space to support collections, sorting and preparation for reuse as well as siting relevant businesses in the reuse, repair and remanufacture. It also has a bearing on construction and demolition practices. The Waste Management Plan for England was published in 2013 and sets out the Government's ambition to work towards a more sustainable and efficient approach to resource use and management.[42] A new draft plan has been published and consultation responses are currently being analysed. The new plan will supersede the old one and it will articulate the actions for government and for others which will result in reduced waste arising and increased resource efficiency.

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[39] https://uhra.herts.ac.uk/bitstream/handle/2299/22098/14687_ExtendingtheLifeofInfantMobilityProductsAPRP15012020_004_.pdf?sequence=1&isAllowed=y

[40] https://www.pwc.co.uk/industries/assets/2020-annual-manufacturing-report.pdf

[41] https://www.wrap.org.uk/sites/files/wrap/Final%20RL%20case%20study.pdf

[42] http://www.gov.uk/government/publications/waste-management-plan-for-england

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced.[43] According to this framework, the purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.[44] The government is currently consulting on major reforms to the planning system which seeks, amongst other things, to radically change how local plans are prepared and function. These reforms, if taken forward, would mean consequential changes to the NPPF and the National Planning Policy for Waste (NPPW) to reflect any agreed changes.[45]

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and

c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

The current National Planning Policy for Waste (NPPW) sets out existing planning policy and requires local planning authorities to include strategic policies in their development plans setting out an overall strategy for the pattern, scale and quality of development, and to make sufficient provision for infrastructure for waste management, and energy (including heat). The NPPW aims to help achieve sustainable waste management by securing adequate provision of new waste management facilities of the right type, in the right place and at the right time. Under the national planning policy approach, waste planning authorities should identify in their local waste plans areas suitable for new or enhanced facilities for the waste management needs of their area. In deciding which land to identify for such facilities, waste planning authorities should assess their suitability against the criteria set out in the policy. This includes the physical and environmental constraints on development, existing and proposed

[43] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf
[44] Resolution 42/187 of the United Nations General Assembly.
[45] https://consult.defra.gov.uk/waste-and-recycling/waste-management-plan-for-england/

neighbouring land uses, and any significant adverse impacts on the quality of the local environment.[46]

The new Waste Prevention Programme for England sets out how we will enable local authorities to take action on waste prevention in construction through planning guidance.

4. Local & Regional Industrial Strategies

Multiple studies demonstrated how the circular economy can contribute at a national, regional and supranational level to objectives such as generating economy growth, creating jobs and reducing environmental impact.[47] Research by WRAP and Green Alliance indicates that net job growth in circular economy activity will be greatest in the North East, followed by the West Midlands and North West. The North East also has one of the largest unemployment rates - over 6%, compared with under 3% in the South West.[48] There is an imbalance of productivity across the UK. The ONS productivity index highlights this disparity. Manufacturing regions such as the East and West Midlands, Wales and Yorkshire and the Humber all have much lower productivity than London and the South West. According to Green Alliance, levelling up resource efficiency could be worth £10 billion in additional profits to manufacturers annually and these low productivity regions would benefit the most - bringing productivity levels up to match those of London and the South West.

It is important that local authorities allocate adequate financial support for waste prevention policies as this will have positive impacts on the economy as well. Some local authorities have chosen to do this, using funds saved from landfill tax reduction.

Between 2014-15, a 2-year waste prevention community partnership fund was delivered. Community-based organisations working in partnership were invited to apply for grant funding of £5,000 to £50,000 from the Innovation in Waste Prevention Fund. Funding was provided to 16 projects and as a result 241 tonnes of waste were diverted from landfill, 239 volunteers were recruited, 24.8 FTE jobs were created, over £90,000 of income was generated and 2,836 low income households were helped. This provided useful learning for local authorities.

WRAP has set up the Household Waste Prevention Hub which provides Local Authorities with a comprehensive online resource to enable them to produce a Waste Prevention plan and to help householders prevent waste. Throughout, the Hub provides evidence that waste prevention plans work by containing real-life and proven success stories where Local Authorities have worked in partnership with residents, community groups and businesses.[49]

In the new Waste Prevention Programme for England we commit to encouraging waste prevention activity through working with local authorities, mayoral combined authorities and local enterprise partnerships.

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[46] https://consult.defra.gov.uk/waste-and-recycling/waste-management-plan-for-england/
[47] https://www.ellenmacarthurfoundation.org/publications/delivering-the-circular-economy-a-toolkit-for-policymakers
[48] ONS, 2019
[49] https://www.wrap.org.uk/content/about-household-waste-prevention-hub

5. Taxes and other fiscal incentives

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. Greenhouse gas emissions are embodied in materials and products, with a reduction of new virgin material production as well as end-of-life treatment, such as incineration and landfill, holding significant carbon savings. For plastics, recycling 1 tonne could reduce emissions by 1.1–3.0 tonnes of CO2e compared to producing from virgin fossil feedstock.[50] The costs of using virgin raw materials and the greenhouse gas emissions are not automatically priced in by the market and are regarded as externalities. These externalities can be addressed by way of taxes and other fiscal incentives.

a. Producer Responsibility Schemes

The Extended Producer Responsibility (EPR) is an environmental policy approach that requires producers to take responsibility for their product's end-of-life stage. An EPR system could incentivise improvements in collections of products and investment in reuse, repair services as well as recycling and reprocessing infrastructure.

The Resource and Waste Strategy 2018 outlines plans for reform on the existing extended producer responsibility (EPR) schemes for packaging waste; end-of-life vehicles; batteries and accumulators; and waste electrical and electronic equipment. It also commits to review and consult on measures such as EPR for five new waste streams: textiles; bulky waste; certain materials in the construction and demolition sectors; vehicles tyres and fishing gears.

The objective of EPR for packaging waste is to maximise value from our resource and minimise waste through the circular use of materials, and to better incentivise producers to manage resources more efficiently. This includes placing responsibility on businesses for the environmental impact of their products and for the costs of managing products at the end of life. The new regulations should incentivise recyclability and reusability of packaging by rewarding/penalising producers according to specified criteria, by modulating fees with regard to those criteria. Money raised through the system should fund better and consistent recycling collections and encourage more domestic recycling and reprocessing and will deliver overall system savings. Consumers should find it easier to recycle packaging due to clear labelling, and measures related to the presentation of evidence relating to the export of packaging waste for recycling will be tightened.

The introduction of the 2013 Waste Electrical and Electronic Equipment (WEEE) Regulations in January 2014 sought to remove inefficiencies and reduce the cost of compliance for producers of electrical equipment compared to the 2006 Regulations. When considering options for encouraging increased collections we will look particularly at small mixed WEEE including the role of the 'Distributor Take-back Scheme' (DTS). The DTS allows members to

[50] Ellen McArthur Foundation, 2019

avoid collecting WEEE in store from customers and instead provides funding to support collections at Household Waste Recycling Centre.

End of Life Vehicles (ELV) follows an individual producer responsibility approach where each manufacturer has responsibility for the vehicles they produce. Producers are responsible for ensuring the vehicles are treated to appropriate standards and that the 95% reuse, recycling and recovery rate is met.

EPR measures should complement other policy measures which aim to achieve similar outcomes (such as product standards, resource efficiency criteria and landfill tax).

A review of the textiles EPR system in France was conducted with a view to assessing the likely benefits of possibly introducing a similar scheme in the UK.[51] It reported the French textile EPR scheme was associated with a rise in used textiles diverted from landfill, with the collection rate for reuse and recycling doubling from 18% to 36% between 2009 and 2017. It also contributed to job creation. The report explained the different context in the UK, with potentially different social objectives and an already (probably) higher collection rate but highlighted that in the UK, the markets for reuse remain subject to global market conditions and the markets for recycling can be low value, both of which pose risk to the longer-term prospects for landfill diversion. EPR systems also potentially provide opportunities for incentivising specific design aspects such as durability.

Our conclusion is that there are benefits of EPR if designed in an appropriate way in terms of shifting management of materials higher up the waste hierarchy to prevent waste and will be a cost-effective approach as the financial burden will be borne by polluters. Once we implement the policies, we will evaluate new provisions by using robust impact evaluation techniques.

b. *Deposit return schemes*

Deposit return schemes require consumers to pay a small deposit when they purchase a product, which can be refunded upon return of the product or packaging to a shop. These schemes can be effective in achieving very high recycling rates as well as reducing litter. Moreover, the effective separation at source would ensure the quality of material collected is high with low contamination. There is, however, little evidence that such deposit schemes would solve the problems of waste generation and, as such, other measures considered in this document should be introduced alongside these schemes to prevent waste.

We will introduce a deposit return scheme in England for single-use drinks containers. Under this scheme, consumers will be charged a deposit upfront when they buy a drink in a single-use container. This can be redeemed when the empty container is returned.

A deposit return system would encourage efficient collection of used materials for recycling and would help guarantee that waste products have a value at the end of life, increase the quality and quantity of materials available to recyclers, and stimulate demand for secondary materials.[52]

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[51] How could a textiles Extended Producer Responsibility (EPR) system help prevent textile waste and divert used textiles from landfill in the UK? Richards, S. 2018 https://www.wrap.org.uk/sites/files/wrap/UK_Textiles_EPR.pdf

[52] https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england

Reducing the amount of drinks containers littered would also have significant wider and indirect environmental benefits. Material that is littered tends to end up in black bin waste once collected and is unlikely to be recycled due to high levels of contamination. If it is not collected, litter can harm wildlife, or enter the water system and cause a serious problem as marine pollution. It is estimated that 80% of man-made debris in the marine environment originated on land before being thrown, blown or washed into rivers, canals and the sea. There would also be substantial savings for Local Authorities as the volume of household waste would be reduced as DRS material is diverted from kerbside collection as well as decrease in street cleaning costs.

Keep Britain Tidy's Beacons of Litter research suggests that the presence of large items of litter (or 'beacons') such as drinks containers in an area may have a normative effect on littering, and that the presence of 'beacon' items at a site appears to encourage others to litter those same items, increasing the likelihood that other 'beacons' will accumulate.[53] The research found that littering of drinks containers rose drastically in sites with many 'beacons' of litter (in most cases drinks containers can be classified as 'beacons' as they are fairly large, often brightly coloured or branded). This suggests that targeting drinks containers may have a knock-on beneficial effect on other forms of litter. The Independent Call for Evidence held by the Voluntary and Economic Incentives Working Group also highlighted the importance of encouraging behaviour change to stop littering at source, and to ideally also promote the capture of valuable resources that can be recycled.[54]

We will undertake an impact evaluation on the deposit return scheme.

c. *Tax on plastic packaging that does not meet 30% recycled content*

At Budget 2018, government announced that from April 2022 it would introduce a world-leading new tax on the production and import of plastic packaging with less than 30% recycled content. Plastic packaging is packaging that is predominantly plastic by weight. This tax will affect UK producers of plastic packaging, importers of plastic packaging, business customers of producers and importers of plastic packaging, and consumers who buy goods in plastic packaging in the UK. The objective of this tax is to provide a clear economic incentive for businesses to use recycled materials in the production of plastic packaging, which will create greater demand for these materials and in turn stimulate increased levels of recycling and collection of plastic waste, diverting it away from landfill or incineration.

The introduction of this tax will encourage a shift to recycled content in plastic packaging. This could have positive environmental benefits thanks to the reduction of raw material extraction during the production process. It should also move towards less usage of plastic packaging across the economy.

d. Other Consumer-related Incentives

Fiscal incentives can play a key role in preventing waste and foster policies that encourage the reuse, repair and remanufacturing of goods.

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[53] https://www.keepbritaintidy.org/sites/default/files/KBT_CFSI_Beacons_Of_Litter_2017.PDF

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

The introduction of a 5p charge in October 2015 in England on all single-use plastic carrier bags distributed by large retailers has been a success, leading to a reduction of over 90% (over 7.1 billion bags less) in the total number of single use carrier bags issued.[55]

e. Charges and Restriction for landfilling and incineration of waste

The BWPER found strong evidence that landfill tax has reduced landfill volumes and waste generation.[56] The relationship between commercial and industrial waste arisings and the standard rate of landfill tax also appears convincing even if the causality is less straightforward, with some of the effect attributable to other policies.

In England, Defra has implemented bans and restrictions on the landfilling of certain types of waste (e.g. whole and shredded tyres and industrial and automotive batteries). A study for WRAP noted that the evidence presented suggests there is minimal effect on waste prevention from landfill bans on their own, and that any preventative effect ought, probably, to be attributed to the combination of policies at work in a specific country, and the general attitude to waste management of the population.[57]

The report notes that a ban/restriction on landfill does not dictate where the material which can no longer be landfilled will be sent. Other policies, and market conditions, will tend to dictate how this material is managed once it can no longer go to landfill. In the case of some bans/restrictions, the specific design of the ban/restriction can influence what is or is not acceptable, but it is unlikely to be able to steer waste into a specified end management route, e.g. reuse.

Landfill tax is charged on material disposed of at a landfill site or an unauthorised waste site. As such, it encourages efforts to minimise the amount of material produced and the use of non-landfill waste management options, which may include recycling, composting and recovery. Increasing landfill tax in line with retail price index (RPI) means that the landfill tax can continue to help the government meet its environmental objectives.

Landfill Tax was introduced on 1 October 1996 to encourage waste producers and the waste management industry to switch to more sustainable alternatives for disposing of material. There is a lower rate of tax, which applies to less polluting qualifying materials covered by two Treasury Orders, and a standard rate which applies to all other taxable material disposed of at authorised landfill sites. Previously, the tax applied across the UK but from 1 April 2015 it was devolved in Scotland and from 1 April 2018 in Wales.[58]

The quantities of waste landfilled stayed relatively stable between 1996 and 2003e, after which they have fallen rapidly. The overall reduction in waste landfilled at the standard tax rate has been in the magnitude of some 38 million tonnes – falling from around 50 million tonnes landfilled in 2001-02 to around 12 million tonnes in 2015-16.[59]

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[55] https://wrap.org.uk/node/200992
[56] WR1403-L2-m4-6-Incentives
[57] Eunomia Research & Consulting (2012) Landfill Bans – Feasibility Research, a report for WRAP
[58] Changes to Landfill Tax rates from 1 April 2020 - GOV.UK (www.gov.uk)
[59] UK Landfill Tax final.pdf (ieep.eu)

6. Business Support & Voluntary Agreements

Our experience has shown that Voluntary Agreements can be effective in a range of circumstances. They are particularly effective at the early stages of encouraging action by industry when a common way forward needs to be found, and when there is a high degree of pressure from the public and consumers driving industry action. Impactful agreements to date include the Courtauld Agreement, the Sustainable Clothing Action Plan, and the recent Plastics Pact. These are described below. Alike the WPP Review 2013, they can be difficult to get off the ground; for example, the Electrical and Electronic Equipment Sustainability Action Plan (ESAP) was not continued although it delivered some outputs.

The Courtauld Commitment 2025 is a voluntary agreement managed by WRAP, within the grocery sector, that works along the entire food chain to reduce the environmental impact of UK food and drink. A key part of this is preventing food waste. WRAP's 'Food Waste Reduction Roadmap Progress Report, 2019' shows that retailers are increasingly publishing their own food surplus and waste data, and work is underway to ensure this is reported in a consistent manner and fully compliant with the Roadmap guidelines.[60] Four retailers have now published time-series data, revealing that between them they have prevented 12,500 tonnes of food waste a year, compared to their baselines, an average 10% reduction worth almost £40 million.[61] Between 2007 and 2018, there was a 27% reduction in food waste per capita. In total, household food waste had a 31% reduction per capita in the total amount of food thrown away that could have been eaten. Latest figures, from 2018, show that food surplus redistribution has nearly doubled to 55,857 tonnes.[62]

The UK Plastics Pact, launched in 2018, is a collaboration between businesses in the plastics sector, UK government and devolved administrations, and third sector organisations, aiming to prevent and reduce plastic waste. In 2018, WRAP published a Roadmap showing what the UK Plastics Pact members and supporters can do to deliver the UK Plastics Pact's targets.[63] The Plastics Pact 2019 progress report shows individual signatories' achievements and future plans.[64] A cost benefit analysis of the Plastics Pact between 2015 and 2020 estimated the overall monetised benefits and costs from the Plastics Pact over the period 2015-2020 to be £37.95million and £12.4million, respectively, so the benefit to cost ratio is 3.06 and the return on investment is 2.06.[65]

The Sustainable Clothing Action Plan (SCAP) is a collaborative framework and voluntary agreement in the textile sector to deliver industry-led targets for reducing the end-to-end use of resources to provide our clothing between 2012 and 2020. Over 90 organisations, including brands and retailers representing more than 48% of UK clothing sales volume, have made the voluntary SCAP Commitment to reduce the impacts of products by taking action in seven key

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[60] WRAP (2019) The Food Waste Reduction Roadmap Progress Report 2019
[61] Parry, A., Harris, B., Fisher, K., Forbes, H. (2020) UK progress against Courtauld 2025 targets and UN Sustainable Development Goal 12.3
[62] https://wrap.org.uk/sites/files/wrap/Final%20WPP%20Summary%20Evaluation%20Report.pdf
[63] WRAP (2018) The UK Plastics Pact – A Roadmap to 2025
[64] Plastics pact 2019 Progress Report
[65] Cost benefit analysis of WRAP activity funded by Defra 2015-20. Draft Summary Report. Prepared for WRAP (2019) Winning Moves. Not published

areas. The progress of signatories to the agreement was reported in 2020 and this showed signatories have reduced water footprint by 19.5%, reduced carbon footprint by 15.9% and reduced waste footprint by 2.3%, against a 2012 baseline.[66] Waste prevention in terms of less clothing waste to landfill and incineration does not appear to have improved to the same extent with a 4% reduction per tonne of clothing against a 15% target. An assessment of the proportion of used clothing re-sold by SCAP charity retailers directly as clothing in 2019 revealed a 5.8% reduction in the waste footprint from garments handled by reuse and recycling organisations since 2015.[67]

A cost benefit analysis of SCAP in 2019 shows that the monetised value of avoided carbon dioxide equivalent (CO_2e) emissions at 2015 prices was £0.13m for traded emissions and £9.28m for non-traded emissions.[68] The overall monetised benefits of SCAP over the period 2015-20 is estimated to be £9.41m while the overall costs were £6.9m, giving a benefit to cost ratio of 1.36 and a return on investment (ROI) of 0.36. Additionally, a series of wider benefits and costs that are more difficult to quantify with certainty were calculated and those include the net improvements in air quality estimated to be £0.03m, the net impacts on long range variable cost (LRVC) 0.19m, reduced water use £4.55m, or saved CO_2e from natural capital benefits £2.10m.

The voluntary Hospitality and Food Service Agreement (HaFSA) aimed at reducing food and associated packaging waste in the Hospitality and Food Service Sector by 5%. It ran between 2012 and 2015. The waste prevention target was exceeded, and actions taken by HaFSA signatories led to the prevention of approximately 25,000 tonnes of waste, of which 10,000 are attributable to the agreement. Ceased in 2015, ongoing work to support the Hospitality and Food Service sectors is being incorporated into Courtauld 2025.[69]

7. Reduce food waste generation

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 impact of UK food waste is estimated at more than 25 million tonnes of carbon dioxide equivalent emissions every year.[70] 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.[71]

For example, Defra funded WRAP to produce guidance for food producers to prevent surplus food from becoming food waste.[72] This provides key considerations for identifying, segregating

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[66] Palmer, G., Gray, S. (2019) SCAP 2020 progress 2012-2018
[67] https://www.wrap.org.uk/sites/files/wrap/SCAP-Technical-Report-2012-2019.pdf
[68] Cost benefit analysis of WRAP activity funded by Defra 2015-20. Draft Summary Report. Prepared for WRAP (2019) Winning Moves. Not published
[69] https://wrap.org.uk/sites/files/wrap/Final%20WPP%20Summary%20Evaluation%20Report.pdf
[70] https://wrap.org.uk/sites/files/wrap/Food_%20surplus_and_waste_in_the_UK_key_facts_Jan_2020.pdf
[71] https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england
[72] WRAP (2016) Guidance for Food and Drink Manufacturers and Retailers on the Use of Food Surplus as Animal Feed

and diverting suitable food surplus to animal feed in line with relevant legislation. While not providing fiscal incentives directly, this work enables food producers to gain access to payments for surplus food that would otherwise have become waste.

Under the Food Waste Recycling Action Plan, during 2017/18 support was provided to 55 local authorities with recycling food waste. Five local authorities were supported to implement intervention measures that have been shown to boost both participation in food waste collections and the amount of food waste recycled. This initiative was expanded in 2018/19 during which £300,000 of funding helped local authorities improve the performance of their household food waste collections.[73] Also, under the same plan, in 2017/18 work on improving contracts for recycling has been delivered by WRAP under the 'Framework for greater consistency in household recycling in England'. This work has included developing bespoke contract clauses that aim to incentivise recycling whether that's for outsourced contracts, or for payment arrangements between collection and disposal authorities.

In 2021, Defra will also be consulting on mandatory food waste reporting for food businesses in England. Mandatory reporting will reduce food surplus and waste by increasing data transparency and accountability of food businesses. This will have indirect environmental benefits, through the avoidance of unnecessary food production and transportation, and a reduction of food waste in landfill.

There is also evidence of financial savings for businesses. Several studies have been undertaken by Champions 12.3 and WRAP.[74] They show that businesses that invested in food waste reduction consistently received a positive return on their investment.[75] Analysis undertaken by Champions 12.3 found that 99% of companies had a positive return on their investment with half of the sites experiencing a return of £14 for every £1 invested in food waste reduction activity.[76]

8. Sustainable public procurement to encourage better waste management and the use of recycled products and materials

The Greening Government Commitments sets out the actions UK government departments and their agencies are taking to reduce their impacts on the environment. The Commitments continued with a series of ambitious targets to reduce greenhouse gas (GHG) emissions, domestic flights, waste, paper and water use. The Commitments aim to improve how Government buys or procures its goods and services to ensure they deliver the best full-life value for money, whilst reducing environmental impacts.

The latest GGC Annual Report (April 2017 to March 2018) reported:

- a 40% reduction in total waste generated, compared to the 2009-2010 baseline.
- 55% reduction in paper use compared to a 2009-2010 baseline.

[73] WRAP (2016) A Food Waste Recycling Action Plan for England
[74] https://champions123.org/
[75] https://wrap.org.uk/resources/business-case-reducing-food-loss-and-waste/hotels
https://champions123.org/the-business-case-for-reducing-food-loss-and-waste-caterers/
[76] http://www.wrap.org.uk/content/business-case-reducing-food-loss-and-waste-0

- Savings worth an estimated £24.3m were achieved through reduced waste in 2017-18 alone.
- The majority of Government departments have either a specific sustainable procurement policy or wider sustainability policy in place.[77]

In addition to this the 'Reuse of Government Assets Pilot' ran for 18 months between April 2016 and October 2017. It encouraged the reuse of stationery, equipment, and furniture across 14 Government departments. The pilot was successful and resulted in the following financial, environmental and societal benefits: £103,000 saved in procurement costs, 55 tonnes of CO_2e emissions avoided; 26 tonnes of waste diverted from landfill; over £10,000 worth of surplus equipment donated to the wider public sector and over £25,000 worth of surplus equipment donated to charity.

9. Environmental Management Systems

In terms of creditable environmental management systems, organisations in the UK may be certified to ISO14001, the international voluntary standard for environmental management systems, or to the EU Eco-Management and Audit Scheme. The UK was required to have a national EMAS while part of the EU, but registration was voluntary and uptake was low. In 2018 the UK had around 25 EMAS registrations compared to around 16,000 certifications to ISO 14001. Following EU Exit, the EU EMAS Regulation is not being brought into domestic law following the end of the Transition Period. The number of EMAS registrations has declined as a result and in November 2020 there were five remaining registrations.

A European Commission Fitness Check of EMAS across Member States in 2017 found that, although the Scheme was contributing to reducing environmental impacts and promoting improvements in environmental performance, it was substantially limited by levels of uptake. This was considered to be due to its voluntary nature, limited awareness of the scheme and significant competition from ISO 14001.

C. DATA, INFORMATION, AWARENESS RAISING & TRAINING

1. Information on Industrial processes

Research indicates that the main market failures in relation to industry are around R&D relating to new processes and materials as well as data to enable the smooth functioning of the market; for example, in relation to waste materials, or by-products, that may have another use. In addition, a better understanding is needed about behavioural and market creation challenges, and of the potential benefits in relation to multiple objectives – carbon etc, and the policy gaps. To address this, UKRI is in the process of setting up a £30million circular economy fund to support research at academic institutions in order that we may develop this evidence base. This will allow us to determine what information can and should be provided to industry.

[77] https://wrap.org.uk/sites/files/wrap/Final%20WPP%20Summary%20Evaluation%20Report.pdf

Industrial symbiosis can also generate jobs across different regions and growth for the UK economy. A study suggests that if fully implemented, industrial symbiosis could create approximately £6.9bn in extra value for the UK economy through money saved from landfill diversion alone.[78] The National Industrial Symbiosis Programme (NISP), which operated between 2005 and 2013, is reported to have led to the recovery and reuse of at least 47 million tonnes of materials, delivered savings of £1bn for businesses, generated £1bn in new sales, and created and safeguarded 10,000 jobs.[79] These figures could be much higher if it accounted for opportunities linked to the upstream market potential of resources not becoming waste, such as through reuse and recirculation of materials. This programme demonstrated to businesses what could be achieved.

Many stakeholders identify lack of access to data and information about material stocks and flows as a key barrier to industrial symbiosis in the UK. There is no single, reliable source of data on the availability of by-products or the location of materials which have already become waste; this leads to inefficiency. Other barriers include insufficient resource or knowledge to invest in symbiosis, negative perceptions about the quality of secondary materials, and possibly, as to circular economy on a wider scale, regulatory provisions as to movement of materials across borders. Actions are underway to address this information and data barrier as explained in the following section.

As committed in the Resource and Waste Strategy, the UK is taking action to establish an electronic waste tracking system, subject to consultation. This will enable granular data on the location and content of waste materials. Working with industry, we will explore how this electronic waste tracking system could be taken forward so users of waste tracking will be able to access the information they need to better understand and manage their waste, and so find the right destination for it, and how else it may in the future offer opportunities for use of waste as a secondary material.

2. **Public awareness campaigns, in particular on separate collection, waste prevention and litter reduction, and mainstreaming these issues in education and training**

Knowledge can be conveyed to individuals and organisations in a range of ways. This includes simple 'push' styles of basic information (e.g. traditional print media, modern digital media methods, and on-pack information), more complex mechanisms (e.g. the use of symbols containing meaning such as the recycling 'swoosh'), the use of exemplification through case studies as well as simply leading by example, the setting of expectations (e.g. through standards), and more structured training and education. This section sets out the channels relevant to the Resources and Waste Strategy.

[78] Technopolis Group (2018) Cooperation fostering industrial symbiosis: market potential, good practice and policy actions, number in publication: €7,642,871,207

[79] Figures from International Synergies independently verified. https://www.international-synergies.com/projects/national-industrial-symbiosis-programme/

Evidence suggests that schools-based education programmes that promote sustainable attitudes and behaviours can work.[80,81] They can help fill gaps in information and they can also lead to behavioural change.[82] For example, the Foundation for Environmental Education's Eco-Schools programme has evaluated the impact of its *Litter Less* work'.[83] They conclude that it is having an impact on the young participants with them dropping less litter and recycling and reusing more. It also has impacted positively on the attitudes of young people and prompted them to discuss relevant issues, encouraged them not to drop litter, and caused them to be more bothered by litter.[84]

Educating children and young adults about resource efficiency can transmit messages to adults within their households. Exeter University (2013) found that children can act as catalysts to promote recycling within their households and can identify opportunities to break habits at home that motivate adults to change their own behaviour.[85] Similarly, Icaro's (2017) evaluation of WRAP's Home Recycling Challenge found it can lead to positive impacts among children and their parents.[86]

However, although knowledge may persist, a behavioural effect may not. By the time young people are teenagers, they are less likely to behave pro-environmentally with respect to litter and recycling. None of the teenagers participating in the Exeter University research expressed an interest in recycling.[87,88] It cannot therefore be assumed that educating and motivating children in resource efficiency will prevent undesirable behaviours throughout teenage years.

Public awareness campaigns, such as *Recycle Now*, *Love Your Clothes* and *Love Food Hate Waste,* combine persuasive messaging with practical tips and tools to help citizens take effective action to reduce, reuse and recycle waste.

The *Recycle Now* campaign is the national recycling campaign for England supported and funded by Government, managed by WRAP and used locally by over 90% of English authorities.[89] The campaign focuses both on recycling, reducing waste, repair and reuse items. This campaign has exceeded targets for engagement, measured through reach, impressions, clicks, and shares on social media.[90,91]

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[80] Chatzsifotiou, A. (2006) 'Environmental Education, National Curriculum and Primary School Teachers. Findings of a Research Study in England and Possible Implications upon Education for Sustainable Development' *The Curriculum Journal* 17:4 pp.367-381
[81] Keep Britain Tidy (2013) Eco-Schools England: Exploring success to inform a new horizon
[82] Nisbet, M.C., Newman, T. P. (2015) Framing, the Media, and Environmental Communication *The Routledge Handbook of Environment and Communication* pp. 325-338.
[83] Although this is a self-evaluation, and self-evaluations cannot be assumed to be reliable, this particular evaluation is thought to be credible due to its large sample sizes and the input of an independent steering group.
[84] Foundation for Environmental Education (undated) Learning, Leading, Action and Community: The Litter Less Campaign Impact Measurement & Evaluation Project (2014-2017)
[85] University of Exeter (2013) Unpacking the Household: Exploring the dynamics of household recycling
[86] Icaro (2017) *Schools Resources Evaluation* (unpublished)
[87] University of Exeter (2013) Unpacking the Household: Exploring the dynamics of household recycling
[88] Keep Britain Tidy (2015) Soft drinks littering: Understanding and influencing young adult litterers
[89] https://www.recyclenow.com/reduce-waste
[90] WRAP (2019) Recycle now: Encouraging UK citizens to recycle more (not online)
[91] Downing, P. (2019) Recycling Tracker 2019 – UK results (Fieldwork October 2019) (not online)

For instance, *Recycle Now* provides information on how to dispose of unwanted textiles and furniture that can then be donated or sold for re-use.[92,93] There were three campaigns specifically targeted at increasing recycling of plastic bottles and a *Plastic Planet* campaign linking the problem of plastic litter with the solution of recycling plastics.[94,95] The *Recycle Now* campaign has recently taken a new approach to communicating recycling messages, having developed a new strategy introducing social norming to positively influence recycling behaviours. The new *Recycle Now* campaign toolkit was launched in April 2018.

The *Love Your Clothes campaign* began in 2014 and was developed together with industry to help change the way the UK consumers buy, use and dispose of their clothing. It aims to reduce the environmental impact of clothing across the UK and to influence a more circular approach to clothing globally. WRAP's report 'Valuing our clothes: the cost of UK fashion' highlights the opportunities and action that can be taken across the sector.[96]

Love Food Hate Waste, aimed to raise awareness of food waste in households and help consumers waste less food, found that 75% of consumers had seen or heard something about food waste.[97] Associated campaigns showed success in terms of reach and meeting engagement targets. Both '*Chill the Fridge Out*' and '*Make Toast Not Waste'* were social media campaigns aimed at younger people (18–34-year-olds and 18-24-year-olds, respectively). In both cases, the campaigns received good levels of engagement and were successful, as measured through clicks, likes, shares and other social media measures.[98]

The Government also provides local authorities with information on the collection of household food waste as a means of diverting material from landfill or other residual waste treatment. The guidance gives examples of ways for local authorities to raise awareness about separate collections, that have been successful in pilot projects, in terms of separating food waste from residual waste.[99]

3. Promotion of research and development including support to research and innovation in advanced recycling technologies and remanufacturing

In support of action towards a more circular economy, the UKRI has allocated funding to support academia to develop more effective ways of promoting recycling and remanufacture across multiple sectors. The steel and aluminium project canters on the top of the waste hierarchy (reduce, reuse, repair) and applies incoming ecodesign principles to promote remanufacture. On textiles, the programme will support the development of new circular design principles in addition to developing material streams from waste. The critical materials programme will develop recycling technology to enable extraction of valuable materials from

[92] https://www.recyclenow.com/what-to-do-with/clothing-textiles-0
[93] https://www.recyclenow.com/what-to-do-with/furniture-0
[94] Radley Yeldar (2020) Campaign Results: Squeaky Clean, Bathroom Plastics and Milk Bottles (not online)

[95] Radley Yeldar (2018) WRAP Recycle Now Plastic Planet Campaign (not online)

[96] WRAP (2017) Valuing Our Clothes: the cost of UK fashion

[97] WRAP (2019) Citizens' Attitudes to Food Waste, Packaging and Plastic Packaging: UK survey 2019 (not online)
[98] WRAP (2018) Love Food Hate Waste Make Toast Not Waste Evaluation (not online)

[99] WRAP (2020) Household Food Waste Collections Guide

the new streams of waste (electric vehicle batteries, wind turbines) which in turn can be used in the manufacture of replacement new EV batteries and wind turbines. For the construction sector, research will develop carbon neutral "circular cements", which will avoid the practice of 'down-cycling'. The chemicals programme will work on applying advanced degradation techniques to waste which will result in chemical waste being reduced to its basic molecular components – at this point these molecules can be resynthesized into any number of new products. This will reduce on our dependence on gas and oil. However, the significant win for this work is that it can effectively manage residual waste – the part of waste that is the most difficult to recycle because of its mixed nature.

Remanufacturing is one way to retain the value of a functional product rather than focusing on its material value through recycling or recovery.[100] It is defined as "returning a product to at least its original performance with a warranty that is equivalent or better than that of the newly manufactured product."
The process involves dismantling, restoring and replacing components, and testing the individual parts, and the whole product, to ensure that it is within its original design specifications. Performance after remanufacturing is expected to be at least to the original performance specifications.[101]

- Remanufacturing brings products or components back into use. In that sense it sits alongside reuse as a way to extend product lifetime. It is most appropriate where an item is high value, not subject to high levels of technological evolution (such as aeroplanes, automobiles, trains, or large medical machines like MRI scanners), and where there are suitable channels or mechanisms for return to the manufacturer or their agent.[102] Remanufacturing can only take place if a product is designed in a way that allows the removal, repair and replacement of its parts.
- Remanufactured medical devices and aerospace components sell for around 30%-70% cheaper than new ones and uses 85% less energy than primary manufacturing.[103] Better product design would further allow businesses to unlock this potential through ease of disassembly and reassembly of products.
- According to a European Remanufacturing Network report (2015), the sector showing the highest intensity of remanufacturing was found to be the ink and toner cartridges sector. The associated resource efficiency savings are fuelled by the sector's aim to cut costs and improve profitability.
- However, due to differences in how these products are constructed (glued, riveted, or welded), remanufacturing potential cannot always be exploited in full. Designing products for ease of disassembly using screws instead of glue also means that the absence of adhesive reduces contamination and makes remanufacturing easier.[104]

Remanufacturing is an established process and has previously been driven by the intrinsic value of components, products and materials. There are strong links between remanufacturing,

[100] Oakdene Hollins (2018) Value Retention is the New Recycling
[101] http://www.remanufacturing.org.uk/what-is-remanufacturing.php
[102] http://www.remanufacturing.org.uk/pdf/story/1p78.pdf
[103] Steinhilper (2006), Remanufacturing: The Ultimate Form of Recycling.
[104] The European Remanufacturing Network (2015) Remanufacturing Market Study

extended producer responsibility and resource efficient business models. Thus, the cross-cutting measures and incentives discussed across the production section would likely help with further growth of the remanufacturing sector. The Consumption Chapter discusses further the demand for and supply of remanufactured products and associated barriers.

4. Metrics[105]

The BWPER examined existing metrics used to quantify waste prevention in the business waste context. It found that the most common metrics used were financial savings and material/waste reduction. Hazardous waste reduction was also identified as a metric in some of the literature reviewed. Variation in metrics was observed between different 'users' - e.g. academia, businesses - reflecting their different needs and interests. It was also noted that the metrics used had changed over time, becoming more complex and latterly including carbon savings as a priority alongside financial savings and material/waste reduction. The BWPE identified a number of learning points for the use of metrics including ensuring that metrics are credible to businesses by keeping them relevant and simple, and by reporting the financial impacts that are observed by business.

When developing the Waste Prevention Programme 2013, Defra worked with stakeholders to identify a suite of seven metrics to monitor progress in waste prevention. These metrics were:

1) waste arisings by sector (households, commercial and industrial (C&I), construction, demolition & excavation and other);[106]
2) hazardous waste arisings by sector;
3) waste from households;
4) waste arising per unit of gross value added (GVA) for the commercial and industrial sector;
5) raw material consumption per unit of gross domestic product (GDP);
6) gross value added of the repair, reuse and leasing sectors, and;
7) GHGs from landfill

Progress against the metrics was reported on in the Digest of Waste and Resource Statistics, published on an annual basis between 2015 and 2018 inclusive,[107] as well as within the 2020 Waste Prevention Programme Review.[108] Since the first Waste Prevention Programme was released in 2013, significant improvements have been made by Defra and industry partners in measuring and monitoring waste, for instance within the C&I sector.

Though there has been no further publication of the Digest of Waste and Resource Statistics after the release in 2018, much of the data presented in the Digest will continue to be tracked

[105] Annex IV (rWFD), measure 3 - The development of effective and meaningful indicators of the environmental pressures associated with the generation of waste aimed at contributing to the prevention of waste generation at all levels, from product comparisons at community level through action by local authorities to national measures
[106] Agriculture, forestry, fishing, mining and quarrying
[107] https://www.gov.uk/government/collections/digest-of-waste-and-resource-statistics
[108] https://wrap.org.uk/node/200992

as part of the Resources and Waste Strategy and subsequently presented in its Indicator Framework '*Monitoring Progress'*.[109]

The BWPER also explored issues around the ease of comparison between different metrics, highlighting the need for common metrics calculated using equivalent assumptions and methodologies.

The Environment Bill allows for long-term targets to be set in respect of any matter which relates to the natural environment. The government is exploring as a priority how targets can help increase resource productivity and reduce the volume of residual waste we generate.

5. Training programmes for competent authorities

The Environment Agency provides training programmes in regard to the insertion of waste prevention requirements in environmental permits. There is currently no evaluation of the impacts of those training programmes. Environment Agency officers who regulate waste facilities undergo a six-month programme of mandatory training and accompanied site visits before they are assessed for their warrants. The initial training is then followed by a further 18 months of on-the-job development which is again assessed to ensure that officers understand the legislative requirements, such as the waste hierarchy, and can advise the businesses they regulate. This development programme is independently assessed and endorsed by the Chartered Institution of Wastes Management (CIWM).

[109] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf