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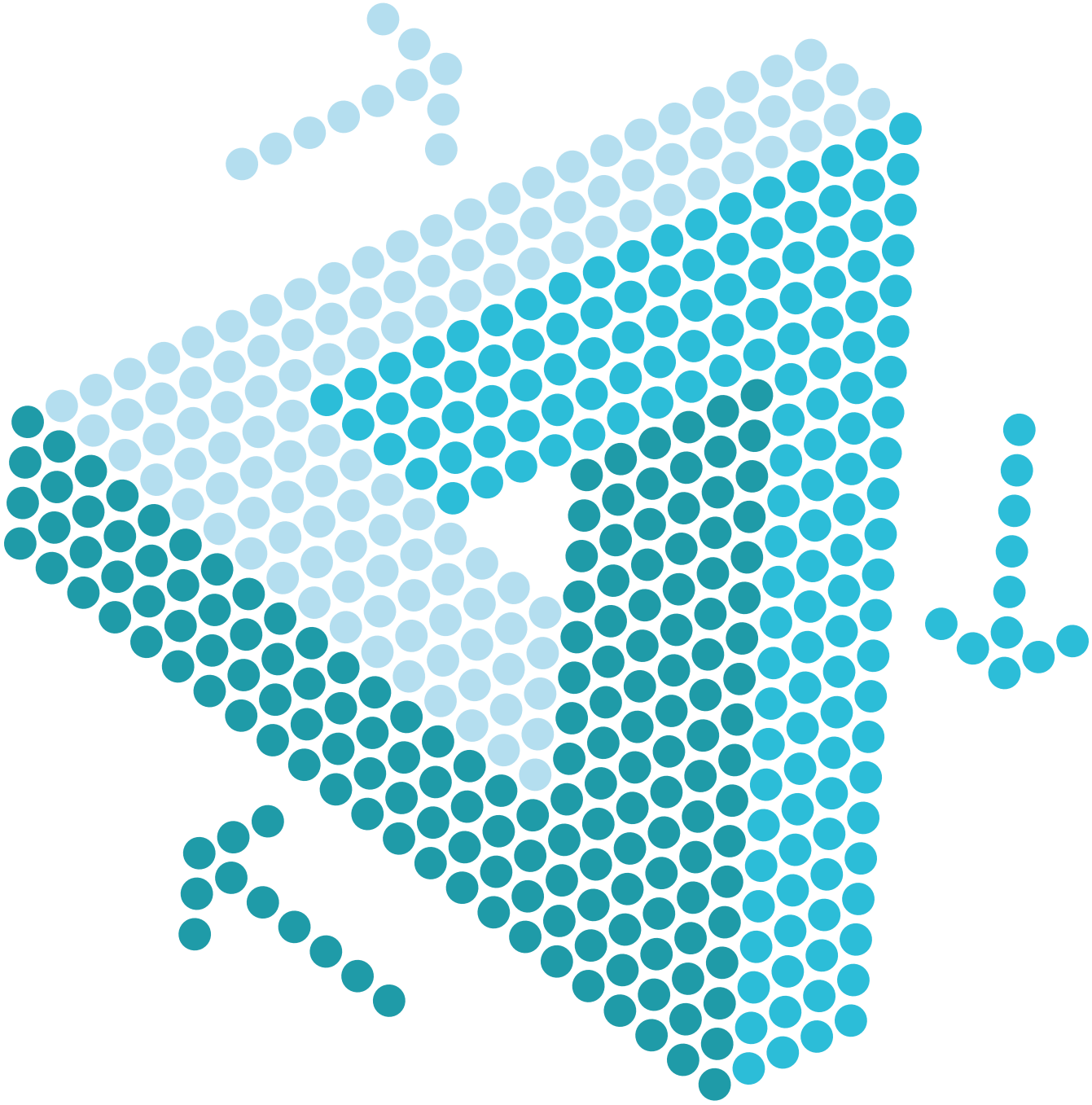

CLOSING THE LOOP TIME TO CRACK ON WITH RESOURCE EFFICIENCY

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ALDERSGATE GROUP

The Aldersgate Group is a politically impartial, multi-stakeholder alliance championing a competitive and environmentally sustainable economy.

The Aldersgate Group is an alliance of major businesses, academic institutions, professional institutes, and civil society organisations driving action for a sustainable and competitive economy. Our corporate members, who have a collective turnover in excess of £550bn, believe that ambitious and stable low carbon and environmental policies make clear economic sense for the UK.

Our policy proposals are formed collaboratively and benefit from the expertise of our members who span a wide range of industry sectors and public interests. Our breadth and collegiate approach allows us to formulate progressive policy positions to benefit all organisations and individuals.

ORGANISATION MEMBERS

Recommendations made in this report cannot be attributed to any single organisation and the Aldersgate Group takes full responsibility for the views expressed.

EXECUTIVE SUMMARY

Resource efficiency: key to reducing emissions, restoring nature and driving competitiveness

The global economy is embedded in nature. Since the Industrial Revolution, wealth and productivity have been dependent upon the exploitation of natural resources. Without cross-cutting and concerted action to break the link between economic growth and the inefficient use of natural resources, current trends will accelerate the biodiversity crisis and climate change. As illuminated by the recent Dasgupta Review,[1] our demands on nature far exceed its capacity to supply them, posing significant risk to the health and well-being of economies and societies.

It is essential that we transform our linear model of production and consumption into a circular economy, in which resources are kept in use for as long as possible, with maximum value extracted during use (i.e. highly resource efficient). Beyond immediate resource efficiency benefits, a move towards a more circular economy offers significant potential for emissions reductions across many sectors of the UK economy. Research has shown that **improving resource efficiency in construction, vehicles, food and drink, electronics and appliances, and textiles could enable the UK to meet its Fourth Carbon Budget and reduce the expected emissions gap to meet the Fifth Carbon Budget by nearly 80%.**[2] The need for greater resource efficiency has become particularly crucial given the UK Government's recent and welcome adoption of a 2035 target to reduce emissions by 78%, as recommended by the Climate Change Committee in the Sixth Carbon Budget.[3]

A transition to a more circular economy also offers demonstrable and significant economic and social benefits. Research has found that 517,000 gross jobs in the UK could be created by 2030, including in regions where there is persistent unemployment,[4] with a net gain in Gross Value Added (GVA) of £9.1bn.[5] Producing more with greater value for less, has the potential to lower production costs, increase supply security and secure long-term competitiveness. A more circular economy could create more resilient and, where economically desirable, localised supply chains, that are less prone to disruption in the event of global shortages or breakdowns in the supply of key materials.

In light of its environmental and economic benefits, driving greater resource efficiency across the economy must become a central, cross-government priority. **Government policies must drive a common purpose through many interconnected supply chains and avoid targeting specific sectors or components of the value chain in silos.** This will require the coordination of policies across *all* relevant Whitehall departments. HM Treasury; the Department for Business, Energy and Industrial Strategy; Department for Transport; and Ministry of Housing, Communities and Local Government all have crucial roles to play in championing the transition to a more circular economy and supporting the development of policies that will genuinely drive greater degrees of resource efficiency.

Whilst this report references the UK, in practice **most of our recommendations are focused on England**, given the fact that the Government's proposals on resources and waste apply to England alone. Nonetheless, **the Aldersgate Group encourages as much collaboration between Westminster and devolved governments as possible on resources and waste policy, particularly given the important progress Wales and Scotland have made in this area** (explored in detail in Section 2). Progress from retailers, builders and manufacturers can occur more rapidly if lessons are shared between the four nations and evolving approaches on resource efficiency and circular economy are as consistent as possible.

England's resources and waste policy: a more detailed and lifecycle approach urgently needed

What is needed going forward is a systems approach that incentivises greater co-ordination of the entire economic value chain, covering manufacture, supply, retail, consumption and waste. Government needs a holistic vision in which circular economy principles are integrated into all sectors of the economy. Many of the greatest environmental gains in resource efficiency will often be in areas that do not hold the same level of public attention as plastic packaging, such as re-manufacturing, which currently only accounts for around 2% of European manufacturing turnover.[6]

Despite clear environmental, competitiveness and economic resilience benefits, UK Government policy development on resources and waste has often been piecemeal and subject to repeated delays. The Government first proposed several major and welcome policy reforms for England in its Resources and Waste Strategy of 2018, including the introduction of eco-design standards, Extended Producer Responsibility schemes, a Deposit Return Scheme, plastics tax, and a National Materials Datahub. **This policy package as a whole has been developing too slowly since 2018, with the recent Waste Prevention Programme of 2021 containing minimal new policy measures.** Despite a positive overarching vision, Government strategies in this area lack ambition and detail, and appear to have received limited buy-in from other government departments beyond Defra's extensive work in this area.

Further, some of the policy proposals put forward would have voluntary status, such as the proposal to introduce a new voluntary agreement for textiles. Whilst these can have some value as an initial step, previous voluntary schemes on resource efficiency have exhibited poor performance and yielded fundamentally limited impact. In this report, **the Aldersgate Group calls for the Government to prioritise the implementation of measures in the Waste Prevention Programme which will drive resource efficiency at the early stages of the product lifecycle and the waste hierarchy, with a particular focus on better product design, waste prevention, material re-use and remanufacturing. These can offer the greatest impacts in terms of reducing primary resource use and maximising economic value from resources.** The Group calls in particular for the rapid implementation of mandatory product standards and labelling schemes, ambitious fee modulation for Extended Producer Responsibility schemes, a wide-ranging Deposit Return Scheme and an escalator for the plastics tax.

Next steps for an ambitious and coherent resources and waste policy in England

This report assesses the progress that has been made in terms of policy development in England since the publication of the Resources and Waste Strategy in December 2018, highlights priority areas of action where the implementation of existing proposals needs to be accelerated, and puts forward additional recommendations to address current policy gaps. This includes suggested next steps in terms of fiscal incentives, product design, extended producer responsibility schemes, amending public procurement criteria, and investing in infrastructure to support resource efficient business models. It also makes the case for promoting and raising consumer confidence in new circular economy business models based on 'servitisation' (i.e. leasing and subscription), and calls for UK trade policy to be better aligned with sustainability considerations. **This report also takes a deep-dive into the challenges facing two resource intensive sectors – construction and automotive – and provides policy recommendations specific to these two sectors.**

Key recommendations for Government

Accelerating the delivery of existing policy commitments

1 **Resources and waste policy must become a cross-government priority, with BEIS, HMT, DfT, Cabinet Office and MHCLG all proactively contributing to policy development in this area.** This will require clear alignment between key upcoming government strategies and the objectives of the Waste Prevention Programme. Lesson sharing and close collaboration between the Westminster and devolved governments will also be essential to promote as much consistency as possible on resources and waste policy and support supply chains and businesses operating across all four nations.

2 **Implement the policy proposals first set out in the Resources and Waste Strategy of 2018, with urgency and ambition. In particular:**

- The **development of eco-design standards and lifecycle assessments should be prioritised** and developed with transparency, with the aim of capturing a rapidly growing range of priority products. All **eco-design standards and labelling schemes** should be introduced with **mandatory status**;
- **The roll out of Extended Producer Responsibility (EPR) schemes should be accelerated beyond the focus on packaging to incentivise the development of products that are easier to re-use and recycle. To be effective, these schemes will need ambitious fee modulation mechanisms,** an overarching aim to stimulate reuse and waste prevention, clear definitions, and close monitoring of performance;
- The design and role of **Deposit Return Schemes should be clarified in the near future, with a particular focus on introducing these schemes in areas where progress may not be sufficiently made by the introduction of EPR schemes and eco-design criteria. Deposit Return Schemes should be simple and convenient to use,** and be designed alongside stakeholder engagement and a complementary public education campaign;
- The **plastics tax should be implemented with an escalator** on the rate of tax or percentage of recycled material to give a long-term trajectory for businesses.

3 **Strengthen the interim targets and Environmental Improvement Plan provisions (EIPs) in the Environment Bill to provide robust and predictable interim milestones for a stable investment context on the way to meeting the Bill's legally-binding long-term targets.** Additionally, the Bill's target development process needs to be supported by industry pathways, for clarity on what each economic sector will need to do to achieve the Bill's ambitions.

Tackling important policy gaps

4 **Introduce pricing mechanisms to better reflect the lifecycle, economic and environmental benefits of using secondary materials where their upfront cost is higher than that of primary raw materials.** These should include:

- **Adjusting tax and VAT rates to incentivise circularity,** as undertaken by Sweden on repair services or on the regeneration of the existing housing stock;
- **Broaden the scope of the tax levied on single-use plastics** to cover other single-use materials;
- **Expand the UK Emissions Trading Scheme** to cover emissions from the waste sector.

5 **Develop criteria for the £290 billion a year spent by the UK on public procurement[7] to drive demand for products and services with higher resource efficiency standards.** The Government could build on the criteria developed under the European Commission's Green Public Procurement framework, which cover an increasing range of products, including textiles, road transport, food and furniture.

6 **Building on the recommendations of the Green Jobs Taskforce, the Government should adopt a comprehensive low carbon skills strategy to equip the existing and future workforce with the skills they will need in a more circular, net zero emissions economy.**

- The Government should collaborate with schools, colleges, and higher and further education institutions to **embed climate change and environmental sustainability education across the national curriculum and education system, as well as promote a much wider uptake of STEM skills learning.** This must come hand in hand with a review of teaching standards and the Initial Teacher Training Content Framework to ensure teachers have the right knowledge to support their pupils and students.[8]
- The adoption of **skills action plans should be made mandatory for all educational providers, including Further Education (FE) and Higher Education (HE).** Action plans should aim to drive greater teaching and uptake of environmental education, essential soft skills (project management, communications skills, etc.) and STEM skills, and to increase gender and ethnic diversity in STEM subjects.

The **Apprenticeship Levy standards should be adapted** to reflect the Government's aims on resource efficiency and net zero.

To support workers already on the job market and in need of reskilling, the Government should continue to provide **financial support for training, upskilling and retraining through the National Skills Fund**. This should be matched by Further Education Institutions offering a broader range of flexible, short-term courses focused on the climate and resource efficiency-related skills workers will increasingly need.

Circular design principles should be included in all engineering, planning, architecture and design degree courses.

7 **Provide public finance – such as through the UK Infrastructure Bank and future green sovereign bond issuances – to support the development of critical infrastructure and facilities for recycling, repair, remanufacturing and reuse.** This infrastructure is essential to create integrated supply chains for secondary materials and support the UK in processing a higher proportion of its own waste and retaining and reusing a larger share of materials within the economy. Targeted public finance can play a key role in crowding in private sector investment in these areas.

8 **Conduct public awareness campaigns to build consumer confidence and grow the demand for resource efficient products and business models (such as those based on 'servitisation', i.e. leasing and subscription) and disincentivise demand for disposable business models such as fast fashion.** Clear communication campaigns will be important to establish trust in secondary products and materials.

9 **Facilitate greater trade in circular products and materials, by featuring circular economy principles in the trade and sustainable development chapters of trade agreements.** As the Aldersgate Group set out in a recent policy briefing,[9] Government must also use its trade policy to provide a level playing field to ensure that domestic businesses innovating in resource efficiency are not exposed to unfair competition from imports with lower environmental standards.

Sector-specific recommendations: buildings and automotive

Circularity in the built environment:

10 **Regulate building design to reduce embodied and operational emissions, with the introduction of a mandatory minimum whole lifecycle carbon standard that is strengthened over time with differentiated targets by function and use.** Government could build upon the guidance produced by the Royal Institute of Chartered Surveyors (RICS) on whole life carbon assessment for the built environment.[10]

11 **Penalise design for buildings with short life spans and require design criteria and "as-built" information to be stored for easy retrieval to allow the adaptation of existing developments.**

12 **Introduce mandatory product standards to reduce embodied emissions in construction materials and increase their resource efficiency.**

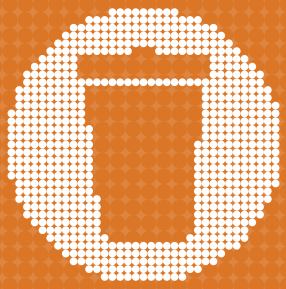
Circularity in the automotive sector:

13 **Develop a common methodology for the assessment and reporting of the whole lifecycle emissions and resource use of vehicles.**

14 **Introduce mandatory product standards for the UK automotive sector on durability, reusability, repairability, and recyclability.**

15 **Provide incentives for pooled mobility and car sharing models to increase the passenger mile per unit of material and support a shift away from private vehicle ownership. The upcoming Transport Decarbonisation strategy should aim to boost uptake of public transport and active travel – cycling and walking.**

Section 1 of this report establishes the importance of moving towards a more circular economy and sets out the need to adopt a systems approach, demonstrating the breadth of benefits such an approach offers to the UK in the context of economic recovery.



Section 2 analyses the Government's proposals in its recent Waste Prevention Programme and highlights some of the key measures which should be prioritised and implemented with urgency.

Section 3 sets out the gaps in the policy landscape and explores the untapped potential of policy that will be needed to overcome the technological, infrastructure, fiscal and market barriers preventing expansion of circular markets.

Section 4 takes a deeper dive into two specific industries – **automotive and construction** – to illuminate what resource efficiency measures will mean in practice at a sectoral level, and provides policy recommendations in these areas.

ONE RE-ESTABLISHING THE IMPORTANCE OF RESOURCE EFFICIENCY

This section establishes the importance of moving towards a more circular economy and sets out the need to adopt a systems approach, demonstrating the breadth of benefits such an approach offers to the UK in the context of economic recovery.

1.1 Introduction: What is a circular economy?

Since the Industrial Revolution, wealth and productivity have been dependent upon the exploitation of our natural resources. From 1970 to 2017, the annual global extraction of materials grew from 27 billion tonnes to 92 billion tonnes, and is expected to double again by 2060. Our linear model of production and consumption is not only highly wasteful but also an important contributor to climate change. The extraction and processing of materials, fuels and food contributes half of total global emissions and to over 90% of biodiversity loss and water stress. Additionally, high-income countries maintain levels of per capita material footprint consumption that are more than 13 times those of low-income countries.[11]

As illuminated by the recent Dasgupta Review, our economy and society is embedded in nature yet our demands on nature far exceed its capacity to supply them, putting biodiversity under significant pressure and society at extreme risk. We **therefore must place boundaries on our consumption and use of natural resources**. Without cross-economy and concerted action, rapid growth and inefficient use of natural resources will accelerate the biodiversity crisis and climate change, posing significant risk to the health and well-being of humanity. A circular economy is an alternative to our traditional linear economy – make, use, dispose – in which resources are kept in use for as long as possible, with the maximum value extracted from them while in use. Emissions are curtailed, further loss of biodiversity is prevented, and waste reduction means that land degradation, soil contamination and waterbodies pollution are minimised.

FIGURE 1 THE WASTE HIERARCHY

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.

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

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

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

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.

Disposal
Landfill and incineration without energy recovery.

Source: HM Government, Our waste, our resources: a strategy of England (2018)

In understanding the circular economy, the waste hierarchy is an important tool to appreciate the different levels of opportunity to conserve resources and the environmental benefits of each. The hierarchy gives a ranking of priority, starting with **prevention of waste** – using less material in design and manufacture and keeping products in primary use for longer. Next down the chain is **re-use** – repairing, refurbishing, remanufacturing products for a second life. Another step down is **recycling** – turning waste into a new product or substance, followed by **recovery** – utilising waste, for example through energy from waste through incineration. The final stage in the hierarchy is **disposal** – sending waste to a landfill. The hierarchy makes clear that the aim of resource efficiency should be to extract the maximum benefits from products and materials possible, by aiming for the earliest stages.

The last five years have seen a huge wave of public attention on plastic pollution, with surveys demonstrating that almost all of the British public is concerned about the impact of plastic waste on the environment.[12] The significant rise in public awareness about plastic and packaging waste, and subsequent policy response is welcome, but must not distract from the need for a whole systems approach. Many of the greatest environmental gains in resource efficiency will often be in areas that do not hold the same level of public attention, such as re-manufacturing which only accounts for around 2% of European manufacturing turnover.[13]

Beyond consumer products, there is significant opportunity for resource efficiency savings in industrial processes and across all sectors of the economy. All government departments must embed circular economy principles in their policy-making to ensure regulations, fiscal incentives and market mechanisms are aligned to support resource efficiency and capturing the maximum value of materials in use. Similarly, whilst a significant number of businesses are focussed on recycling their products, this only retains the value of material that is turned into a new product. Remanufacturing, refurbishment, repair and reuse enable the retention of the inherent value of products themselves. Beyond utilising waste and minimising harmful disposal, a truly circular economy means transforming our production methods and consumption behaviours.

1.2 Benefits of resource efficiency

Progress towards a circular economy offers huge potential for the UK in meeting its net zero target. Research has shown that improving the resource use in construction, vehicles, food and drink, electronics and appliances, and clothing and textiles could enable the UK to meet its Fourth Carbon Budget and reduce the expected overshoot for the Fifth by nearly 80%.[14] In the longer term, research from the Ellen McArthur Foundation has found that when applied to four key industrial materials (cement, steel, plastic and aluminium), circular economy strategies could help reduce emissions by 40% in 2050.[15] Tackling these industrial process emissions is an opportunity to accelerate the decarbonisation of materials and manufacturing that will be crucial to reach climate neutrality by mid-century.

Whilst environmental improvement is a clear co-benefit of resource efficiency, the economic benefits are just as well documented. Producing more with greater value for less has the potential to lower production costs, increase supply security and secure long-term competitiveness. The past decade has seen a dramatic increase in the price volatility and the incidence of supply chain disruptions of a host of essential raw materials, with environmental costs of production being a crucial factor.[16] Research suggests circular economy business models offer a range of possibilities to distribute risk across supply chains, increasing their flexibility and resilience.[17] Progress towards a circular economy will offer particular security to the UK as a net importer of materials for domestic use. The proportion of material footprint sourced from China by the UK rose between 1990 and 2017 from 2% to 17%.[18] Reducing raw material consumption would reduce the UK economy's exposure to volatile commodity prices, increasing resilience.

With rising amounts of waste being generated annually (at 221 million tonnes in the UK in 2016)[19] and increasing pressure on the environment, a circular economy would inject much needed resilience into an economy recovering from the pandemic. The transformation from the existing linear economy to a

closed loop for materials could make a **net contribution to UK employment and create 517,000 gross jobs**, including in regions where there is persistent unemployment.[20] By 2030, the UK could see major returns – research commissioned by SUEZ estimates that a shift to resource efficiency would see a total net gain in Gross Value Added (GVA) of £9.1bn in 2030.[21]

This is further reinforced by business trials that the Aldersgate Group was involved in as part of the REBus programme. REBus was an EU funded initiative that set up 26 trials in the UK and the Netherlands involving government bodies and businesses of all sizes with an aim to help organisations develop business models that would cut resource use and identify the barriers to doing so. Findings from the programme show that the move to a more resource efficient economy can have significant positive impacts on the UK economy and could **deliver an increase of up to £76bn in Gross Value Added by 2030**, whilst also improving resource security.[22]

For businesses, making further progress on waste prevention allows them to reduce costs and generate revenue from their waste where it can be used to create new, quality products. UK businesses could realise resource efficiency savings of at least £3bn per year at low or no cost.[23] Other benefits to society include lowering the cost of accessing goods and services, for example through new business models favouring access over ownership, replacing primary with high-quality secondary materials, and utilising digital technology to address structural waste in supply chains. Research has shown that **regulation conducive to waste-prevention has driven business innovation and made first-movers more competitive internationally**, in addition to creating higher-skilled jobs that are needed for remanufacturing, as opposed to lower-skilled jobs associated with landfill waste processing.[24]

Helpfully, **there is already demonstrable public support for circular economy measures that go beyond packaging and plastic concerns**. Members of the Climate Assembly, a representative group of UK citizens tasked by the House of Commons to work out how the country should reach net zero, strongly supported a future in which businesses make products using less – and lower carbon – energy and materials. They backed a range of specific policies to support this aim, including 'resource efficiency targets and standards' (91%), an 'amended procedure for awarding Government contracts that gives preference to low carbon companies and products' (83%), and taxes on producers, products and services (83%). Assembly members supported the idea of individuals repairing and sharing more, with less purchasing of new products. They backed 'measures to enable product sharing' (77%) including technical and financial support to businesses who offer sharing or renting services.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1.3 A resilient recovery from COVID-19

The COVID-19 pandemic has led to some undesirable roll-back on the progress of environmental regulations, particularly around reusable and single use products, and has contributed to delays to consultation on key provisions of the UK's Resources and Waste Strategy, including extended producer responsibility. The global plastic packaging market size is projected to grow from USD 909.2 billion in 2019 to 1012.6 billion by 2021, at a compound annual growth rate of 5.5%, mainly due to pandemic response.[25] Since the pandemic began, recycling businesses have shrunk by more than 20% in Europe, by 50% in parts of Asia and as much as 60% for some firms in the US.[26] This roll-back must be reversed as countries recover from the pandemic, with clear policies and incentive structures enabling businesses and consumers to make environmentally-positive choices.

As set out in the Aldersgate Group's recent report commissioned to academics at the Grantham Research Institute at the London School of Economics, **a recovery package based on sustainability and resource efficiency can generate a sustained economic recovery, with stronger job creation and ultimately, stabilise public sector debt.**[27] It can also act to decouple economic growth from materials use and greenhouse gas emissions while boosting the productive efficiency and long-term competitiveness of the economy. Our recent report with Buro Happold,[28] found that the pandemic has allowed for a reassessment of priorities and increased importance of environmental protection, and of circular and localised supply chains from the additional resilience they bring. Business representatives interviewed for the research appreciated the ambition of emerging resources and waste policy, but were quick to raise the importance of good environmental policy design. The report demonstrated the need for adaptability, a broad view of all aspects of the circular economy in order to accelerate collaboration across sectors, and a clear target escalator that gives businesses confidence to invest and innovate.

TWO ACCELERATING GOVERNMENT PROGRESS ON RESOURCES AND WASTE

This section analyses the UK Government's proposals in its recent Waste Prevention Programme and highlights some of the key measures which should be prioritised and implemented with urgency.

2.1 Beyond the waste sector to a systems approach

Radical changes are required across the whole value chain to transform our linear economy into a more sustainable circular one. Given the mounting evidence showing that improving resource efficiency across different economic sectors will be critical to reach net zero emissions, a more comprehensive approach is needed from Government. Ambitious action on the circular economy is being increasingly enacted globally, from Wales' zero waste and one planet resource use goals for 2050, to Europe's sustainable framework for products, to 'right to repair' legislation developed in the United States. Further examples are explored in Table 1.

Existing legislation and target setting around waste and resources have chiefly focused on the "end of the pipe" by promoting landfill diversion and recycling. For example, the interpretation of extended producer responsibility does not give enough prominence to prevention and reuse, leaving the UK out of step with the EU's framework approach. Similarly, under public ownership the Green Investment Bank dedicated the vast majority of funds in resources and waste to end of life treatment.[29] **Policy focus now needs to shift beyond the later stages of the waste hierarchy to the earlier stages of prevention and re-use, and seek to influence the causes of waste inherent in the production and consumption of goods and services.**

As the Climate Change Committee identified in the Sixth Carbon Budget, there are considerable opportunities to improve resource efficiency that are not being taken, even though they would reduce costs to consumers. Resource efficiency offers the opportunity to reduce emissions in hard to treat sectors and accelerate the transition to a net zero economy. For the industrial production of cement, steel, plastics and aluminium, the main sources of emissions come from high temperature processes, production emissions and end of life emissions.[30]

Circularity reduces the emissions from new production in addition to those related to disposal and with these, some of the most difficult to abate emissions. In designing industrial products with alternative feedstock materials – low carbon or renewable – emissions are reduced from the outset. Furthermore, re-manufacturing and refurbishing processes can be powered through renewable energy, unlike the production of many primary materials. **If pursued strategically and systematically, resource efficiency measures can enable increased production activity without the associated rise of environmental impacts, and with significant cost savings to producers and consumers.**

A systemic approach is required that appreciates the interdependences of the entire economic value chain, from manufacture to supply, retail, consumption and waste. Given the complexities involved in leveraging such change, policies will have to drive a common purpose through many interconnected supply chains. Government must avoid introducing policy interventions that target only a specific sector of component of the value chain. Instead, policy must ensure involvement of all relevant departments across Whitehall in creating resource efficiency policy. HM Treasury, the Department for Business, Energy and Industrial Strategy, Department for Transport, and Ministry of Housing, Communities and Local Government all have a crucial role to play in championing the transition to the circular economy.

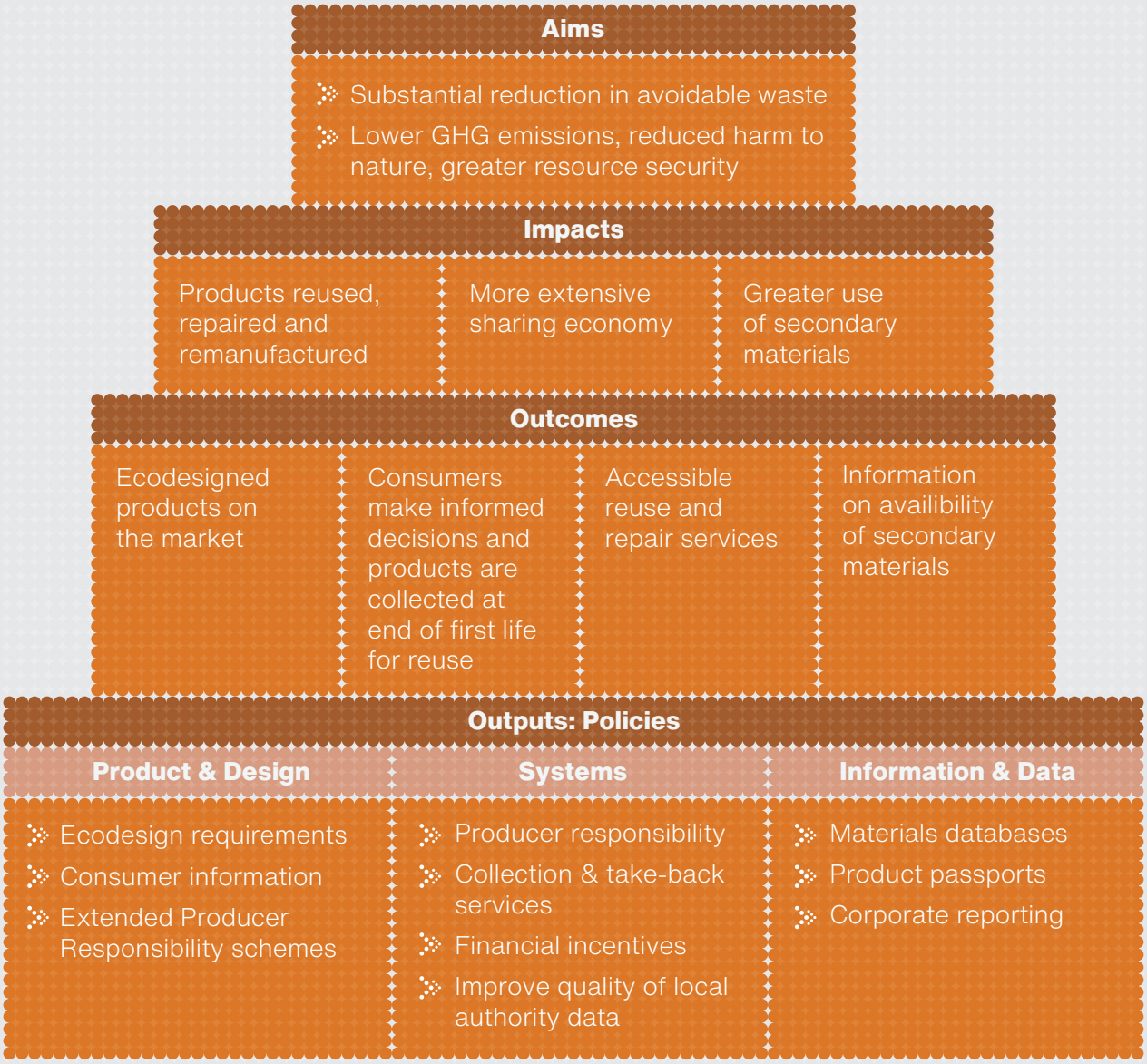
Alignment between the objectives of the Government's Waste Prevention Programme and other Government strategies, particularly the upcoming net zero strategy will be essential to properly integrate circular economy considerations. **Designing out waste and pollution, keeping materials in use, and regenerating natural systems will result in environmental benefits; generate significant economic returns; reduce our dependence on virgin resources and imports; boost local repair, remanufacturing, and upcycling economies; and better equip us to address climate change and exogenous shocks like COVID-19.**

TABLE 1: GLOBAL AMBITION ON THE CIRCULAR ECONOMY

The table below provides examples of best practice in resources and waste policy from other countries, highlighting the policy levers that have had a significant impact and could also be replicated in England.

Country	Circular economy measures/targets
Wales	In its recent Beyond Recycling Strategy,[31] the Welsh Government has committed to **'One planet resource use'** and **'zero waste' goals by 2050, aiming to phase out residual waste to landfill and incineration**, i.e. an effective 100% recycling rate from all sectors. A target of **70% recycling of all waste by 2025**, alongside statutory local authority recycling targets at the same level. A £6.5 million fund has been made available for local authorities and public bodies to increase their recycling rates. Development of **re-use targets for local authorities**, aiming to prioritise re-used and remanufactured content in the goods that the public sector procures. A proposal to place a **moratorium on any future large-scale energy from waste developments**. Resource efficiency is **mainstreamed into Government strategies** and is a core component of its Covid-19 Reconstruction: Challenges and Priorities Strategy,[32] and features strongly in a range of policies, including Wales' Natural Resources Policy[33] and its economic approaches.
Europe	The EU's Circular Economy Action Plan[34] aims to **decouple economic growth from resource use** through a set of initiatives aimed at creating a sustainable framework for products, services and business models. The plan contains the following actions: • A **sustainable product policy** legislative initiative focusing on durability, repairability and recyclability. • **Mandatory Green Public Procurement** (GPP) criteria and targets, with mandatory reporting on GPP. • Consumer rights legislation to establish a **right to repai**r and a legislative proposal on **substantiating green claims**. • Supporting the circular economy transition through the **Skills Agenda, Just Transition** and Cohesion policy funds. • **Sector specific actions** for electronics, batteries and vehicles, packaging, textiles, construction and buildings, and food. MEPs have called for binding 2030 targets for material use and consumption footprint, covering the whole lifecycle of each product category placed on the EU market.[35]
United States	**Right to repair legislation** has been passed in at least 14 states, across sectors including consumer technology and medical or agricultural equipment.[36] The major automotive trade associations have signed a memorandum agreeing to abide by the Motor Vehicle Owners' Right to Repair Act of Massachusetts in all fifty states, which requires vehicle manufacturers to provide the necessary documents and information to give consumers the right to repair.[37]

FIGURE 2 UK GOVERNMENT'S APPROACH TO WASTE PREVENTION



Source: Defra (2021) Waste Prevention Programme for England consultation document

2.2 Policy proposals from Government

In March 2021, the Government published its long-awaited and overdue Waste Prevention Programme for England as an update to the 2013 Programme (due to be updated every six years). The Programme builds upon the high-level vision of the 2018 Resources and Waste Strategy by developing cross-cutting and sector specific aspects. The overarching objectives of the 2021 Programme are to transform product design to make reuse and repair viable, facilitate sustainable consumer purchasing, progress producer responsibility ("polluter pays"), and align the regulatory framework with circular economy principles (see Figure 2). The Programme does display evolution from the 2018 strategy, particularly in the shift of focus towards the earlier stages of the waste hierarchy and crucially beyond consumer goods to the use of industrial by-products. Additionally, the sector specific proposals add a layer of granularity and breadth to the 2018 Strategy's narrative.

Seven key sectors have been prioritised, as the most significant in terms of amount of waste, emissions from production, and public interest: construction, textiles, furniture, electronics, vehicles, food, and plastic packaging. **The development and expansion of sector-specific measures will be vital to driving real progress on resource efficiency, providing a clear framework for meeting our net zero emissions target, supporting business resilience, and creating jobs across the economy.** Particularly welcome is the Government's proposal to drive sustainable product design by setting requirements on durability, repairability and recyclability with a focus on rolling these out initially to textiles, furniture and construction products.

However, the bulk of the Programme comprises narrative building rather than specific policy interventions, with the majority of proposed reforms having first being put forward in the 2018 Resources and Waste Strategy. Further, all proposals are subject to public consultation and the way in which they will be implemented therefore remains uncertain. It is worth noting that many proposals have been carried over from the Resources and Waste Strategy from three years ago.

Funding for some new initiatives has yet to be secured. For example, the Programme notes that the means of funding a National Materials Datahub "is being explored". The voluntary status of agreements, initiatives and eco-design standards is also concerning, given that multiple studies have demonstrated the consistent poor performance of voluntary schemes and their fundamentally limited impact.

For example, a quantitative review by RSPB found that the 82% of voluntary schemes analysed performed poorly, particularly in relation to target achievement and level of uptake.[38] The research concluded that voluntary approaches are rarely, if ever, an effective substitute for regulatory or fiscal measures in seeking to achieve public policy objectives. Similarly, the OECD has found few cases where such approaches in environmental policy have contributed to environmental improvements beyond what would have happened anyway.[39] Voluntary agreements also cannot capture all of the actors within an industry. Action is needed consistently across entire sectors of the economy, not just from leading actors willing to volunteer to reduce impact.

For example, as part of setting a new voluntary agreement for 2021–2030 to reduce the environmental footprint of the textiles industry, the Programme proposes building on the Sustainable Clothing Action Plan 2020 (SCAP). However, the success of SCAP is highly questionable. Only one of the targets (reducing water use by 18%) was met as of 2018, with signatories failing to meet modest targets on reducing waste to landfill (4% reduction to a 15% target) and reducing waste across product lifecycles (1.4% reduction to 3.5% target). Crucially, as the targets were measured per tonne of clothing, the continued annual increase in clothing sales in the UK more than offset any progress towards targets.[40]

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TABLE 2: GOVERNMENT'S RESOURCES AND WASTE POLICY PROPOSALS

The table below lists the key policy proposals for England within the Government's Waste Prevention Programme, most of which first appeared in the 2018 Resources and Waste Strategy. The table also sets out the Aldersgate Group's recommendations for implementation of each proposal.

Policy Proposal	Details	Aldersgate Group recommendations
Eco-design	Government is proposing to set **product requirements on durability, repairability and recyclability**, with scope to include water usage during production and embodied carbon. The sectors chosen for the first phase of standards are **textiles, furniture** and **construction products**. Defra will also work with BEIS to launch a new **energy-related products policy framework to push for energy and resource efficiency**.	**Labelling schemes** will be explored alongside eco-design standards Product standards, lifecycle assessments and labelling schemes should be introduced with **mandatory status** and implemented as soon as possible with transparency. Additional metrics that Government should explore are **upgradability**, **component reuse** and **critical raw material content**.
Extended Producer Responsibility (EPR)	EPR is a scheme to **shift the responsibility for the end-of-life treatment of goods onto manufacturers** who control product and packaging design. Proposed waste streams for EPR are **construction and demolition materials, textiles, tyres, fishing gear** and **bulky waste**. A commitment to explore how EPR schemes can **encourage reuse and support circular business models** such as rental schemes, including through the use of modulated fees.	Government should **accelerate the implementation timeline**, for example the target for consultation for EPR for tyres is 2025. The aim of EPR should be to **stimulate reuse and prevention** rather than just promote recycling and reduce litter. **Ambitious fee modulation** (i.e. varying fees the producer will pay according to criteria on their product's environmental performance) will be necessary to drive material change at scale and reward sustainable product design. **Clear, common definitions, a harmonised approach across devolved nations**, and **close monitoring of the scheme's performance** and costs will also be essential.
Deposit Return Scheme (DRS)	A **DRS for single-use drinks containers** will see consumers charged a deposit up-front to be redeemed when returned through a reverse vending machine.	A DRS should be **implemented in areas where progress may not be sufficiently made by EPR and eco-design.** Design should prioritise **simplicity** and **ease of access**. A **complimentary public education campaign** on waste collection and **ample producer engagement** will help ensure successful implementation.

Policy Proposal	Details	Aldersgate Group recommendations
Plastics Tax	A **£200/tonne tax on plastic packaging** with less than 30% recycled plastic. Aims to provide a **clear economic incentive** for businesses to use recycled material and stimulate recycling of plastic waste.	A ratchet on ambition is needed given the 30% rate is an industry target for 2025[41] – the tax should be implemented with an **escalator on the rate of tax or % of recycled material**. An escalator would provide a much-needed **long-term trajectory for UK businesses** and give certainty to investments in domestic supply chain.
Data	The development of a **National Materials Datahub** to support investment in the UK by companies using secondary materials as inputs. Explore the introduction of **"product passport" requirements** to support the reuse and extraction of secondary materials.	The Datahub has not yet received funding, HM Treasury should therefore prioritise **securing investment**. Product passports could cover **environmental footprint, hazardous substances, critical raw material content, due diligence** and **repair information**.[42] Governments should aim for **harmonisation** with the EU's digital product passports.
Innovation Support	A funding commitment from UK Research and Innovation (UKRI) to support a **new National Interdisciplinary Circular Economy Research programme** (NICER). £30 million for research funding has now been allocated to establish **five circular economy research centres** and a central hub to coordinate activity. The five programmes cover textiles, chemicals from waste, metals, critical minerals and construction.	Given lack of access to technical expertise is an equally important a barrier to innovation as access to finance, Government should introduce a programme similar to the **National Industrial Symbiosis Programme (NISP)** that established partnerships across sectors to share best practise.

2.3 Environment Bill

The Environment Bill, currently completing its passage through Parliament, represents the Government's vision of a framework for environmental regulation and governance in the UK, following its departure from the EU. For resource efficiency, the Bill is important for two reasons. Firstly, the Bill serves as the legislative vehicle to provide Government with the powers needed to introduce several important elements of the Waste Prevention Programme (including eco-design standards, EPR and product passports). Secondly, as the Government announced last year,[43] the Bill will include legally binding targets on waste and resource efficiency, water, air quality and biodiversity.


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The Aldersgate Group believes that setting robust, transparent, and ambitious long-term targets are vital to ensure an environmental governance framework that protects and enhances the natural environment.[44] **To ensure that businesses are provided with a stable investment context and confidence that successive governments will be required to introduce policies to deliver the long-term targets, it is essential that the interim targets and Environmental Improvement Plan provisions (EIPs) in the Bill be strengthened to provide robust and predictable interim milestones on the way to meeting the long-term targets.** Additionally, the target development process needs to be supported by putting in place industry pathways, so it is clear what each economic sector will need to do to achieve the ambitions set forth in the Environment Bill. Improvements need to come from all sectors, not just those where improvements are easily identifiable, such as packaging.

The proposed target outcomes under development for resources and waste are to increase resource productivity and reduce the volume of residual waste. The objectives for these targets are helpful as they include both upstream resource productivity and downstream residual waste reduction. This focus will help drive improvements across the economy, and as such, the Aldersgate Group welcomes this initial focus on the resource efficiency and waste reduction targets. Targets have contributed to the progress made towards a circular economy by Wales, allowing the Welsh Government to drive action and monitor progress.

Nonetheless, a target focused on resource productivity is unlikely to address unsustainable consumption on its own, as Government proposes to explore measuring resource use against economic output (GDP). This means that absolute resource use could keep rising as the economy grows.[45] Consequently, Government should explore the inclusion of a target to reduce resource use to accompany the resource productivity target, in order to further decouple resource use with economic growth. Such a target featured in an early version of the EU's Circular Economy Action Plan – to halve the bloc's material use by 2030.[46] Since, MEPs have called for binding 2030 targets for material use and consumption footprint, covering the whole lifecycle of each product category placed on the EU market.[47] Government should consult on a UK target to reduce resource use, including what an appropriate figure to reduce by should be.

To further improve the targets, we urge Government and the independent expert panel convened to develop the targets, to consider how additional aspects – minimisation of global footprint – could be incorporated into this priority area.[48] A global footprint needs to encompass imported as well as exported materials to fully capture the UK's impact on the environment and to prevent offshoring of raw material extraction. The Government's proposed approach to measure resource productivity by raw material consumption (RMC) is welcome, as this includes domestic and foreign extraction of materials needed to produce goods and services in the UK.[49]

THREE ADDRESSING GAPS IN THE POLICY LANDSCAPE

This section sets out the Aldersgate Group's recommendations for further policy developments that the Government should implement within and alongside its Waste Prevention Programme.

Despite the inclusion of welcome sector-specific proposals within the Government's 2021 Waste Prevention Programme as explored above, there are significant gaps in terms of untapped policy potential. Government has at its disposal a wide breadth of policy tools, such as fiscal incentives, regulatory measures, and support for circular business models that have not yet been fully employed. This section sets out 7 key recommendations to plug existing gaps and move the policy agenda forwards.

1. **Resources and waste policy must become a cross-government priority, with BEIS, HMT, DfT, Cabinet Office and MHCLG all proactively contributing to policy development in this area.** This will require clear alignment between key upcoming government strategies and the objectives of the Waste Prevention Programme. Lesson sharing and close collaboration between Westminster and devolved governments will also be essential to promote as much consistency as possible on resources and waste policy and support supply chains and businesses operating across all four nations.

A ratchet in ambition is needed in implementing the Programme to achieve Government's objectives of substantially reducing waste and maximising the value of resource use. Only a holistic, progressive, and cross-Government package of measures can overcome the infrastructure, technological, fiscal and market barriers preventing an expansion of new markets. Doing so will provide much-needed certainty to businesses innovating in the circular economy.

2. **Introduce pricing mechanisms to better reflect the lifecycle, economic and environmental benefits of using secondary materials where their upfront cost is higher than that of primary raw materials.** These should include:

- **Adjusting tax and VAT rates to incentivise circularity,** as undertaken by Sweden on repair services or on the regeneration of the existing housing stock;
- A **resumption of the successful Landfill Tax escalator** at £5/tonne annually over a ten year period, a figure suggested in our engagement with businesses;
- **Broaden the scope of the charge levied on single-use plastics** to cover other single-use materials;
- **Expand the UK Emissions Trading Scheme** to cover emissions from the waste sector.

Although the Government is due to implement a plastics tax in 2022, **at present the UK's fiscal framework does not encourage resource efficiency at scale**, and in some cases, unintentionally discourages businesses from adopting more circular business models. For example, the VAT on new builds is 0%, but for refurbishment, repair and maintenance of buildings, it is 20%. The transition to greater resource efficiency will require broad reform of the UK's tax approach, so that businesses are rewarded for innovating in the transition, secondary materials become more attractive, and consumers are incentivised to repair their goods. The Public Accounts Committee concluded in a recent inquiry on environmental tax measures that HM Treasury "have taken a very limited role of tax so far.[50]

Value added tax (VAT), the UK's tax on consumption, offers one of the most important opportunities for creating incentives on resource efficiency, and Ministers have raised the flexibility offered by leaving the EU to reform VAT. Research has shown that 76% of people in the UK would either support or are neutral about replacing or changing VAT to better reflect environmental impact.[51] In adjusting VAT rates on repair, **Government could increase the cost-effectiveness of repair over the manufacture of new products and services, incentivising service-led approaches**. Currently, VAT is charged at the standard rate for repairs, which, combined with high labour costs, discourages consumers from mending broken products rather than purchasing new products. In 2017, Sweden announced tax breaks for repairs to clothes, bicycles, fridges and washing machines – with some products receiving a VAT reduction from 25% to 12%, and white goods consumers able to claim back income tax.[52]

As the UK is no longer subject to EU VAT rules, **a priority tax reform should be to zero-rate VAT on all repairs to complement plans for eco-design standards on repairability**. As explored in a later section, another opportunity to adjust VAT would be aligning VAT rates on the maintenance and regeneration of buildings with those on new builds. This would not only reduce the unnecessary demolition of adaptable and durable existing buildings (preventing emissions from new construction). Research has also shown cutting VAT on home improvement works to 5% could generate a £15bn economic stimulus and almost 100,000 extra jobs.[53]

Whilst decreasing VAT would stimulate new economic activity and business models, Government could raise additional revenue through taxation elsewhere to offset the lost revenue from reducing VAT rates. **When Sweden reduced VAT on repairs, it estimated it would reduce its tax revenue by 460 million kronor (£40 million) a year – to counteract this, the Swedish Government introduced a new tax on hazardous chemicals, predicted to raise two billion kronor (£174 million) a year.**[54] A good starting point would be renewal of the Landfill Tax Escalator which has driven a 44% reduction in waste to landfill since 2000. **Renewing the Landfill Tax should be part of a package of policies, including better tracking mechanisms for waste, and funding for the police, Environment Agency and HM Revenue & Customs to ensure the Escalator does not simply increase the incentives for waste crime.**

Another means of raising revenue and encouraging a shift towards circularity would be to **expand the UK's emissions trading scheme (ETS) to waste incinerators**. A well-designed ETS is a cost-effective way of encouraging emitters to reduce their carbon footprint, and the UK has an opportunity outside of the EU to develop a more robust and effective system. A UK ETS that has a gradually reducing cap in line with the net zero target will put in place a framework to drive continuous and increasingly ambitious emissions reductions in the waste sector. Revenue raised from expanding ETS to the waste sector would also provide a boost to public finances, acting as a significant offset to any tax rebates to incentivise repair/remanufacture. Finally, bringing incinerators within the scope of the UK ETS would send a reliable investment signal and provide continuity to businesses since the EU ETS already covers most emissions from waste incineration.

Longer-term, Government should gradually shift taxation from labour to primary resource use, in recognition that resource-efficient processes are frequently more labour-intensive which makes them more expensive.[55] Almost half of the UK Government's 2021 Budget is based on labour taxes, specifically income tax and national insurance contributions, while environmental levies are merely 1.2% of expected receipts. The Budget's forecast for 2025/26 predicts a stagnation of this proportion with environmental levies remaining at 1.2%.56 A study by the Ex'tax Project in cooperation with Deloitte, EY, KPMG and PwC, found that such a tax shift could be worth €33.7bn and create hundreds of thousands of jobs. **The study found that such an increase could be balanced by exemptions/reductions in income tax, social contributions, VAT and corporate income tax equalling €33.7bn.**[57]

3 **Develop criteria for the £290 billion a year spent by the UK on public procurement**[58] **to drive demand for products and services with higher resource efficiency standards.** The Government could build on the criteria developed under the European Commission's Green Public Procurement framework, which cover an increasing range of products including textiles, road transport, food and furniture.

Procurement has a major role to play in accelerating the transition towards a circular economy, with the UK spending some £290 billion per year via public procurement (roughly 13.7% of GDP).[59] This represents a significant lever with which to drive forward resource efficiency, by increasing demand for resource efficient goods and services and enabling public authorities to meet today's most pressing environmental challenges and budget constraints. Research has demonstrated that collaboration between procurers and suppliers throughout the procurement process can lead to reductions in raw material utilisation and waste generation, whilst promoting the development of new, more sustainable business models.[60]

The Waste Prevention Programme does feature a welcome commitment to reduce waste generation through public procurement of electronic equipment, and to explore how public procurement could play a role to increase the use of remanufactured parts. Whilst this is an excellent start, a broader, cross-Government approach is needed with a goal to embed resource efficiency criteria into all public procurement. The Steel Procurement Taskforce, chaired by Lord Grimstone,[61] provides another useful starting point for reforming procurement to support Government priorities, and should be expanded to reach other industrial sectors and include circularity in addition to decarbonisation.

The Government should explore what standards can be put in place to help ensure that its procurement teams are making purchasing decisions that best decouple economic growth from the use of natural resources and reliance on ecosystems. An opportunity for reform is the upcoming National Procurement Policy Statement, in which Government intends to require contracting authorities to pay due regard to the Government's strategic priorities in public procurement. Propositions in the Cabinet Office's Green Paper set out criteria that go beyond the subject matter of the contract, to encourage suppliers to operate in a way that contributes to economic, social and environmental outcomes. Specifically, Government aims to support growth and productivity, help communities recover from COVID-19, and tackle climate change.[62]

The recent National Procurement Policy Statement marks a good step forwards in recommending that all contracting authorities consider national priority outcomes including "tackling climate change and reducing waste".[63] The Government should now explore what standards can be put in place to help ensure that its procurement teams are making purchasing decisions that best decouple economic growth from the use of natural resources and reliance on ecosystems.

This Statement should set resource efficiency outcomes for all contracting authorities in their procurement and commercial activity. A clear roadmap should be established whereby medium- and long-term resource efficiency goals are set, with timelines on mandatory requirements to give suppliers time and visibility to adapt. Such an approach would show leadership as well as drive financial efficiency. The outcomes should continue to be monitored and reported in order to encourage others to follow. New procurement guidelines could see the leasing of public building furnishings and application of good quality secondary raw materials for national infrastructure projects.

Examples of reduction opportunities in different project phases include optimisation of construction for use of less material and alternative construction material; optimisation of energy and material use over life cycle; and cement clinker replacement in concrete. Government should then aim to educate commissioners and procurement teams on the circular element of outcomes-based procurement to ensure the necessary skills and competencies are developed. It will be imperative that Defra and BEIS collaborate with the Cabinet Office on all procurement policy reform.

GREEN PUBLIC PROCUREMENT IN DENMARK

Denmark launched a national initiative called the Partnership for Green Public Procurement (GPP) aiming to shift procurement activities to support the circular transition. The Partnership for GPP is a collaborative initiative between Danish regions, municipalities and the Ministry of Environment and Food on common objectives for green procurement. The current 14 partners have committed themselves to integrating green goals in their procurement policies as well as greening their procurement on 11 specific product groups. Criteria include recyclability, number of chemicals, product lifespan, and total cost of ownership. This, alongside other examples internationally, offers great insight into how metrics to reduce emissions can be put at the heart of procurement policy, and how achieving a circular economy requires greater collaboration and integration of policy between all levels of government.

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4 Building on the recommendations of the Green Jobs Taskforce, the Government should adopt a comprehensive low carbon skills strategy to equip the existing and future workforce with the skills they will need in a more circular, net zero emissions economy.

- The Government should collaborate with schools, colleges, higher and further education institutions to **embed climate change and environmental sustainability education across the national curriculum and education system, as well as promote a much wider uptake of STEM skills learning**. This must come hand in hand with a review of teaching standards and the Initial Teacher Training Content Framework to ensure teachers have the right knowledge to support their pupils and students.[64]
- The adoption of **skills action plans should be made mandatory for all educational providers, including Further Education (FE) and Higher Education (HE)**. Action plans should aim to drive greater teaching and uptake of environmental education, essential soft skills (project management, communications skills etc.) and STEM skills, and to increase gender and ethnic diversity in STEM subjects.
- The **Apprenticeship Levy standards should be adapted** to reflect the Government's aims on resource efficiency and net zero.
- To support workers already on the job market and in need of reskilling, the Government should continue to provide **financial support for training, upskilling and retraining through the National Skills Fund.** This should be matched by Further Education Institutions offering a broader range of flexible, short-term courses focused on the climate and resource efficiency-related skills workers will increasingly need.
- **Circular design principles should be included in all engineering, planning, architecture and design degree courses.**


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The transformation from the existing linear economy to a closed loop one for materials could make a contribution to UK employment of 517,000 gross jobs[65] across many levels of the economy – from disassembly, resource management, remanufacturing and design/automation activities. For this significant job creation potential to materialise, investment in skills will be needed, and the nature of certain jobs will have to change. This has already occurred following the introduction of the Landfill Tax, after which the waste sector saw a growth in the number and nature of jobs created with the implementation of new infrastructure. While landfills require few highly skilled staff, new facilities such as recycling facilities require a higher and better educated workforce.[66]

To support the recovery from COVID-19, Government policy, business and the education system have a crucial role to play in equipping the workforce with the right skills to build an inclusive and competitive circular, low carbon economy. Impacts from the slowdown in economic activity from COVID-19 are falling most severely on individuals with low pay and less job security, disproportionately affecting young people, women and people from BAME backgrounds. Investment in reskilling will be crucial to allow people to move from one industry to another as new opportunities are created from circular business models. Maintenance and repair will be two areas particularly crucial to job creation opportunities, with potential at a local level right across the UK, supporting Government's levelling up agenda.

The Waste Prevention Programme contains scarce reference to skills, and has no policy proposals to upskill the workforce that can drive its resource efficiency objectives. Government should undertake a mapping exercise to anticipate the future education and skills needs for a circular, net zero economy. The Skills and Productivity Board could play a role here in reviewing future skills gaps, and as such should include representatives with appropriate expertise on resource efficiency. The Government announcement in 2020 on expanding post-18 education and training, with a stronger focus on lifelong training, technical qualifications and developing skills that are in high demand, represents a key opportunity to reintegrate workers in the post COVID-19 economy and address prevailing regional inequalities. Government's investment in STEM could be used to deliver high-level training with a focus on re-manufacturing and automation skills.

As the Aldersgate Group has recommended in a recent briefing, *Upskilling the UK workforce for the 21st century,*[67] **Government must develop a national low carbon skills strategy that embeds resource efficiency and net zero delivery across the whole education system.** Such a strategy should integrate learning about climate change and the circular economy across all disciplines and teaching standards, and update the Initial Teacher Training Content Framework. Further education and Higher Education institutions around the UK also have a significant role to play in developing local skills to deliver jobs in the circular economy. These institutions should also work closely with the private sector to better align their skills provisions with skills gaps that employers are grappling with – this is already happening to some degree in clusters like the Humber (offshore wind) and West Midlands (automotive), and Government should play a role in rolling this out further across the country.

Apprenticeships will also be important in providing learning opportunities and career prospects, and enabling employers to nurture skills, boost productivity and increase profitability. As of 2017, large UK employers have been required to pay into the apprenticeship levy, set up to increase businesses' control over apprenticeship training and to enhance the quality and quantity of available apprenticeships. However, current apprenticeship standards do not directly refer to the circular economy, climate change or biodiversity. Leaving standards to be purely employer-led creates the risk that training is insufficiently broad and focused on short-term demands/in-house priorities, rather than deliver what is needed for the economy in the longer term. One solution could be to offer discounts on the apprenticeship levy to employers investing in skills that are essential for a circular, net zero economy.

Additionally, apprenticeship standards need to be revised to ensure businesses are teaching their workforce the required skills and core sustainability skills beyond their current organisation's remit. More widely, short retraining courses are currently lacking, with the minimum length for apprenticeships being a year. While there are exemplary initiatives, such as the Careers Transition Partnership,[68] a joined-up approach between the private sector and Government would increase the availability of short-term retraining courses, with clear pathways into employment as an incentive for workers, already vulnerable due to COVID-19.

5 Provide public finance – such as through the UK Infrastructure Bank and future green sovereign bond issuances – to support the development of critical infrastructure and facilities for recycling, repair, remanufacturing and reuse. This infrastructure is essential to create integrated supply chains for secondary materials and support the UK in processing a higher proportion of its own waste and retaining and reusing a larger share of materials within the economy. Targeted public finance can play a key role in crowding-in private sector investment in these areas.

Investing in the infrastructure needed to transition to a circular economy, as part of a wider investment programme for net zero-enabling infrastructure, will be an opportune way to promote economic recovery following the COVID-19 pandemic whilst meeting environmental objectives. The UK still exports a significant quantity of its waste to European countries, and lacks the infrastructure to process and recycle materials that would otherwise be sent to landfill. Retaining these materials generates significant economic and job creation benefits and protects the UK from volatile commodity prices. Infrastructure has a huge influence on whether resources are preserved, and yet investment in infrastructure in the UK to date has focussed largely on final treatment and disposal of waste.

Defra's main infrastructure investment fund (the Waste Infrastructure Delivery Programme) is dedicated to residual waste treatment, predominately generating energy from waste. £3 billion has been committed by Government and industry to 2042.[69] Recent figures from the Environment Agency indicated a 4% increase in waste material sent to landfill in 2019 at 45,859,000 tonnes, suggesting that reinvigorated action and a clear new direction is required to help the sector further divest from disposal.[70] The 2021 Waste Prevention Programme recognises that in managing waste, using infrastructure such as energy from waste (EfW) and landfill comes with costs that could be reduced by keeping products in use for longer. However, it features no details on building the UK's facilities on reuse, repair and remanufacture and suggests only a light-touch, bottom-up approach. Policy proposals include developing an "information note" and voluntary guidance for local authorities, that would set out best practise for reuse and fulfilling reporting requirements.

A top-down approach is needed from Government alongside funding for new infrastructure to shift business models to activities upstream in the waste hierarchy, create jobs and prevent waste. A strategic plan for infrastructure would shift the share of materials sent to energy from waste to recycling, reuse and repair activities. Examples of new infrastructure that will be needed are reuse facilities for cleaning, maintenance and monitoring of textiles for clothing resales, repair and remanufacturing centres to sort electrical equipment, testing facilities for reusability of products, and refurbishing facilities for vehicles.

For the rest of the UK, much greater knowledge of current infrastructure and material flows is needed to support a shift away from waste treatment to recycling, reuse and repair facilities. Whilst the Waste Infrastructure Delivery Programme tracks both public and merchant facilities for residual waste, there is no equivalent, comprehensive list of facilities for recycling, repair, remanufacturing or reuse. As such, the National Materials Datahub proposed by Government should be prioritised by HM Treasury for funding and implemented with urgency. The National Infrastructure Commission should work more closely with civil society and businesses to inform its recommendations relating to waste, and improve assessment of the UK's current capacity for reuse, repair and recycling.

The announcement of a new UK Infrastructure Bank (UKIB) is a welcome step to allow co-investment with the private sector in post-COVID recovery and net zero delivery. The UKIB should take a broad definition of infrastructure, and should specifically play a role


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in funding and crowding-in private investment into new circular economy facilities in the UK. The Bank could act as an observatory of UK infrastructure finance, tracking financial flows in real-time to quantify investment for different infrastructure needs at the national and regional level, and to identify shortfalls in investment and barriers to levelling up. This would complement the role of the National Infrastructure Commission while adding a financial perspective.

In committing funding, the Government should learn from reflections on funding from the Green Investment Bank. As Green Alliance note in their report *Building a Circular Economy*:[71] "The Green Investment Bank, when it was government owned prior to 2017, dedicated the vast majority of funds in resources and waste to end of life treatment; despite calls from the Environmental Audit Committee for it to finance innovative technologies to support a circular economy[72,73] [...] Private sector infrastructure funding has also concentrated on waste disposal, in the absence of policy to drive investment towards circular solutions." Green sovereign bond issuances could also play a crucial role in contributing to the finance of critical circular infrastructure and facilities, alongside the UKIB. Earlier this year, Italy launched its inaugural green bond of €8.5 billion, of which some proceeds will be allocated to circular economy and research.[74]

6 **Conduct public awareness campaigns to build consumer confidence and grow the demand for resource efficient products and business models (such as those based on 'servitisation', i.e. leasing and subscription) and disincentivise demand for disposable business models such as fast fashion.** Clear communication campaigns will be important to establish trust in secondary products and materials.

The Government's Waste Prevention Programme does acknowledge the crucial role that consumer education will play in the transition to a circular economy, but is focussed primarily on eco-design standards and producer responsibility. Government must go further to tackle the lack of awareness amongst consumers in circular business models and how to participate in resource efficient behaviours. Although data shows that a significant majority of consumers are already changing their purchase preferences based on sustainability, consumers are often not aware of the environmental consequences of many of the common products they purchase and therefore their best intentions can go unfulfilled.[75] Additionally, consumers lack awareness of some circular models and how to participate in resource efficient behaviours. In the electronics industry, 40% do not know how to access repair services and 70% are not aware of device-sharing platforms.

For the full benefits of a circular economy to be realised, **consumers will need a better understanding of the transition that they are supporting, and how companies' new models can deliver the best outcomes for them.** Whilst the UK Government's Waste Prevention Programme features welcome proposals on eco-design standards on durability, repairability, recyclability and other metrics, significant progress is needed to increase consumer awareness about second hand, renting/leasing and repair markets.

The benefits of durability and repairability must be actively promoted by Government, to link these qualities with high quality and cost-savings in the long term. Warranties and safety guarantees must be applicable to remanufactured and refurbished products to ensure customer trust is supported. Clear regulations for this emerging service area will also give manufacturers confidence in long-term trends, supporting the case for investment in expensive research and development (R&D) to develop new products and processes. As explored earlier, **consumer rights legislation would further strengthen the Government's proposals** on the right to repair.

Whilst consumers have been encouraged to make different consumption decisions in terms of recycling and sustainability choices, there has been less emphasis on people consuming less in material terms, through radically more efficient approaches such as accessing rather than purchasing goods. Government therefore has a role to play in raising awareness of circular business models that go beyond recycling and greening production, by addressing the issue of over-consumption at the source. Although there are well known examples, such as Uber, there are a breadth of sharing economy business models that have not yet diffused nationally. One promising, though relatively unknown, form of the sharing economy is a Library of Things (LoT), which extends the library concept from lending books to other items – from tools to cooking equipment – to encourage a switch from product ownership to product access.[76]

Despite their innovation, and breadth of benefits (community role, local social and economic contribution), LoTs remain far from achieving economies of scale. IKEA opened its first second-hand store in Sweden, after piloting subscription-based leasing for furniture, in an effort to ensure products are reused as often as possible before being recycled.[77] Collaboration will be needed between businesses, local authorities and Government to broaden the appeal, reach and sustainability of such models, and to **communicate the benefits of sharing-based business models to a mainstream public**, not all of whom will be motivated by strong sustainability values.

The French Government have planned to make an "unprecedented communication effort" to mobilise citizens and businesses about the circular economy. This will focus on sustainable consumption, reuse, repair, recycling and the environmental impact of dumping, and will entail the deployment of a "system of circular economy ambassadors". The French Ministry of National Education will also integrate the concept of circular economy into mainstream education for sustainable development, starting from primary school. To stimulate regional action, presentations will be given by regional councils which will develop regional strategies in connection with the state on circular economy, with monitoring of resource flows and job creation.[78] The UK Government should build on this model, with additional focus on awareness and supporting peer-to-peer platforms that provide access to intangible resources, such as knowledge and repair skills.

7 **Facilitate greater trade in circular products and materials, by featuring circular economy principles in the trade and sustainable development chapters of trade agreements.** As the Aldersgate Group set out in a recent policy briefing,[79] Government must also use its trade policy to provide a level playing field to ensure that domestic businesses innovating in resource efficiency are not exposed to unfair competition from imports with lower environmental standards.

Resource efficient value chains are often global, crossing borders and involving international companies throughout. Trade flows will be transformed by the shift to circularity, and trade agreements can either incentivise or hinder the circularity of material flows at an international scale. The UK still exports a significant amount of waste, particularly plastic, which results in dumping or incineration abroad – in 2020, the UK exported half a million tonnes of plastic, mainly to Turkey and Malaysia.[80] As explored earlier, the UK also depends heavily on imports of raw materials, so shifting to a circular economy would alleviate this dependency, with the value of materials kept in the economy for longer and an increase in secondary raw material use. Further, with the development of repurposing, remanufacturing and recycling hubs, the UK could export high-quality secondary raw materials to the EU and beyond to promote global circular markets.

The UK's negotiation of trade agreements therefore presents an opportunity to advance its resource efficiency agenda. As the Aldersgate Group has recommended previously, incorporating environmental and climate considerations at the heart of the UK's trade policy is in its economic, social and environmental interests.[81] The UK's objectives on a resource efficient and low carbon economy are shared by Japan, South Korea, the US and the EU. Strengthening the trade and sustainable development chapters of **future trade deals should contain provisions on circular economy ambition**. Sector-specific chapters could aim to bolster trade in high-quality secondary materials.

As the UK is supportive of efforts to promote the liberalisation of environmental goods and services, Government should push for incentivisation of trade in goods that have been produced using sustainable circular economy practices. The UK could also play a role in supporting the harmonisation of definitions and standards relating to waste recycling, circularity, and treatment practises, as the lack of alignment is hindering the promotion of circular economy through trade policy.[82]

Alongside opportunities, trade deals also present unintended but acute risks – including UK industrial innovation being undermined by imports that do not abide by the same standards. Given the significant investments required of businesses to adapt their business models to reach circularity, consistent application of new regulations and policies on all market participants will be essential to ensure a level playing field.

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FOUR INTEGRATING RESOURCE EFFICIENCY INTO NEW SECTORS: DEEP DIVE ON CONSTRUCTION AND AUTOMOTIVE SECTORS

This section takes a deeper dive into two specific industries – automotive and construction – to illuminate what resource efficiency measures will mean in practice at a sectoral level, and provides policy recommendations in these areas.

As explored above, existing policy interventions on resource efficiency have largely been confined to the waste sector. Waste management has long sat within the remit of Defra and its predecessors, and there is a lack of cross-sectoral focus in current and emerging policy. Although Government have identified seven priority sectors in its Waste Prevention Programme, its policy proposals are largely limited to the remit of Defra when a cross-Whitehall approach is needed. Concrete buy-in from HM Treasury, BEIS, the Ministry of Housing, Communities & Local Government (MHCLG) and the Department for Transport (DfT) will be essential to drive forward an economy wide vision for resource efficiency.

The **Government's upcoming net zero strategy is an opportunity to tie together the industrial decarbonisation and resource efficiency agenda and develop a pan-economy, long-term strategy that builds on the UK's strengths to create a productive, low-carbon and circular economy**. Co-ordination between the Government's Waste Prevention Programme, industrial decarbonisation strategy and net zero strategy will be essential. The Government should look to mirror alignment from the Welsh Government, which has mainstreamed resource into its strategies – the circular economy is a key component of the Welsh Covid-19 Reconstruction: Challenges and Priorities Strategy, and features heavily in Wales' Natural Resources Policy and its economic approaches.

Mainstreaming resource efficiency measures across the economy offers huge economic, social, and environmental benefits to the UK – generating jobs, increasing productivity and GDP, encouraging inward investment, maximising value from resources whilst minimising the environmental impacts of production, and encouraging inward investment. In 2019, the Ellen MacArthur Foundation modelled the potential impact of a circular economy for five materials – steel, aluminium, plastics, cement and food. It found that switching to a circular economy for these commodities could offset 45% of the emissions associated with their production and consumption, or 9.3 giga tonnes of CO_2 equivalent per year by 2050, while generating substantial economic benefits. This could be achieved by substantially increasing the use rates of assets, such as buildings and vehicles, and recycling the materials used to make them. In turn, that will reduce the demand for the virgin steel, aluminium, cement, and plastics, and the emissions associated with their production.[83]

Given that Government will have to drive a common purpose through many interconnected supply chains, it must **avoid introducing policy interventions that target only a specific sector or component of the value chain**. This section takes a detailed look at two sectors, automotive and buildings, to illustrate what integrating resource efficiency measures will mean in the real world. It covers the obstacles to circularity in supply chains for vehicles and buildings, the opportunities to be gained by industry, and the sector-specific policy measures that will be needed in the transition.

4.1 Circularity in the Built Environment

The **buildings sector is the single largest contributor to global emissions**, with approximately one third of global energy end use taking place within buildings. The built environment also uses almost half of the world's materials extracted every year and current projections estimate that by 2060, across the world the equivalent of the city of Paris will be built each week.[84] If these urbanisation trends continue, it has been estimated that material consumption by the world's cities will grow from 40 billion tonnes in 2010 to about 90 billion tonnes by 2050 – exceeding what the planet can sustainably provide.[85] We need not only a transition to renewable energy and energy efficiency, but a systematic rethink of how we design, construct and use buildings. The identification of construction as one of seven key sectors prioritised for policy measures in the Waste Prevention Programme is therefore a useful signal for action to transform the sector.

A share of emissions from buildings that has been less consistently measured and addressed to date comes from the lifecycle of the building itself – from the extraction of materials, manufacturing, assembly, maintenance, deconstruction, and disposal.[86] Buildings are the destination for two thirds of cement, a third of steel, a fifth of plastics, and a quarter of aluminium used in Europe.[87]

The carbon and energy intensive processes associated with the production of these materials mean the embodied emissions associated with buildings, i.e. construction and renovation, can account for up to 50% of total emissions in countries that have decarbonised their energy mixes. While emissions from heating, lighting and cooling are regulated in the UK (albeit insufficiently) through Building Regulations, **embodied emissions tend to go unmeasured and unreported.**

Obstacles to the transformation of the construction sector are its fragmented nature, the diversity of value chains within it, and the breadth of stakeholders with conflicting interests throughout the construction process. Therefore, **a whole lifecycle approach is required**. It will need to encompass the building design, the manufacturing of material supplies, the construction process, buildings operation and maintenance, as well as the disposal, recycling and reuse of building, construction and demolition waste. Carbon emissions can be reduced at any point in the delivery process, but the opportunities are greater the earlier this is started. An impressive 90% of construction and demolition waste is already recovered for recycling,[88] so Government intervention must focus on the earlier stages of the waste hierarchy – designing out waste through modular design, material optimisation and, crucially, reuse/regeneration of buildings to reduce unnecessary construction.

It is welcome that the Waste Prevention Programme recognises the value of eco-design standards for construction products – including proposals on increasing recycled content, durability and the capacity to disassemble them. Despite the significant opportunities within this proposal, it is concerning to see that Government will "encourage industry to set their own standards to reduce the need for regulation", given the breadth of studies that demonstrate the consistently poor performance of voluntary schemes. **Mandatory standards for low carbon construction materials could drive companies to innovate in this space,** grow the market for low carbon goods, and support the competitiveness of domestic industries.[89]

Another welcome element of the Programme is developing EPR for certain materials in the construction and demolition sector. However, since this was originally proposed in the Government's 2018 Resources and Waste Strategy, the scheme should be implemented as soon as possible. A bold and comprehensive EPR scheme for construction could achieve far more than simply funding recycling, and reducing the prevalence of short-life buildings that are down-cycled into aggregate. Such a scheme must incentivise the right material or product being used at the right time – it should redress the economic imbalance between established building materials benefitting from economies of scale and emerging sustainable materials that are not yet at the same scale or level of development. The Government's proposal to work with industry through the Green Construction Board to publish a roadmap to achieving zero avoidable waste in the sector by 2050 is a step in the right direction, but the Government must focus on incentivising transformation at scale within the industry.

Additionally, while the Waste Prevention Programme's construction proposals tackle the latter stages of the waste hierarchy, it fails to tap into the bigger opportunity of reusing buildings and reducing construction in the first place. Improving efficiency in construction is not just about building new assets in a more intelligent way, it is also about demanding better performance from existing assets. Most of the UK's infrastructure networks are already mature, and although new infrastructure is needed to meet new social and economic needs, getting more out of existing assets will be essential to meeting increased demand. Many of the carbon reduction opportunities available will be associated with **upgrading, adapting and modernising infrastructure currently in operation**. In fact, HM Treasury's Infrastructure Carbon Review sets out the following emissions reduction hierarchy for identifying carbon reduction opportunities within the value chain:

- **Build nothing:** challenge the root cause of the need; explore alternative approaches to achieve the desired outcome;
- **Build less:** maximise using and refurbishing existing assets; optimise asset operation and management to reduce the extent of new construction required;
- **Build clever:** design-in the use of low carbon materials; streamline delivery processes; minimise resource consumption;
- **Build efficiently:** embrace new construction technologies; eliminate waste.[90]

Despite these aims, the UK's tax system favours new builds over the reuse of existing buildings. VAT is charged at 20% on repair, maintenance and adaptation work to buildings whilst new buildings are not charged VAT. In the Government's Building Better, Build Beautiful Commission's final report, a key proposal is for the "radical reform of the VAT provisions" to remove this incentive. The Government must **bring an end to the unnecessary and environmentally harmful destruction of adaptable and durable buildings**, and their replacement by short-lived new buildings.

AS GREEN ALLIANCE SET OUT IN THEIR REPORT ADDED VALUE:[91]

"Demolishing buildings squanders the carbon emissions generated in their construction. This is especially problematic for residential buildings, where emissions associated with their construction can account for over half of their total climate impact over their lifecycle.[92] Demolition also creates a lot of waste: the construction, demolition and excavation sector is responsible for 62% of the total waste generated in the UK.[93]... Around 50,000 buildings are knocked down every year,[94] and the number of long-term vacant buildings in England has risen over the past three years in a row and is now nearly 226,000.[95]"

Investment and development of infrastructure and building should not only focus on creation, but regeneration and reuse. According to independent research, **cutting VAT on home improvement works to 5% for the period 2015 to 2020 would have generated an economic stimulus of £15.1bn and 95,480 extra jobs.**[96] Over a fifth of the UK's residential building stock is now over 100 years old, yet there are few policies targeted at extending the life of these buildings. For example, it is estimated that there are around 1,350 underused or vacant mills in the North West and West Yorkshire. If refurbished, these historic mills could provide over 27,000 new homes, 150,000 jobs and prevent the substantial carbon emissions from equivalent new builds.[97]

Policy recommendations to address these issues include:

1. **Regulate building design to reduce embodied and operational emissions, with the introduction of a mandatory minimum whole lifecycle carbon standard for buildings and infrastructure.** To achieve net zero, a standard must be agreed with industry for the whole lifecycle carbon footprint of buildings and infrastructure which is strengthened over time, with differentiated targets by function and usage. Government could build upon the guidance produced by the Royal Institute of Chartered Surveyors (RICS) on whole life carbon assessment for the built environment.[98] The UK could also revise Eurocodes to ensure low carbon alternatives are given preference, and to embed requirements for the reusability of building components and minimisation of waste.

2. **Penalise design for buildings with short life spans.** For example, Government should make 'Module D', the end-of-life element of Environmental Product Declarations (EPDs), mandatory rather than voluntary to reward sustainable design. Detailed design criteria and 'as-built' information must also be stored for easy retrieval and use decades later, to allow the adaptation of existing developments and reuse of spare materials.

3. **Reduce VAT on housing renovation and regeneration to match the level on new builds, to incentivise the reuse of existing building.** This should cover core improvements to existing buildings, including reroofing, extensions, conversions and renewable heating installation. Such an alignment would shift incentives from demolishing existing buildings to regenerative development.

4. **Introduce mandatory product standards to reduce embodied emissions in construction materials and increase their resource efficiency.** This will ensure that they are not undermined by low cost overseas imports with poor environmental standards.

5. **Simplify waste regulations to avoid industrial materials being classified as waste unless no other safe use can be determined.** Currently, waste regulations create an obstacle for the re-use of reliable building materials, either directly or indirectly through classification of resources as "waste".

6. **Create markets for recycled construction materials, through the introduction of tax adjustments and construction standards.** Where resource efficient construction materials, or products made with secondary materials, struggle to compete on upfront cost, pricing mechanisms need to be adjusted to ensure upfront price competitiveness and reflect the longer-term, environmental and economic benefits derived from using more resource efficient methods of production.

7. **Integrate circular design principles in all engineering, architecture and design degree courses and industry training boards.** This should be a criterion for the Joint Board of Moderators, supported by The Engineering Council (EngC), the Royal Institute of British Architects (RIBA), and also university faculties' Industrial Advisory Panel. Additionally, the Construction and Engineering Industry Training Boards should deliver effective skills in modular, adaptable and flexible construction.

4.2 Circularity in the automotive sector

Transport represents the largest emitting sector at 27% of total UK emissions, and only **marginal reductions have been made since the 1990s as increased road traffic has largely offset improvements in vehicle fuel efficiency.**[99] The automotive sector also uses a significant proportion of steel, aluminium, glass, rubber, plastic and, increasingly, lithium and cobalt from battery production. Almost a million cars were built in the UK in 2020, and road traffic has risen by almost a third since 1990, with COVID-19 expected to cause a car ownership boom due to decreased public transport use.[100,101,102]

Reducing emissions from road transport remains a significant challenge with electric vehicles (EVs) making up around 7% of the overall UK car market. In 2020, the UK Government confirmed a welcome decision to phase out the sale of new petrol and diesel cars and vans by 2030 in its Ten Point Plan.[103] This will send a decisive market signal on the need for decarbonising the automotive sector through electrification. However, while EVs significantly reduce use-phase emissions, especially as renewables continue to expand their share of the UK grid's energy mix, **the energy and emission intensive production processes of automotive materials, in particular batteries, will place new demands on the sector's efforts to decarbonise.**

With a full transition to EVs, more than 60% of automotive lifecycle emissions will likely come from materials by 2040, shifting the balance of the carbon footprint of cars to materials production. In fact, Volvo's recent lifecycle assessment comparing its new EV with an ICE vehicle found that the production phase of its EV resulted in around 70% more emissions than the ICE vehicle. **Circularity in the automotive production process will therefore be essential for truly zero carbon cars** which produce zero material waste and zero pollution during manufacture, usage and disposal.

Reducing the quantity of steel, aluminium and other materials used in vehicle production has been estimated to have the potential to deliver carbon emission reductions of 8.49 $MtCO_2e$ between 2023 and 2032.[104] Environmental benefits sit alongside economic benefits – remanufacturing has been shown to be up to twice as profitable as manufacturing.[105] Designing more durable cars with longer lifetimes would also reduce the demand for materials and energy for manufacturing – keeping cars in use for four more years could reduce carbon emissions by 9.15 $MtCO_2e$ between 2023 and 2032.[106] Although most automotive materials are already recyclable, **the value chain must be fundamentally transformed to achieve circularity where reused, remanufactured or retreated components are the default.**

Supply chains in the sector are complex, and vehicle production has long lead times, with a timeline of four to six years from initial concept to market. Integrating circularity into the production process will therefore require significant investment in clean materials supply chains, the stimulation of market demand for these materials, close collaboration between producers and aftermarket services, and a modular design process that ensures materials can be easily disassembled, sorted and reused at end of life.

Currently, high-quality automotive materials are commonly downcycled at the end of life (EOL), which increases demand for energy-intensive primary materials. Design for disassembly will enable easier access to materials to be recycled, and will facilitate repair, remanufacture, refurbishment, and

REMANUFACTURING BY HYUNDAI

Hyundai Automotive Enterprise is a representative manufacturer in Korea that has developed a circular economy approach for various aspects of its business. This has been achieved by establishing remanufacturing and service stations where more than 500 people are employed to offer services, tests, and recovering mechanical sub-assemblies. These remanufactured parts are sold at prices below their original prices, resulting in relatively low reuse costs that make car repairs economically attractive to customers. Remanufacturing has been enabled by modulating the design for easier disassembly and repurposing Hyundai's supply network to allow for the delivery of replacement parts to retailers in the market. Hyundai also offers a service package that informs customers when to replace parts, and guides customers to a nearby service centre – removing inconvenience and increasing the life expectancy of cars in use. If owners sell the cars in a second-hand car market, all the information is transferred to the new owners.

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purpose adjustments. Where virgin materials cannot be replaced by recycled materials, new technologies must be deployed to decarbonise the energy-intensive processes associated with virgin material production.

Transformation to circularity will also include moving from traditional business models built around personal vehicle ownership to mobility-as-a-service business models, as privately owned cars are used at highly inefficient rates – the typical car is parked 95% of the time.[107] Business as usual projections by the Commission on Travel Demand forecast an increase in vehicle ownership in the UK from 27 million to around 40 million by 2050. **Car sharing/fleet models can dramatically reduce emissions and material costs through optimising use phase and reducing the total number of vehicles in demand.** Rather than paying for mobility in a lump sum with vehicle ownership (alongside insurance, parking and other associated costs) and then consuming without limit, products and services can be paid for incrementally.

Government should encourage the scaling up of leasing and subscription models, and on-demand rental and ride-sharing models. The British Vehicle Rental & Leasing Association (BVRLA) have reported that customers are increasingly willing to explore new business models, technology platforms and partnerships.[108] Companies could also increase capacity of use for their fleets by sharing the fleet across multiple services depending on demand cycles. Combining fleet-based mobility with improved maintenance, re-manufacture and recycling could significantly reduce emissions and resource extraction. The Government's upcoming Transport Decarbonisation Plan is an opportunity to utilise circular economy measures to strengthen automotive emissions reduction efforts. In December Scottish Government set a target of reducing car kilometres by 20% by 2030, with a roadmap to reaching this to be published this year.[109]

The Waste Prevention Programme features a welcome commitment to "capture evidence relating to the social and environmental benefits of car-sharing and ridesharing models" and to build these findings into a future strategy. The Commission on Travel Demand have made useful recommendations to follow on from such research. These include for the Department for Transport and HM Treasury to **set out a vision for the transition to a smaller vehicle fleet, for local transport bodies to establish shared mobility strategies, the piloting of mobility hubs**, and for Highways England to **monitor car occupancy levels.**[110] In its updated Climate Change Plan in 2020, the Scottish Government set a commitment to reduce car kilometres by 20% by 2030 in order to address the "over-reliance on cars".[111] The UK should look to match this commitment in its upcoming transport decarbonisation strategy alongside other circular economy measures in the automotive sector.

Tyres

Retreading tyres is a high-tech process that can reuse 85% of a worn-out tyre, significantly reducing the environmental impact of new manufacture and the quantity of end-of-life tyres, whilst providing a cost saving to the vehicle operator. A truck fleet deploying a tyre policy based on premium tyres and retreading uses less than a quarter as many tyres compared to a fleet using single-life throw-away tyres. 95% of truck tyre retreads in the UK are made domestically (compared to fewer than 10% of new truck tyres), and the UK retreading industry supports 5,500 highly skilled jobs, many of which are located in deprived areas of the country.[112] As such, **the retreading industry has a significant role to play in job creation, economic growth and levelling up the UK.**

However, not all tyres have the necessary durability for retreading due to their design, materials or manufacturing quality. This is particularly the case for many low cost single-life tyres, which often have a life expectancy not exceeding 80,000 miles. As shown in section 3, **the import of single-life tyres from Asia has had a significant, detrimental impact on the UK's retreading industry**. In response to this, many countries and trading blocs have imposed tariffs. The EU has only recently opened an anti-dumping investigation – consequently, over the last 5 years the UK has become a major destination for this international trade. Compared to 2012, an estimated 500,000 additional end-of-life truck tyres now arise in the UK every year. Since UK end-of-life tyre recovery infrastructure is saturated, these additional worn-out tyres are exported for incineration, typically in developing countries, releasing 160,000 tonnes of CO_2 every year. The growth in sales of single-life tyres is increasing the UK's dependency on overseas solutions for end-of-life tyre recovery, contrary to the UK Government's ambitions.

The EPR Scheme for tyres, as proposed originally in the Government's 2018 Resources and Waste Strategy is welcome, but should be implemented without further delay. The UK Government could build upon the EPR scheme introduced by the Republic of Ireland in 2017, which places an obligation and fee on the first actor to put a tyre or vehicle on the market, including those imported from outside Ireland.[113] Government could go further and modulate producer fees based on the design of their tyres – including longevity and repairability. EPR for tyres must sit alongside a host of supportive policies as shown in section 2 – including the **reintroduction of the Landfill Tax, resource efficiency criteria in Government public procurement guidelines, and a supportive trade policy**. It will be essential to ensure the UK's future trade agreements align with the Government's circular economy objectives to prevent further damage to the UK retreading industry through the provision of a level playing field between domestic innovators and foreign imports of lower standard.

Batteries

Although batteries are a crucial component of low carbon electric vehicles, they are currently relatively carbon-intensive and expensive to produce. Electromobility will be responsible for roughly 90% of battery demand in 2030, and roughly 50% of automotive manufacturing emissions will be attributable to batteries.[114,115]

Addressing battery production-related emissions will be crucial before demand surges to reach sale cost parity with ICE vehicles by 2025. Additionally, there is a limited supply of raw materials for lithium-ion batteries. Costs are on an upward trend over recent years, and global cobalt production in 2025 will likely need to be double that of 2016 production to satisfy global EV demand[116].

In addition to the ecological impacts of mineral extraction and the limits to source reserves, social concerns in Africa and South America – e.g. human rights violations connected to cobalt mining – add yet another reason to reduce dependencies through resource efficiency. Whilst recycling of components and critical materials should continue to be a focus, **the potential for reuse and repurposing of batteries offers greater resource efficiency and economic benefits** as a greater proportion of the battery's intrinsic value is recouped. For example, the costs of remanufacturing and reuse have been reported to be as low as ~10% the cost of a new battery.[117]

There is significant potential to provide a second-life to EV batteries that can no longer meet EV performance standards – for example to perform stationary energy-storage services. One barrier to the remanufacturing of batteries is the lack of standardisation and traceability, and the fragmentation of volume of battery-pack designs on the market, which will increase by 2025 with an expected 250 new EV models.[118] Additionally, the cost gap between remanufacturing and new manufacturing must remain sufficiently large to warrant performance limitations of second-life batteries.


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While these challenges are not insignificant, they can be alleviated through targeted action along the supply chain from manufacturers to end users, enabling a sustainable second-life-battery industry to emerge. Nissan has a formal partnership with Sumitomo Corporation to reuse lithium-ion battery packs from the Nissan Leaf for stationary distributed and utility-scale storage systems[119]. Renault is also engaging in both recycling and reuse programmes with industry partners. Renault's Re-Factory aims to extend the life of vehicles, decarbonise production and optimise resource management with 45,000 second-hand vehicles to be reconditioned annually from September 2021.[120]

Given the lack of regulation to such a new market, **a strong regulatory regime on recycling and remanufacturing of EV batteries would significantly help address these challenges** and provide certainty to manufacturers, second-life battery companies and customers. The Government's commitment to review and enhance UK producer responsibility laws on batteries (and end-of-life vehicles) is warmly welcomed, and Government should consult on an EPR for batteries as soon as feasibly possible. Extending the life of EV batteries through technological advancement, providing incentives for modular design for ease of disassembly, setting a "right to repair" on batteries, and strengthening the regulation of end-of-life processing requirements would all significantly improve re-use and recycling of batteries.

This year, the European Commission has proposed a suite of new battery regulations as part of its Circular Economy Action Plan to ensure batteries placed on the EU market are sustainable and high-performing and materials obtained in respect of human rights. These include **mandatory carbon footprint disclosures for electric vehicle battery producers, performance and durability labelling**, an obligation to reveal the recycled raw material content by 2027, and a minimum content requirement of recycled material from 2030.[121] The new Batteries Regulation will replace the Batteries Directive, which, since 2006, has prohibited the disposal of batteries in landfill or incineration and required proper waste management of batteries including recycling and collection.[122]

Funding technologies and new business models for the remanufacture and recycling of batteries will also be essential. The Faraday Battery Challenge (part of the Industrial Strategy Challenge Fund) is investing up to £318 million between 2017–2022 in research and innovation projects and facilities to make batteries produced in the UK cost-effective, longer range, long-lasting, safe and recyclable. Several projects have already been announced through the Faraday Battery Challenge funding. This includes the Faraday Institution that brings together research scientists and industry partners on projects with commercial potential. These projects aim to reduce battery cost, weight, and volume; improve performance and reliability; and develop whole-life strategies, including recycling and reuse. In March 2021, the Faraday Institution committed an additional £22.6m in four key research challenges: extending battery life, battery modelling, recycling and reuse, and solid-state batteries.[123]

Policy recommendations

1 **Develop a common methodology for the assessment and reporting of whole lifecycle emissions and resource use of vehicles.** A useful example of this is Volvo's life cycle assessment, which includes emissions from upstream supplier activities, manufacturing and logistics, the use phase of the vehicle and the end-of-life phase. Such a methodology could lead to holistic consumer labelling to explain total resource consumption of vehicles. This could sit alongside the quality assurance mark proposed by Defra to increase consumer confidence in repaired, reclaimed, or remanufactured automotive parts.

2 **Introduce mandatory product standards for the UK automotive sector on durability, reusability, repairability, and recyclability.** The Waste Prevention Programme includes promising proposals to consider ecodesign principles for the UK automotive sector. Such standards will be essential to integrating resource efficiency into the design of vehicles. Minimum quality standards for used batteries should be introduced as part of this package, including raw materials extracted, suitability for disassembly, re-use, re-purposing and recycling.

3 **Adopt mandatory re-use, re-purposing and recycling targets based on material and weight.** With cost as the main driver affecting industry choices for end-of-life EV battery management, targets would incentivise transformative circularity in supply chains.

4 **Provide incentives for pooled mobility and car sharing models** to increase the passenger mile per unit of material. These models will also spread the cost of each vehicle over an increased number of users.

5 **Pilot mobility hubs to support a shift from private vehicle ownership towards mobility as a service.** The Department for Transport and HM Treasury should commission an options review to develop a shared mobility strategy and incentivise lower vehicle holding per household. Government should also encourage local authorities to integrate mobility as a service within local transport systems.

6 **Deliver an ambitious active travel strategy to increase the uptake of cycling and walking in urban areas** by committing long-term investment to a comprehensive, high-quality cycling and walking network, and investing in a national public health communications campaign.

7 **Ensure public transport is the most attractive form of transport for most journeys and support other forms of low carbon mobility where public transport is not viable.** This should include improving accessibility, reliability and affordability of the rail network, integrating car clubs within local transport systems and planning new housing developments so they are better connected to sustainable transport options.

FIVE SUMMARY OF ALL POLICY RECOMMENDATIONS

Accelerating the delivery of existing policy commitments

1 **Resources and waste policy must become a cross-government priority, with BEIS, HMT, DfT, Cabinet Office and MHCLG all proactively contributing to policy development in this area.** This will require clear alignment between key upcoming government strategies and the objectives of the Waste Prevention Programme. Lesson sharing and close collaboration between the Westminster and devolved governments will also be essential to promote as much consistency as possible on resources and waste policy and support supply chains and businesses operating across all four nations.

2 **Implement the policy proposals first set out in the Resources and Waste Strategy of 2018, with urgency and ambition. In particular:**

- The **development of eco-design standards and lifecycle assessments should be prioritised** and developed with transparency, with the aim of capturing a rapidly growing range of priority products. All **eco-design standards and labelling schemes** should be introduced with **mandatory status**;
- **The roll out of Extended Producer Responsibility schemes should be accelerated beyond the focus on packaging to incentivise the development of products that are easier to re-use and recycle. To be effective, these schemes will need ambitious fee modulation mechanisms,** an overarching aim to stimulate reuse and waste prevention, clear definitions and close monitoring of performance;
- The design and role of **Deposit Return Schemes should be clarified in the near future, with a particular focus on introducing these schemes in areas where progress may not be sufficiently made by the introduction of EPR schemes and eco-design criteria. Deposit Return Schemes should be simple and convenient to use**, and be designed alongside stakeholder engagement and a complementary public education campaign;
- The **plastics tax should be implemented with an escalator** on the rate of tax or percentage of recycled material to give a long-term trajectory for businesses.

3 **Strengthen the interim targets and Environmental Improvement Plan provisions (EIPs) in the Environment Bill to provide robust and predictable interim milestones for a stable investment context on the way to meeting the Bill's legally-binding long-term targets.** Additionally, the Bill's target development process needs to be supported by industry pathways, for clarity on what each economic sector will need to do to achieve the Bill's ambitions.

Tackling important policy gaps

4 **Introduce pricing mechanisms to better reflect the lifecycle economic and environmental benefits of using secondary materials where their upfront cost is higher than that of primary raw materials.** These should include:

- **Adjusting tax and VAT rates to incentivise circularity,** as undertaken by Sweden on repair services or on the regeneration of the existing housing stock;
- **Broaden the scope of the tax levied on single-use plastics** to cover other single-use materials;
- **Expand the UK Emissions Trading Scheme** to cover emissions from the waste sector.

5 **Develop criteria for the £290 billion a year spent by the UK on public procurement[124] to drive demand for products and services with higher resource efficiency standards.** The Government could build on the criteria developed under the European Commission's Green Public Procurement framework, which cover an increasing range of products including textiles, road transport, food and furniture.

6 **Building on the recommendations of the Green Jobs Taskforce, the Government should adopt a comprehensive low carbon skills strategy to equip the existing and future workforce with the skills they will need in a more circular, net zero emissions economy.**

- The Government should collaborate with schools, colleges, higher and further education institutions to **embed climate change and environmental sustainability education across the national curriculum and education system, as well as promote a much wider uptake of STEM skills learning.** This must come hand in hand with a review of teaching standards and the Initial Teacher Training Content Framework to ensure teachers have the right knowledge to support their pupils and students.[125]
- The adoption of **skills action plans should be made mandatory for all educational providers, including Further Education (FE) and Higher Education (HE).** Action plans should aim to drive greater teaching and uptake of environmental education, essential soft skills (project management, communications skills etc.) and STEM skills, and to increase gender and ethnic diversity in STEM subjects.
- The **Apprenticeship Levy standards should be adapted** to reflect the Government's aims on resource efficiency and net zero.
- To support workers already on the job market and in need of reskilling, the Government should continue to provide **financial support for training, upskilling and retraining through the National Skills Fund**. This should be matched by Further Education Institutions offering a broader range of flexible, short-term courses focused on the climate and resource efficiency-related skills workers will increasingly need.
- **Circular design principles should be included in all engineering, planning, architecture and design degree courses.**

7 **Provide public finance – such as through the UK Infrastructure Bank and future green sovereign bond issuances – to support the development of critical infrastructure and facilities for recycling, repair, remanufacturing and reuse.** This infrastructure is essential to create integrated supply chains for secondary materials and support the UK in processing a higher proportion of its own waste, and retaining and reusing a larger share of materials within the economy. Targeted public finance can play a key role in crowding in private sector investment in these areas.

8 **Conduct public awareness campaigns to build consumer confidence and grow the demand for resource efficient products and business models (such as those based on 'servitisation', i.e. leasing and subscription) and disincentivise demand for disposable business models such as fast fashion.** Clear communication campaigns will be important to establish trust in secondary products and materials.

9 **Facilitate greater trade in circular products and materials, by featuring circular economy principles in the trade and sustainable development chapters of trade agreements.** As the Aldersgate Group set out in a recent policy briefing,[126] Government must also use its trade policy to provide a level playing field to ensure that domestic businesses innovating in resource efficiency are not exposed to unfair competition from imports with lower environmental standards.

Sector-specific recommendations: buildings and automotive

Construction sector: policy recommendations:

10 **Regulate building design to reduce embodied and operational emissions, with the introduction of a mandatory minimum whole lifecycle carbon standard for buildings and infrastructure. To achieve net zero, a standard must be agreed with industry for the whole lifecycle carbon footprint of buildings and infrastructure which is strengthened over time, with differentiated targets by function and usage.** Government could build upon the guidance produced by the Royal Institute of Chartered Surveyors (RICS) on whole life carbon assessment for the built environment.[127] The UK could also revise Eurocodes to ensure low carbon alternatives are given preference, and to embed requirements for the reusability of building components and minimisation of waste.

11 **Penalise design for buildings with short life spans. For example, Government should make 'Module D', the end-of-life element of Environmental Product Declarations (EPDs), mandatory rather than voluntary to reward sustainable design. Detailed design criteria and 'as-built' information must also be stored for easy retrieval and use decades later to allow the adaptation of existing developments and reuse of spare materials.**

12 **Reduce VAT on housing renovation and regeneration to match the level on new builds, to incentivise the reuse of existing building.** This should cover core improvements to existing buildings, including reroofing, extensions, conversions and renewable heating installation. Such an alignment would shift incentives from demolishing existing buildings to regenerative development.

13 **Introduce mandatory product standards to reduce embodied emissions in construction materials and increase their resource efficiency.** This will ensure that they are not undermined by low cost overseas imports with poor environmental standards.

14 **Simplify waste regulations to avoid industrial materials being classified as waste unless no other safe use can be determined.** Currently, waste regulations create an obstacle for the re-use of reliable building materials, either directly or indirectly through classification of resources as "waste".

15 **Create markets for recycled construction materials, through the introduction of tax adjustments and construction standards.** Where resource efficient construction materials, or products made with secondary materials, struggle to compete on upfront cost, pricing mechanisms need to be adjusted to ensure upfront price competitiveness and reflect the longer-term, environmental and economic benefits derived from using more resource efficient methods of production.

16 **Integrate circular design principles in all engineering, architecture and design degree courses and industry training boards.** This should be a criterion for the Joint Board of Moderators, supported by The Engineering Council (EngC), the Royal Institute of British Architects (RIBA), and also university faculties' Industrial Advisory Panel. Additionally, the Construction and Engineering Industry Training Boards should deliver effective skills in modular, adaptable and flexible construction.

Automotive sector policy recommendations:

17 **Develop a common methodology for the assessment and reporting of the whole lifecycle emissions and resource use of vehicles.** A useful example of this is Volvo's life cycle assessment, which includes emissions from upstream supplier activities, manufacturing and logistics, the use phase of the vehicle and the end-of life phase. Such a methodology could lead to holistic consumer labelling to explain total resource consumption of vehicles. This could sit alongside the quality assurance mark proposed by Defra to increase consumer confidence in repaired, reclaimed, or remanufactured automotive parts.

18 **Introduce mandatory product standards for the UK automotive sector on durability, reusability, repairability, and recyclability. The Waste Prevention Programme includes promising proposals to consider eco-design principles for the UK automotive sector.** Such standards will be essential to integrate resource efficiency into the design of vehicles. Minimum quality standards for used batteries should be introduced as part of this package, including raw materials extracted, suitability for disassembly, re-use, re-purposing and recycling.

19 **Adopt mandatory re-use, re-purposing and recycling targets based on material and weight.** With cost as the main driver affecting industry choices for end-of-life EV battery management, targets would incentivise transformative circularity in supply chains.

20 **Provide incentives for pooled mobility and car sharing models to increase the passenger mile per unit of material.** These models will also spread the cost of each vehicle over an increased number of users.

21 **Pilot mobility hubs to support a shift from private vehicle ownership towards mobility as a service. The Department for Transport and HM Treasury should commission an options review to develop a shared mobility strategy and incentivise lower vehicle holding per household.** Government should also encourage and offer support to local authorities to integrate mobility as a service within local transport systems.

22 **Deliver an ambitious active travel strategy to increase the uptake of cycling and walking in urban areas by committing long-term investment to a comprehensive, high-quality cycling and walking network, and investing in a national public health communications campaign.**

23 **Ensure public transport is the most attractive form of transport for most journeys, building on the 2021 Bus Back Better strategy and supporting other forms of low carbon mobility where public transport is not viable.** This should include improving accessibility, reliability and affordability of the rail network, integrating car clubs within local transport systems and planning new housing developments so they are better connected to sustainable transport options.

Endnotes

1 HM Treasury (2021) *The Economics of Biodiversity: The Dasgupta Review*

2 Green Alliance (2018) *Less in, More Out*

3 CCC (2020) *The Sixth Carbon Budget*

4 Green Alliance and Wrap (2015) *Employment and the circular economy*

5 Suez/Eunomia (2016) *A resourceful future: expanding the UK economy*

6 United Nations Environment Plan (2018) *Redefining Value: The Manufacturing Revolution*

7 Cabinet Office (2020) *Transforming public procurement*

8 Aldersgate Group (2020) *Upskilling the UK workforce for the 21st century*

9 Aldersgate Group (2020) *Aligning the UK's trade policy with its climate and environmental goals*

10 Royal Institute of Chartered Surveyors (RICS) (2017) *Whole life carbon assessment for the built environment*

11 UN Environmental Programme (2019) *Global Resources Outlook 2019*

12 Ipsos MORI (2018) *King's Club Poll on Environment – 2018*

13 United Nations Environment Plan (2018) *Redefining Value: The Manufacturing Revolution*

14 Green Alliance (2018) *Less in, More Out*

15 Ellen Macarthur Foundation (2019) *Completing the Picture: How the Circular Economy tackles climate change*

16 Circular Economy Task Force (2013) *Resource resilient UK*

17 Ellen MacArthur Foundation (2019) *Completing the Picture: How the Circular Economy Tackles Climate Change*

18 ONS (2020) *Material footprint in the UK: 2017*

19 Department for Environment, Food & Rural Affairs (2020) *UK Statistics on Waste*

20 Green Alliance and Wrap (2015) *Employment and the circular economy*

21 Suez/Eunomia (2016) *A resourceful future: expanding the UK economy*

22 Aldersgate Group (2018) *No Time to Waste: the Government must use Brexit to make the UK a world leader in resource efficiency*

23 Oakdene Hollins for Defra (2017) *Business resource efficiency quantification of the no cost/low cost resource efficiency opportunities in the UK economy in 2014*

24 Buro Happold (2021) *Driving innovation and creating market opportunities through environmental regulations*

25 Business Insider (2020) *COVID-19 impact on packaging market by material type, application and region—global forecast to 2021*

26 Reuters Special Report (2020) *The Plastic Pandemic: COVID-19 Trashed the Recycling Dream*

27 Dimitri Zenghelis, James Rydge, LSE (2020) *Rebuilding to Last: How to design an inclusive, resilient and sustainable growth strategy after COVID-19*

28 Buro Happold (2021) *Driving innovation and creating market opportunities through environmental regulations*

29 Green Alliance (2019) *Building a Circular Economy*

30 Material Economics (2019) *Industrial transformation 2050: pathways to net-zero emissions from EU heavy industry*

31 Welsh Government (2021) *Beyond Recycling*

32 Welsh Government (2020) *COVID-19 Reconstruction: Challenges & Priorities*

33 Welsh Government (2020) *Natural Resources Policy*

34 European Commission (2020) *A new Circular Economy Action Plan For a cleaner and more competitive Europe*

35 https://bit.ly/3dt8KLJ

36 https://bit.ly/2SKPEJW

37 https://bit.ly/3dAb4k9

38 RSPB (2015) *Using regulation as a last resort: Assessing the Performance of Voluntary Approaches*

39 OECD (2003) *Voluntary Approaches for Environmental Policy: Effectiveness, Efficiency and Usage in Policy Mixes*

40 Green Alliance (2020) *Response to Environmental Audit Committee Inquiry "Fixing Fashion: follow up"*

41 WRAP (2019) *Eliminating problem plastics, version 2*

42 Green Alliance (2020) *Design for a circular economy: Reducing the impacts of the products we use*

43 Defra (2020) *Environment Bill – environmental targets policy paper*

44 https://bit.ly/3hofQ5k

45 Green Alliance (2021) *Targeting success: Why the UK needs a new vision for resource use*

46 Euractiv (January 2020) *LEAK: EU's new circular economy plan aims to halve waste by 2030*

47 European Parliament press release (27 January 2021) *MEPs call for binding 2030 targets for materials use and consumption footprint*

48 Wildlife and Countryside Link (2020) *Response to the Environment Bill Targets Policy Paper*

49 Wildlife and Countryside Link (2020) *Response to the Environment Bill Targets Policy Paper*

50 https://bit.ly/3ydOs0M

51 Green Alliance and CIEMAP (2018) *By popular demand: what people want from a resource efficient economy*

52 Government Offices of Sweden (2016) *Strategy for sustainable consumption*

53 Federation of Master Buildings (2020) *Government loses potential for £15bn economic boost and job creation*

54 The local (2016) *How Sweden wants to make repairing things cheaper*

55 Government Office for Science (2017) *From waste to resource productivity. Evidence and case studies.*

56 In the Budget delivered to Parliament in March 2021, the forecast for the 2021-2022 fiscal year indicated £198.2bn from income tax, £146.8bn from national insurance contributions and £10.2bn from environmental levies. Receipts are expected to total £731.6bn.

57 Ex'tax project (2014) *New era. New Plan. Fiscal reforms for an inclusive circular economy*

58 Cabinet Office (2020) *Transforming public procurement*

59 Cabinet Office (2020) *Transforming public procurement*

60 Witjes *et al.* (2016) *Towards a more Circular Economy: Proposing a framework linking sustainable public procurement and sustainable business models*

61 https://bit.ly/3qG9H8A

62 Cabinet Office (2020) *Transforming Public Procurement*

63 Cabinet Office (2021) *National Procurement Policy Statement*

64 Aldersgate Group (2020) *Upskilling the UK workforce for the 21st century*

65 Green Alliance and Wrap (2015) Employment and the circular economy

66 Aldersgate Group (2020) *Seize the moment, building a thriving and resilient economy in the aftermath of COVID-19*

67 https://bit.ly/3h9j3GR

68 Ministry of Defence (2012) *Career Transition Partnership Guidance*

69 HM Government (2018) *Our waste, Our Resources: A Strategy for England*

70 Let's Recycle (2020) *Waste to landfill in England jumps 4% in 2019*

71 Green Alliance (2019) *Building a Circular Economy*

72 HM Government (2011) *Update on the design of the Green Investment Bank*

73 EAC (2014) *Growing a circular economy: ending the throwaway society*

74 NN investment partners (2021) *Europe's sovereign green bond boom continues as Italy taps the market*

75 Capgemini (2020) *How sustainability is fundamentally changing consumer preferences*

76 https://bit.ly/3h8UIGD

77 https://bit.ly/3waFEY2

78 French Ministry of the Ecological Transition (2018) *50 measures for a 100% circular economy*

79 Aldersgate Group (2020) *Aligning the UK's trade policy with its climate and environmental goals*

80 Greenpeace (2021) *What really happens to your plastic recycling?*

81 Aldersgate Group (2020) *Aligning the UK's trade policy with its climate and environmental goals*

82 IEEP (2019) *EU circular economy and trade: improving policy coherence for sustainable development*

83 Ellen MacArthur Foundation (2019) *Completing the Picture. How the Circular Economy Tackles Climate Change*

84 UNEP and IEA (2017) *Towards a zero-emission, efficient, and resilient buildings and construction sector, Global Status Report*

85 IRP and UNEP (2018) *The weight of cities: resource requirements of future urbanization*

86 UK Green Building Council & The Crown Estate (2015) *Tackling embodied carbon in buildings*

87 Material Economics (2018) *The Circular Economy: A Powerful Tool for Climate Mitigation*

88 Green Construction Board (2020) *Zero Avoidable Waste in Construction*

89 Buro Happold (2021) *Driving innovation and creating market opportunities through environmental regulations*

90 HM Treasury (2013) *Infrastructure Carbon Review*

91 Green Alliance (2020) *Added Value*

92 Royal Institute of Chartered Surveyors (RICS) (2017) *Whole life carbon assessment for the built environment*

93 Department for Environment, Food and Rural Affairs (2020) *UK statistics on waste*

94 Architects Journal (2019) *Introducing RetroFirst: A new AJ campaign championing reuse in the built environment*

95 Ministry of Housing, Communities and Local Government (2020) *Live tables on dwelling stock (including vacants) table 61,*

96 Federation of Master Buildings (2020) *Government loses potential for £15bn economic boost and job creation*

97 Historic England (2017) *Engines of Prosperity: new uses for old mills*

98 Royal Institute of Chartered Surveyors (RICS) (201) Whole life carbon assessment for the built environment

99 BEIS (2021) *2019 Greenhouse Gas Emissions*

100 SMMT (2020) *SMMT Vehicle Data: Manufacturing Data*

101 ONS (2019) *Road transport and air emissions*

102 https://www.ey.com/en_gl/news/2020/11/millennials-to-lead-covid-induced-car-ownership-boom-ey-survey

103 HM Government (2020) *The Ten Point Plan for a Green Industrial Revolution*

104 Green Alliance (2018) *Less in, more out: using resource efficiency to cut carbon and benefit the economy*

105 The Society of Motor Manufacturers and Traders (SMMT) *2019 Automotive Sustainability Report'*

106 Ibid.

107 Brookings (2020) *The end of the car as we know it: What COVID-19 means to mobility in Europe*

108 BVRLA (2019) *Industry Outlook 2019*

109 Scottish Government (2020) *Update to the Climate Change Plan 2018–2032*

110 CREDS (2019) *Shared mobility – where now, where next? Second report of the Commission on Travel Demand*

111 Scottish Government (2020) *Securing a green recovery on a path to net zero: climate change plan 2018–2032 – update*

112 British Tyre Manufacturers' Association (2018) *Retreading Truck Tyres, Sustainable Future*

113 Irish Statute Book (2017) *Waste Management (Tyres and Waste Tyres) Regulations 2017*

114 World Economic Forum (2020) *The Road Ahead: A policy research agenda for automotive circularity*

115 Statista (2021) *Global demand for cobalt in batteries from 2017 to 2025*

116 McKinsey & Company (3 June 2019) *Recharging economies: the EV-battery manufacturing outlook for Europe*

117 Ricardo Energy & Environment (2019) *Circular Economy Perspectives for the Management of Batteries used in Electric Vehicles*

118 McKinsey & Company (30 April 2019) *Second-life EV batteries: the newest value pool in energy storage*

119 Sumitomo Corporation (2018) *Nissan, Sumitomo Corporation and 4R set up plant to recycle electric-car batteries*

120 Groupe Renault (2020) *Re-factory: The Flins site enters the circle of the circular economy*

121 European Commission (2021) *Batteries-modernising EU rules*

122 https://bit.ly/2Uf5YmD#

123 BEIS (2021) *Press release: Over £30 million product standards for the UK automotive sector on durability, reusability, repairability, and recyclability Government investment to boost batteries and hydrogen vehicles*

124 Cabinet Office (2020) *Transforming public procurement*

125 Aldersgate Group (2020) *Upskilling the UK workforce for the 21st century*

126 Aldersgate Group (2020) *Aligning the UK's trade policy with its climate and environmental goals*

127 Royal Institute of Chartered Surveyors (RICS) (2017) *Whole life carbon assessment for the built environment*