Fostering Prosperity

Driving innovation and creating market opportunities through environmental regulations

Commissioned by the
Aldersgate Group

BURO HAPPOLD

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Contents

Foreword

The UK has set commendable objectives on the climate change and environmental agenda. In addition to its net zero emissions target by 2050, the UK is committed to overturning the decline in the natural environment within a generation, significantly improving the resource efficiency of its economy and embarking on a green economic recovery following the COVID-19 crisis. Good regulation will have a critical role to play in achieving these ambitions and ensuring that the transition to a net zero emissions and environmentally restorative economy comes with the development of new market opportunities, growing supply chains and job creation.

This is why the Aldersgate Group commissioned Buro Happold to do a detailed review on the effectiveness and economic implications of past and existing environmental regulations, identify the key characteristics of good environmental regulation and draw out lessons which can help guide future UK policy making. We were particularly interested in understanding how environmental regulations can best be designed going forward to help achieve the UK's climate and environmental goals in a way that also supports business investment in innovation, supply chain growth, skills, job creation and contributing to the levelling up challenge.

This report - which focuses on evidence drawn from the construction, waste and automotive sectors - finds that environmental regulations have generated significant economic as well as environmental benefits to date which have outweighed initial compliance costs. Building on a detailed literature review as well as interviews with 16 business leaders, it finds that environmental regulations in these sectors has resulted in accelerated business innovation, the creation of new market opportunities and corresponding benefits in terms of supply chain growth, job creation and skills. In the building sector, the London Plan, which establishes requirements for improving the sustainability of developments, supported over £100 million investment in heat networks, solar PV installation and carbon offsets during 2018. Similarly, the Landfill Tax has been a net positive job creator for the waste sector, and estimations suggest that a more resource efficient economy will generate the creation of a further 500,000 jobs. The transition to electric vehicles will also generate around 30,000 new jobs by 2030, and leverage around £3bn of private investment in the automotive sector.

Of course, not all regulations have been successful in the past and there are valuable lessons that must be learnt to ensure that the regulatory frameworks that are developed going forward deliver effective environmental, economic and social outcomes. The real-life evidence review provided in this report shows that **good environmental regulation must be forward-looking and underpinned by clear and ambitious targets which tighten over time**. Environmental regulations need to be **consistently enforced** across all market participants and supported by **well-funded and resourced regulators** and local bodies. Businesses also need to be provided with predictable implementation timescales and clear communications to support investment in new technologies and business models. Furthermore, to be fully effective and avoid unintended consequences, regulations across the environmental and climate agenda need to be more **carefully joined up** and better integrated with the UK's broader industrial strategy and economic policy.

What is clear is that environmental regulation will be essential to the UK's environmental and economic objectives going forward. The urgency of putting the UK on a pathway for a durable economic recovery as well as on a credible pathway to achieving net zero emissions in less than three decades represent unprecedented challenges in both time and scale. Clear market signals which drive cost-effective business investment in innovation, new products, factories and services, growing supply chains, skills and job creation will be essential. **Good environmental regulation must therefore sit at the heart of the government's forthcoming regulatory review and its upcoming strategies to achieve net zero emissions and other key environmental goals**.

This decade presents a huge opportunity for the UK, both in terms of making significant progress against its climate and environmental targets but also in terms of diversifying its economy, growing new supply chains and supporting the creation of high-quality jobs across the country. Ambitious, well-designed and properly enforced environmental regulations and market mechanisms will be vital to this.

Joan Walley
Chair of the Aldersgate Group

Nick Molho
Executive Director of the Aldersgate Group

1 Executive Summary

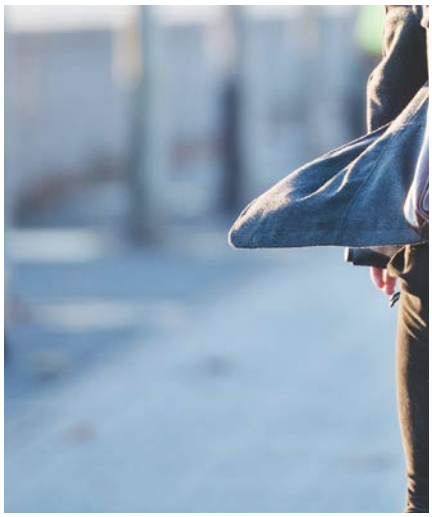
1.1 Overview

This study, commissioned by the Aldersgate Group, revealed that businesses and stakeholders across the buildings, waste and resources, and automotive sectors have experienced clear economic benefits owing to environmental regulations. **It finds business support for clear, ambitious environmental regulation that supports the economic recovery whilst driving the UK's efforts to achieve net zero emissions and reverse the decline in the natural environment. These regulations are essential to provide businesses with a forward-looking and stable policy environment and one which will drive investment in innovation and the growth of new markets.**

The evidence presented in this report was gathered through a literature review of current and emerging regulations in these three sectors and **twenty expert interviews with business leaders and practitioners.** It shows that environmental regulations have clear benefits in terms of competitiveness, innovation, and job creation. Moreover, interviewees stated that good environmental regulations had wider system and resilience benefits, including increasing the quality of design and materials processing, better cross-supply chain collaboration and cooperation, and business outputs that better align with local needs and priorities, strengthening local economies. **Despite initial compliance costs, regulations in the waste, construction and automotive sectors have also delivered significant economic as well as environmental benefits.** This will be increasingly important as businesses work to cope with the impacts of climate change while taking steps to decarbonise the whole economy.

To realise these opportunities, the UK government should base its forthcoming regulatory review[1] on the recognition [1] that well-designed and ambitious environmental regulations can deliver important benefits to the economy, society and the environment and should move beyond the 'red tape' narrative that has often shaped past regulatory reviews. Based on the lessons learnt from past and existing regulations, **a key focus of government policy going forward should be to put in place a robust and credible regulatory regime that will put the UK on track to meet its environmental and climate targets and deliver economic and social benefits in the process.**

This report shows that **interviewees felt strongly that good environmental regulation should be forward-looking, with clear, ambitious outcomes and targets that tighten over time, as has been implemented successfully with building energy performance targets. This clear trajectory allows businesses to innovate and invest with confidence.** A key message coming out of business interviews was also that a good environmental regulatory framework should be cross-sectoral, taking account of interactions between sectors, aligning with other policy areas and infrastructure changes and providing consistency along supply chains. This is particularly important in the case of waste and resources policy, which should look to manage materials processing throughout project lifecycles, rather than the current focus on disposal. A forward-looking perspective beyond short-term electoral cycles and breadth of scope across sectors was raised by many of the interviewees as critical to both the transition to a decarbonised economy and a thriving business landscape.



Well-resourced regulators and markets are also necessary for the effective delivery of environmental regulation. Interviewees indicated that well-funded and resourced local authorities and regulators are essential to ensure the proper implementation of regulation on the ground and they also provide valuable expertise, local insight and management of the cross-sectoral influences of regulations. This is exemplified in the production of local plans and spatial strategies, which can ensure that new developments are integrated with local transport networks and materials processing infrastructure, as well as specifying core green building standards. Markets have an accompanying role in using standards to drive innovation, through lobbying and political engagement and in responding to demand for new skills and jobs.

Taken together, this suggests a range of important opportunities for the development of well-managed and properly resourced regulations with ambitious, forward looking targets and milestones. This includes work to align policy across sectors, to shape regulation to local priorities, to help protect businesses from market fluctuation and to raise environmental standards. Good environmental regulations will **foster business prosperity through new jobs, skills and drivers for innovation, while delivering a successful green recovery post COVID-19 and Brexit and meeting the ambitions of the Resources and Waste Strategy.** These regulations must be delivered rapidly, with sufficient ambition to deliver legally binding **national environmental and decarbonisation targets.**

Key findings from interviews: Overall

- Green regulations play a key role in **driving job creations, skills, and innovation** through requirements for changes in practice and ambitious new targets for business. For example, the GLA estimates that in 2018 over £100m was invested in the heat networks and technologies stipulated in the London Plan, national biodiversity net gain requirements are estimated to have a net annual value of over £250m, while the Waste and Resources Action Programme (WRAP) estimates that moving towards a circular, cross-sector approach to waste management could create up to 500,000 additional jobs, coupled with a gross value added to the sector of £75 billion;
- Green regulations can also **increase business resilience** by improving cross-supply chain collaboration and requiring cross-sector policy alignment. Adaptable regulation encourages partnerships across the supply chain and builds strength, resilience and synergies in other sectors;
- Regulations make a transition to a sustainable economy **cost-competitive** by providing consistency, while ambitious new targets and standards for best practice can help to overcome industry inertia;
- Cross-sectoral environmental regulations **maximise the benefits of business activities**, especially around implementing infrastructure to facilitate a circular economy. For example, adaptable waste regulation that encourages businesses to reuse and repurpose high value materials and develop partnerships up the supply chain can offer savings in transport and reduced air pollution emissions, incentivise high quality design of homes and greatly reduce waste disposal requirements;
- Regulations should be **enforced**, to hold government and local authorities to account as target setters and implementers, and to allow businesses to operate in a fair environment;
- Regulations need to be accompanied by **support and investment in cross-sectoral communication and training, technological availability, new business models, and clear communication**; and
- The rise in **public awareness** around environmental issues, particularly regarding plastics, is positive but must be considered with caution so as not to divert from highest impact areas.

Key findings from interviews: Buildings

- **Local plans** have helped drive the low carbon agenda forward and play a key role in highlighting local sensitivities and proactively stewarding local areas. It is important that efforts to streamline planning rules do not undermine the ability of local authorities to provide essential local insight and act on local priorities;
- **The London Plan** is considered ambitious and a key driver in setting environmental and quality standards, especially around whole life carbon and building energy efficiency. The GLA estimates that in 2018 over £100m was invested in the heat networks and technologies as a result of the London Plan However, concerns were raised that ambitious requirements and **targets may be harder for local authorities to mandate in areas with lower house prices, and may benefit greater government support** in order to meet decarbonisation goals;
- **Future Homes Standard 2025 and other regulation should align with equivalent international regulations such as future updates to the EU Energy Performance of Buildings Directive.** This means ensuring that there aren't major differences in focus, reduced ambition or onerous changes in necessary business expertise or product specifications that prevent companies and supply chains from continuing to operate internationally; and
- **Planning reform** in its current form was seen by interviewees as a backwards step, siloed and inconsistent with other legislation such as the Environment Bill.

Key findings from interviews: Waste & Resources

- Current policy, including the Resources and Waste Strategy 2018, has a **good level of ambition** and its consideration of circular economy goals is welcomed;
- There is a **lack of cross-sectoral focus** in both current and emering policy, with too much onus on the waste sector and end-of-pipe regulation; there are significant benefits associated with broader integration of resource efficiency and consumption reductions consideration across adjacent sectors, including buildings and manufacturing;
- More detail is needed on **implementation strategies** for emerging policy and its transposition into law is inconsistent (eg extended producer responsibility (EPR) schemes, eco-product standards and public procurement review). There are lessons to be learned from previous schemes such as the Landfill Tax and the plastic bag levy, as well as EPR where it exists in relation to electrical and electronic equipment, batteries and end of life vehicles, including the need to provide sufficient incentives for high waste hierarchy options including reduction, reuse and repair;
- **Uncertainty following Brexit** risks a loss of competitiveness and rise in illegal activity, and the UK needs to continue to effectively match with the EU's circular economy policy as we move forward; and
- COVID-19 is driving a **roll-back of some planned environmental progress,** for example around reusable and single use products, and this should be targeted for reversal as we recover from the crisis.
- Policy to effectively accelerate the transition to circularity, and the infrastructure this will require in the collection, sorting and recovery of materials promises to generate a net increase in jobs. WRAP estimates that this could be up to 500,000 additional jobs, coupled with a gross value added to the sector of £75 billion.

Key findings from interviews: Automotive

- **More stringent regulations** come with higher compliance costs and businesses are reluctant to make changes that are not supported by a strong business case. Hence, it is crucial to provide clear timelines, supporting frameworks for innovation and cross sectoral partnerships; and incentives to lower ownership costs for EVs;
- **Incentives** are considered more effective drivers for change than penalties;
- Lack of **charging infrastructure** remains a key barrier to the transition to electric mobility. A greater network of fast chargers, smart grids and ease of use are required for large scale adoption of EVs;
- **The UK has the capability to lead the way** to ultra-low and zero emission vehicles through world class research and innovation programmes such as the Faraday Battery Challenge. The University of Strathclyde's Centre for Energy estimates that a UK transition to EVs could create 30,000 new jobs by 2030;
- **Future trade deals** under a new EU-UK era and with other major countries will determine UK businesses' ability to remain competitive in the global market; and border carbon tax adjustments may be required and;
- COVID-19 is reshaping mobility trends towards **more active travel** and has also severely affected the automotive sector, which is reliant on interconnected global supply chains. One in six jobs is at risk of redundancy in the UK automotive sector, highlighting the need to strengthen local supply chains and incentivise domestic players. Developing an integrated transport policy will facilitate a shift to active and electric mobility as well as increased public transport, while protecting livelihoods;

1.2 What makes good environmental regulation: key recommendations

KEY RECOMMENDATIONS

KEY THEMES

FUTURE REGULATORY DESIGN

1. Regulations and targets should be **ambitious and in line with net zero targets** and bold ambitions on environmental action.
2. **Targets, standards and benchmarks in emerging policy should show a clear timescale, tightening over time.** This provides policy direction and enables different sectors of the economy, such as the construction sector, to upskill its workforce and invest to meet those targets.
3. **Enforcement must be clear and consistent**, holding to account government or the regulator as the target setter and allowing businesses to operate in a fair environment. This requires both improved enforcement of existing policy and a coherent strategy for enforcement of new policy. Where compliance costs are a concern, incentives, as opposed to penalties, will push the industry to develop and adopt new technologies.
4. **Policy should be cross-sectoral, compatible with circular economy thinking and consistent with regulations in connected industries** to maximise regulatory benefits. At present environmental regulation is siloed, with circular economy issues typically consigned to waste policies.
5. **Policy should act to provide consistency to businesses across markets**, allowing innovative and environmentally forward-thinking businesses and investors to operate with protection from fluctuation in high-carbon markets.
6. New regulation must be supported by **clear communication** and messaging that instils confidence.

EMPOWERED AND WELL-RESOURCED REGULATORS

The role of the regulator is an important component of environmental and climate policy design, both in terms of providing accountability and managing enforcement, and being local or subject experts who can highlight local sensitivities and targets, proactively stewarding their areas of remit. **Their role should not be diluted in future policy changes but rather be enhanced, with adequate funding for regulators to enforce standards despite pressure on public finances** – the weakening of environmental regulators and local authorities is a key risk in proposed changes to planning policy.

KEY RECOMMENDATIONS

KEY THEMES

INVESTMENT AND SUPPORTING MECHANISMS	Regulations and standards are not effective in isolation. **Skills and training, research and development, client buy-in, market access, and technological availability all need to accompany good environmental regulation**. For example, charging infrastructure supply in the automotive sector remains a key barrier to facilitate the transition to electric mobility.
BREXIT	Having left the EU, regulatory ambition should not be reduced, and actions can be taken to shape policy and regulation in such a way that eases high business uncertainty around the transition. This may include: **a.** Ensuring **clear alignment of standards** with international regulations to support international supply chains and product sales across borders. **b.** **Current gaps in transposition of EU legislation** should be filled to prevent businesses being left exposed and uncertain. **c.** **Border tax adjustments on carbon** may be required so that the UK industry is not penalised by low-cost inputs from countries with less stringent environmental regulations. The UK may have a linking mechanism with the EU ETS covering the automotive sector.
COVID-19 RECOVERY	The impact of COVID-19 may result in a weakening of environmental compliance in the short term due to lack of resources. Policy should move away from a culture of compliance and incentivise a race towards high environmental performance to **cultivate a more resilient supply chain, promoting investment and upskilling and sharing of resources to limit the impact of future shocks**. Government policy and regulatory frameworks are essential to foster economic flourishing with high quality business output and performance.
HARNESSING PUBLIC CONCERN, WHILST FOCUSING ON THE AREAS OF GREATEST IMPACTPUBLIC	Regulatory capacity needs to maintain focus on achieving the transition to a material circular economy. Supported with strong evidence, policy makers must focus on the policy interventions that will make the biggest material difference to the environment. This means being aware of public opinion, for example excessive focus on plastic use, but not be distracted by it.

2 Introduction

2.1 Background

In 2017, the *Help or Hindrance?* study[2] was commissioned by the Aldersgate Group to explore the connection between ambitious environmental standards and rising industrial competitiveness, skillsets, and innovative capacity. This study found strong evidence that well-designed environmental policies can have a strong environmental and broader societal benefit, as per the Porter Hypothesis (Box 1).[3]

In 2020, this report was commissioned to revisit these findings. Since 2017, there have been major changes to the regulatory and political landscape in the UK. In terms of policy, recent years have seen legislation passed for a 2050 net zero target, the development of a new Agriculture Bills and Energy White Papers, and the adoption of the 2018 Resources and Waste Strategy, while the Environmental Bill, Transport Decarbonisation Plan and Updated Industrial Strategies are all forthcoming. With significant changes afoot as a result of the COVID-19 pandemic and leaving the European Union (EU), the Aldersgate Group believes that there is an opportunity for the UK to introduce and design strong environmental regulations which can support business growth and safeguard the environment.

***Help or Hindrance?* 2017**

This study looked to investigate the Porter Hypothesis that stricter environmental regulation stimulates innovation (the 'weak' view). A 'strong' version of this hypothesis is that stricter regulation actually enhances competitiveness and performance. In 2017, evidence in support of the 'weak' version was fairly well established while support of the 'strong' version was mixed. Since then, studies have continued to find evidence to support both the 'strong' and 'weak' hypotheses, including in relation to firm productivity.[2]

Interviewees for the 2017 *Help or Hindrance?* study reported that:

- The impact of environmental regulation on the competitiveness of their business was positive overall
- The costs of compliance are more than offset by gains in improved quality, performance and competitiveness
- Other support mechanisms are required to deliver wider benefits such as skills enhancement and innovation
- Environmental regulation has led to the creation of new jobs, have influenced changes in skills and driven innovation

The Rebuilding to Last[4] study , produced with the London School of Economics (LSE) and the University of Cambridge for the Aldersgate Group, provides a useful summary of how, during a crisis or period of major change and uncertainty, regulations can be helpful policy tools. First, existing regulations can ensure that the UK 'does not go backwards'. If standards are suspended or weakened, firms may be tempted to relax pollution controls or worker protection to save costs in the short run. Second, progressive regulations and standards can provide signals and policy certainty for the private sector that guide investments over the medium-term. Using regulation and new standards as complements to carbon pricing can help to accelerate innovation in growth sectors, create efficient markets and stimulate development of new technologies. Finally, since publicly funded projects account for a quarter of UK spending, the government can use public procurement to create incentives at scale for products and technologies that meet both financial and environmental needs.

This new study aims to better understand how these mechanisms apply in the UK in light of recent regulatory changes and the uncertain nature of the future policy landscape. This includes capturing the role of regulators and markets as a complement to environmental regulation and considering the role of regulations within a circular economy.

The *Help or Hindrance?* 2017 study also looked to understand the benefits of environmental regulation on jobs, skills and business innovation. **Environmental regulations help stimulate and support low carbon economies,**[4] **and there is extensive evidence that these industries are routinely net-job creators, often more effectively than fossil fuel investments.**[5] Regulations were found to provide a strong market signal for skills development, stimulating the development of entirely new markets as well as innovation in existing markets. In the context of climate change, innovation is also widely acknowledged to be necessary at a national level to decarbonise 'hard-to-crack' industries, around which supporting regulatory frameworks and government engagement is essential.[6,7]

In this update, further benefits and opportunities are considered. These are intended to better capture principles of resilience, circular economy and systems thinking to give a broader picture of the consequences of environmental regulation in the UK business landscape. In particular, there is extensive literature on the wide range of co-benefits brought by decarbonisation technologies and clean industries – including reduced waste, air pollution, urban heating and congestion, and improvements in health outcomes, flood resilience, job creation and commercial opportunities.[8]

This suggests that successful regulation in one area can have both traditional business benefits and positive impacts in connected systems beyond their direct regulatory remit. Conversely, climate change brings a strong adaptation and resilience challenge to businesses and our societies. The literature indicates that regulators have a role in strengthening adaptation capacity and reducing the risk of climate impacts through setting, monitoring, enforcing and advising resilience standards, benefits and price reviews.[9]

Regulation and the Circular Economy

'The circular economy is a new economic model that moves away from this current linear economy, where materials are mined, manufactured, used and thrown away, to a more circular economy where resources are kept in use and their value is retained.' GLA Design for a Circular Economy Primer, 2020[10]

The circular economy looks to deliver net zero principles through principles of regeneration, repurposing and reusing. This enables a more streamlined and higher value use of materials, waste and energy, protecting the sector and urban environments from the rising cost of materials and disposal of waste, and 'the impact of demolition and waste on air and noise quality, congestion, land take.'[10] It forms the centre of green recovery plans and green deal proposals: the European Commission launched their first Circular Economy Action Plan in 2015, and in 2020 released: 'a strong and coherent product policy framework that will make sustainable products, services and business models the norm and transform consumption patterns so that no waste is produced in the first place.'[11]

The Ellen MacArthur Foundation states that 'effective circular economy policymaking requires the combination of many policy interventions and does not rely on a 'silver bullet' or blanket solutions'.[12] Regulation of a circular economy requires cross-sector, multidisciplinary thinking. It moves from controlling waste at end of life to instead stretch across sectors, focussing on incentivising repurposing, regeneration and reuse. This covers a baseline of tackling resource productivity, circular activities, waste generation and energy and greenhouse gas emissions. Regulatory frameworks must include government strategy and targets on resource productivity and circular economy; product regulations; waste regulations; industry regulations and accounting; reporting and financial regulations, including accounting for natural capital and resources; and the fiduciary duty of investors and managers.

2.2 Study approach

The 2017 study[2] described a dynamic system of regulatory design where the positive impacts of regulation – such as innovation, introduction of new products and processes, new jobs and increased productivity – typically aim to outweigh the costs of compliance. It outlined how environmental regulation looks to incentivise a change in business behaviour, which is further influenced by a backdrop of R&D spending appetite, public attitudes and regional variations. In this updated study, this picture is particularly influenced by EU exit trade deal negotiation and associated regulatory change, the disruption caused by COVID-19 and the 2019 legislation introduced to require the government to reach net zero targets by 2050.

We carried out detailed studies into the economic impact of environmental regulation for three different sectors, to see whether there are any general insights that can be reached about this picture. These studies are based on high-level desktop research and interviews with industry leaders, structured around key sector policies, as in the 2017 study (Table 2.1). While the complex nature of regulatory impact means that these policies do not exist in isolation, this is a useful starting point, and the interviews were designed to encourage reflections on the wider context.

It should be noted that interviews took place during late 2020, prior to the UK-EU Trade and Cooperation Agreement being confirmed and made publicly available. Interviewees were requested to discuss the potential influence of Brexit on business performance but the lack of detail of the terms of this agreement were acknowledged in these discussions.

In this update, we considered a wider package of both existing and emerging policies than the 2017 study (Table 2.1). This was intended to create a more forward-looking approach, encouraging insight into the potential impact of changing political and regulatory landscapes, the role of regulation packages in stimulating circular economies, and the effect of heightened public attention to green issues. This also allowed the study to continue to consider policies at varied scales: covering market and non-market instruments at regional, national and international (EU) level.

	BUILDINGS	AUTOMOTIVE	WASTE
***HELP OR HINDRANCE?* 2017**			
Current Policy	The London Plan 2016	EU Regulation on passenger cars & light vehicles (2015)	Landfill Tax 1996
***FOSTERING PROSPERITY*, 2020**			
Current Policy	The London Plan 2019 (ItP)	EU CO_2 emission performance standards for new passenger cars and light commercial vehicles (2020)	European Union Circular Economy Action Plan United Kingdom National Strategies on Waste & Resources
Emerging Policy	Future Homes Standard (2019 consultation) Planning for the Future White Paper 2020	Road to Zero Strategy (2018) 2030 ban on petrol and diesel car (2020) Decarbonising Transport (2020 consultation)	Plastic Tax 2022 Environment Bill (forthcoming)

Table 2.1
Sectors and policies selected for focus of study, showing updates from the 2017 *Help or Hindrance?* study

In addition to widening the scope of the policies reviewed in this study, we expanded the definition of benefits to business that we wished to explore. **Previously, the study considered the impact of environmental regulations on jobs, skills and innovation and market and technological changes. It also looked at advances linked with overcoming barriers, market expansion and radical improvements to how we live. In this update, we also asked interviewees about the impact of environmental regulation on:**

Systems benefits – knock-on effects the influence of sustainable policies, changes and actions, on wider societal systems, markets and how we live; and

Resilience – as diverse challenges related to heat, flooding, disease and political disruption arise from climate change, preparedness and resilience to such changes will be required, both for the public and for business survival.

The following sections summarise the findings for each sector. Each chapter highlights key messages and strengths and weaknesses for that sector. The final section seeks to draw those findings together to understand where benefits of environmental regulation might lie, how they could be built upon and what implications this might have for future, UK-wide industrial strategy and regulatory reform in the context of Brexit, COVID-19, the UK's 2050 net zero target and ambitions to operate with the principles of a circular economy.

3 Sector Findings

3.1 Buildings

This section explores environmental regulations as they relate to buildings, construction and the built environment.

As in all sections of this study, data is collected on the case studies of both existing and emerging regulations. For existing building-related environmental regulation, the role of Local Plans is considered. Interviewees from all stages of the construction supply chain were asked how Local Plan planning requirements linked to climate and energy have influenced their operations and performance in the last ten years. Perceptions of future regulations are then explored through the examples of the Planning for the Future White Paper, and Future Homes Standard 2025 consultation. Interviewees were asked about their perceptions of the impacts of these forthcoming policy areas, and the additional influence of COVID-19 and the UK's exit from the EU.

In light of these two lines of discussion, interviewees were also asked to discuss key features of good environmental regulation, and to make recommendations for the direction of future and emerging planning policies.

3.1.1 Key messages

Key messages about the impact and effectiveness of environmental regulation in the buildings sector from our literature review, cases studies and interviews included:

- **Regulatory benefits will be maximised where environmental regulations are cross-sectoral, compatible with circular economy thinking and consistent with regulations in connected industries**. At present buildings' environmental regulation is siloed, with a focus on operational efficiency of buildings. Discussions of the circular economy are typically consigned to waste policies in Local Plans, with few regulations or policies in place that drive improvements in embodied carbon of construction materials and resource efficiency. Environmental regulations need to be more ambitious and cross-sectoral and incorporate circular economy principles - for example, requiring planning applications to consider building end of life and material origin.
- **Local Plans have pushed ambition, innovation and environmental performance**, and today are encouraging groups across the supply chain to consider key areas of sustainability, such as the circular economy, embodied carbon and social value. This makes them an important leveller of the 'playing field' for driving green action. **Local Authorities as regulators play an important role** in highlighting local sensitivities and targets, in influencing other authorities' actions, and in proactively stewarding local areas. It acknowledged however that some local authorities are challenged by low local house prices, making environment targets more challenging. This is an area which may therefore benefit from gap funding. Overall, the **loss of local authority powers in the Planning for the Future White Paper was unpopular with our interviewees.**

- As in 2017, interviewees felt that **green regulations play a role in driving jobs, skills and innovation, and have further capacity to drive systems benefits**. Examples provided ranged from regulations driving a higher quality of housing, improved comfort levels and health in the home to cross-supply chain collaboration and cooperation, better consideration of and funds for natural systems and biodiversity, and increased regional and local engagement by projects, strengthening local economies.
- **Regulations affirm corporate reputations** and provide a guarantee of standards. This is fundamental to receiving a 'social license to operate'. **They make a sustainable transition cost-competitive, helping to identify and enable cost savings. Ambitious regulations are also key to overcoming sector inertia and driving innovation** through providing new challenges and targets for businesses that enable market creation, especially at a time when we are aiming for unprecedented targets like net zero.
- The impact of COVID-19 may result in **weakening of environmental compliance due to lack of resources**. However, the state of environmental regulation after Brexit is uncertain. **Roll-back and loss of ambition are not desired** in emerging policy suites, but respondents feared they might occur, particularly given the lack of reference to sustainability in the Planning for the Future White Paper. Correspondingly, interviewees felt that **alignment with international regulations like the EU Performance of Buildings Directive** is important. Ensuring that regulations and standards are comparable and consistent with international equivalents will ensure that products can be traded internationally, will ensure that workforces continue to have expertise relevant to projects overseas, and prevent disruptions to supply chains. This is a particularly important consideration for the requirements of the Future Homes Standard 2025.
- **Planning reform in its current format was seen by interviewees to be a backwards step for Local Plan powers and accountability**. Interviewees were concerned they could lead to a potential disruption to processes without clear benefits, that they were siloed and inconsistent with other legislation, and lacking in resilience and sustainability ambition. Interviewees felt the reforms were not in line with movements towards a more circular construction supply chain and broader economy or other considerations that are of interest to the market.
- Well-designed **regulations should tighten over time, with a clear outcome and direction**. Robust enforcement by well-funded and properly resourced regulators is needed – goodwill to deliver results cannot be relied upon. This is a pertinent recommendation for the Future Homes Standard 2025, which looks to set standards for improvements in building energy efficiency in operation. Clear, ambitious standards with well-defined interim targets and details of enforcement requirements are needed, covering such diverse environmental requirements as embodied carbon, air pollution and circular usage of materials.

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREAT
LONDON LOCAL PLAN 2019	■ Drives sector reform, which brings new jobs, skills, innovation and broad systems benefits ■ Local Authority input is valuable to highlighting regional sensitivities and driving ambition ■ Largely aligned with other regional plans and areas ■ Drives renewable and low carbon investment through carbon pricing and grid decarbonisation projections	■ Lack of cross-sectoral and circular economy focus ■ Needs greater focus on resilience and climate adaptation ■ Good environmental policy should tighten over time, with clear signals as to direction. This is only achieved in some areas of the London Plan	■ Contrasting UK local plans drive ambition and innovation ■ Level playing field in area of powers ensures that sustainable transition is cost-competitive for businesse ■ Focus on data collection will be useful for future plans and research	■ Proposed planning reforms look to reduce regional and local powers and oversight ■ COVID-19 may constrain short-term ability to meet new regulatory requirements
FUTURE HOMES STANDARD 2025	■ Well-defined, clear targets ■ Sector-wide baselines and minimums established	■ Design for compliance ■ Focus on Standards rather than performance encourages design for compliance rather than innovation ■ No coverage of embodied carbon and other key areas	■ Well-established format, compliance expected ■ UK standards are visible worldwide, meaning standards set an important precedent	■ Loss of local authority powers to set more ambitious standards may quash a key driver of innovation ■ Regulations must come with other levers for change – e.g. training, skills, technological shifts
PLANNING FOR THE FUTURE WHITE PAPER	■ Digitisation and focus on transparency will increase usability ■ Expected to align with broader national climate policy	■ Lack of cross-sectoral and circular economy focus ■ Sustainable content and ambitions unclear, no strong regulatory direction	■ Potential to align expedited planning incentives with sustainability goals ■ Potential to create level playing field for less ambitious local authorities	■ Loss of local authority powers and input jeopardises local expertise and regional management ■ Brexit may constrain long-term international supply chain and project operations and competitiveness

Table 3.1
SWOT of current and emerging policy case studies for Buildings

3.1.2 Summary of current regulations

The construction sector remains a major part of the UK economy, contributing 6% of annual GDP and an average rise in construction employment of 2.8% across Great Britain in 2018 – rising to 16.1% in the East of England.[13] As reported in the 2017 study,[2] **construction is a complex, highly fragmented sector, with many different inputs, activities and outputs. Buildings and their supporting infrastructure are a major contributor to greenhouse gas emissions and as such have been a focus of government climate change policy for a number of years**. They hold further importance through their role in controlling domestic heating demand, which makes up 30% of UK energy consumption, and is therefore an important consideration in controlling the future UK energy mix.[14]

This study has focused on the impacts of climate change and energy policies within Local Plans on residential and commercial property developers and their supply chains. It then looked to interrogate broader planning reform signals announced by government, and the role of building regulations in a circular buildings and construction sector.

The desktop study looked to the use of climate policy in Local Plans. Table 3.2 lists key requirements of five major Local Plans. These typically look to leverage planning incentives and regulations to define city-level ambitions and local policy for more sustainable development and construction. While the London Plan was the central focus of interviews, being common to the majority of interviewees' experiences, Local Plan climate policy across the UK tends to cover:

- Carbon neutrality targets for developments, as early as 2038 in Manchester;
- Reduction of operational and often embodied carbon, with whole life carbon assessments increasingly being introduced to demonstrate how this is achieved;
- Energy performance standards, such as through accreditation systems like BREEAM, as in Birmingham, or their own benchmarks, as in London;
- Shifts to low carbon heat, such as district heating systems, heat pumps and solar thermal, or measures to demonstrate how developments will in future be compatible with low carbon heat connections and green infrastructure in future;
- Incentivising investment in green technologies and electrification; and
- Requiring major developments to provide evidence that they are following sustainability, circular economy or low embodied carbon principles in their schemes.

The level of ambition and environmental consideration in these plans has evolved rapidly over the last decade. Table 3.3 shows this for the London Plan, a document which has been updated regularly since first release in February 2004.

DOCUMENT	KEY SUSTAINABILITY REQUIREMENTS
GREATER MANCHESTER SPATIAL FRAMEWORK 2019 DRAFT	■ Carbon neutral by 2038, following a Greater Manchester carbon budget and science-based target ■ New development must be net zero by 2028, following the energy hierarchy. All new dwellings should seek a 19% carbon reduction against Part L of the 2013 Building Regulations and achieve a minimum 20% reduction in carbon emissions ■ Carbon assessment required to demonstrate how design has sought to maximize reductions in whole life carbon emissions ■ Large residential developments should evaluate the viability of heat network connections or should incorporate capability for future connection
ADOPTED BIRMINGHAM DEVELOPMENT PLAN 2031	■ New development must demonstrate how its design minimises overheating, reduces reliance on air conditioning systems and integrates green infrastructure and other sustainable design features ■ All large new non-residential built developments are to meet BREEAM standard Excellent (or any future national equivalent) unless it can be demonstrated that the cost of achieving this would make the proposed development unviable ■ New developments will be expected to incorporate the provision of or connect to low and zero carbon forms of energy generation ■ Development that directly or indirectly causes harm to sites of national importance national importance or under a conservation order will not be permitted
CARDIFF LOCAL DEVELOPMENT PLAN 2006-2026	■ Development proposals are required to take account of carbon emissions, protecting and increasing carbon sinks, adaptation, promoting energy efficiency and use of renewables, and flood risk ■ Proposed development should demonstrate how green infrastructure has been considered and integrated into the proposals ■ The Council will encourage developers of major and strategic sites to incorporate schemes with renewable and low carbon technologies - including heating, cooling and power systems. An independent energy assessment investigating the financial viability and technical feasibility of incorporating such schemes will be required to support applications

Table 3.2
An overview of key climate and energy planning requirements in major UK city policy

DOCUMENT	KEY SUSTAINABILITY REQUIREMENTS
GLASGOW CITY DEVELOPMENT PLAN 2017 AND SUPPLEMENTARY GUIDANCE	■ Sustainable Urban Drainage Systems (SUDS) must be an integral component of the design from its inception ■ All public realm improvements should be sustainable in terms of materials, design and climate change resilience and demonstrate the highest standards of sustainable design and construction. This should include seeking to use durable materials and incorporate appropriate planting ■ Ensure that all new buildings are well insulated and energy efficient. All new developments must make use of low and zero carbon generating technologies, following the Energy Hierarchy: energy reduction, energy efficiency, renewable energy; and Heat Hierarchy: reduce the need of heat, supply heat efficiently (district heat) and low carbon heat (renewable, electrical, Combined Heat and Power), conventional energy ■ Integrate soft landscaping and green infrastructure into design solutions, eg planting, trees, grass, water etc, where appropriate ■ Seek to adapt and re-use traditional buildings, where possible
LONDON PLAN (INTEND TO PUBLISH VERSION 2019) [15]	■ Achieve at least 35% carbon reduction on site, with an offset charge payable to achieve a 100% carbon reduction (calculated using the Building Regulations Part L 2013 methodology) ■ Apply a 'lean, clean, green, seen' Energy Hierarchy whereby passive energy savings are prioritised before system efficiencies, and before renewable energy production, and where post-occupancy review is required ■ Eliminate or reduce comfort cooling through application of the Cooling Hierarchy ■ Incentivise investment into green technologies and electrification through higher carbon valuation and SAP10 grid intensity factors that reflect decreasing carbon levels in the grid ■ Require major developments to provide evidence that they are hard-wiring circular economy principles into schemes through a Circular Economy Statement

Table 3.2 Cont.
An overview of key climate and energy planning requirements in major UK city policy

LONDON PLAN VERSION	OVERALL CARBON REDUCTION TARGET	ENERGY	HEATING	OVERHEATING & COOLING	EMBODIED CARBON
FEB 2004		Demonstrate application of energy hierarchy	Assess one possible low carbon technology		
2008	20% reduction from renewable sources				
2011	25% reduction over Part L 2010 rising to 40% (2013) and finally zero carbon. Offset fund included		Heat source hierarchy prioritises connections to district heating	Demonstrate resilience to overheating	
2016	SPG recommends that 40% over Part L 2010 is equivalent to 35% over Part L 2013			As above, min-imise cooling through the application of cooling hierarchy	
2020	City-wide zero carbon target for 2050 added	As above, with introduction of energy demand reduction targets and 'Be Seen' post occupancy monitoring requirements added	Some adjustments to heat source hierarchy, district heat still prioritised	Some updates to the hierarchy	Whole life carbon assessment required

Table 3.3
How key London Plan climate change policies have evolved since 2004

3.1.3 Summary of emerging regulations

In 2020, the UK government released the Planning for the Future White Paper,[16] announcing its intentions for major planning reform in the coming years. These reforms had previously been signalled in the Future Homes Standard 2025 consultation in 2019,[17] which looked at potential building regulations standards changes. Though not considered in this study, these documents sit alongside a wider landscape of emerging new policy – including biodiversity gain requirements in the recent Environment Bill,[18] and the forthcoming Energy White Paper, which had not been published at the time of writing. The devolved administrations have also seen some recent changes in this area, with a new Planning (Scotland) Act passed in 2019,[19] a Planning (Wales) Act in 2016,[20] and a Strategic Planning Policy Statement for Northern Ireland released in 2015.[21]

The key conclusion of the Planning for the Future document is an intention to "streamline the planning process... a shorter, more certain process will remove significant risk from the process, lowering the need for developers to secure long development pipelines and lowering the regulatory barriers to entry that currently exist in the market". This involves improved planning system user experience (namely through digitisation) and support for home ownership and domestic land supply. It also includes a major reclassification of UK land categories into a tiered system of expedited planning: "Growth areas suitable for substantial development, and where outline approval for development would be automatically secured for forms and types of development specified in the Plan; Renewal areas suitable for some development, such as gentle densification; and Protected areas where development is restricted." **This change in regulation is expected to cover environmental regulations**, for example with a proposal for a single 'sustainable development' test for local plans that combines current frameworks such as Strategic Environmental Assessments, Sustainability Appraisals and Environmental Impact Assessments. This would comprise "a simplified process for assessing the environmental impact of plans, which would continue to satisfy the requirements of UK and international law and treaties", removing "requirements that cause delay and challenge".

The Future Homes Standard consultation looked to introduce requirements for new build homes in the UK to be future-proofed with low carbon heating and "world-leading levels of energy efficiency", as well as introducing plans to reduce the footprint of existing buildings and non-domestic new and existing buildings. This will include changes to ventilation (Part F) and efficiency requirements (Part L), raising building fabric standards and shifting to low carbon heat sources - with gas boilers likely to be banned in new homes from 2025. **The Future Homes Standard consultation also looks to "remove the ability of local planning authorities to set energy efficiency standards above the Building Regulations" as a result of 'inconsistent minimum energy standards being applied across the country'**. This is in opposition to the current system of a minimum set of common standards through the Building Regulations, with flexibility for Local Authorities to require more ambitious standards for developments. This change has proven to be in line with the principles of deregulation in the Planning for the Future White Paper, with other consultation options also including removal of numerous areas of supplementary guidance and assessment requirements.[22]

The **overall approach proposed could dramatically decrease levels of building and planning regulation** across the UK, as explored in Table 3 4.

KEY PLANNING POLICY REFORMS PROPOSED	IMPLICATIONS FOR ENVIRONMENTAL REGULATIONS
Tiered approach to planning permission, with areas of expedited planning permission	Deregulation in certain geographical areas, with reduced scrutiny from planning officers
A more focused role for Local Plans in identifying site- and area-specific standards and requirements while general development management policies, such as energy efficiency standards, are set nationally[23]	This may remove flexibility and the ability of local plans to drive ambitious environmental regulations
Local Plans should be subject to a single statutory 'sustainable develop-ment' test, and unnecessary assessments and requirements that cause delay and challenge in the current system should be abolished	This may directly remove the ability of plans to include assessments and initiatives intend-ed to drive sustainability of developments and infrastructure
Ensure the National Planning Policy Framework targets those areas where a reformed planning system can most effectively address climate change mitigation and adaptation and facilitate environmental improvement	Unclear as to the effect on environmental regulation
Introduce a quicker, simpler framework for assessing environmental im-pacts and enhancement opportunities, which speeds up the process while protecting and enhancing England's unique ecosystems	Implies reduced or simplified environmental regulation

Table 3.4
Summary of proposed environmental regulation reforms

3.1.4 Findings

Impacts of the London Plan[15]

The desktop study highlighted that industry responses to the new London Plan were broadly positive. **Its environmental strategies have been considered 'impressive', particularly around the introduction of embodied carbon assessment and the principles of the circular economy**. However, criticisms have been levied around the fact that design assessments often fell short of the detail that would be required for more ambitious change, and that **regulations and guidance did not go far enough on key topics – such as on air pollution and embodied carbon.**[24] **Concerns were also raised around system wide impacts not being properly realised** – such as around fuel poverty,[24] air quality[25] and inclusion[26] , which was linked to concern that the plan is too 'siloed', limiting opportunities to integrate environmental services. This could lead, crucially, to failing to deliver key principles of the circular economy, which is mainly covered in the London Plan as it relates to the waste industry.

In line with signals in the proposed housing reform documents (Section 3.1.3), Housing Secretary Robert Jenrick was also critical of the Intend to Publish version of the London Plan.[27] While not referring specifically to environmental regulations, he claimed that the London Plan does not support a 'pro-development stance' through its 'complexity', that there is a shortfall of housing capacity possible under the plan (14,000 homes), a lack of support for mixed building typologies and inappropriate use of rent controls. The Planning for the Future White Paper suggests a new standard method to establish local housing requirement figures, though this is not connected to proposed streamlining of regulatory requirements.

In terms of impacts, the GLA[28] provides some further insight into the efficacy of the Plan. **The GLA's study finds that high carbon reductions were achieved in planning applications approved in 2018, with 80% of applications meeting their targets of 35% carbon reductions in operation. It goes on to report substantial investment in heat networks, solar PV installations and carbon offset funds in that year – totalling well over £100 million**. Estimated energy cost savings came to £470,000 per annum as a result of investment in energy efficiency and fabric improvements, with the report highlighting the positive co-benefits this should bring for fuel poverty, quality of life and housing resilience. Finally, a positive effect on employment is claimed: it is estimated that the developer commitments obtained in 2018 have directly created jobs, such as in energy services companies (ESCOs).

Interviewees:

- Developers: Lendlease, Berkeley
- Contractor/Supply Chain: Cemex, Willmott Dixon
- Consultants: Bioregional, Haworth Tomkins, Ramboll
- Industry overview: UKGBC, Zero Waste Scotland

Key references:

- GLA (2018): Monitoring the implementation of the London Plan Energy Policies in 2018. Available online.
- London Plan Consultation Responses (2018). Available online.
- GLA (2020). Design for a Circular Economy Primer. Available online.
- UKGBC (2020). UKGBC Green recovery position paper. Available online.

From interviewees, there was a broad consensus that the London Plan has, in the last ten years, been ambitious and pushed innovation and progress in sustainability across the sector: "it's got a lot of people thinking and thinking about very new areas." Interviewees felt that this had been most successful in the design stages, with the new 'Be Seen' component of the London Plan Energy hierarchy acting as an overdue mechanism to push sustainable action into the supply chain. Interviewees noted that at present there was a 'vanguard' sector of businesses acting with more ambition than the London Plan and its equivalents around the UK. However, there is a further group of businesses for whom regulation and Local Plans remain necessary to push action. These businesses also consider hard to tackle areas like embodied carbon, and 'level the playing field' in terms of building and construction that moves towards net zero and a circular economy.

Interviewees felt strongly that the role of the local authority as regulator, and their engagement with planning and the development of unique local plans, was important: "[the London Plan] helps us to identify sensitive receptors, understand standards and requirements that a development has to satisfy." This is linked to the experience of local authorities in actively managing and developing infrastructure in local areas, with one interviewee explaining that "there's an important role for local authorities to proactively steward their local areas, with the engagement of the communities to get their buy in". Interviewees noted that local authorities experience serious challenges as a result of understaffing and lack of funding, leading to delays in planning and lack of enforcement.

The difference between plans in various regions was largely not seen as an issue in terms of delivering designs, given that they broadly align – "we can transpose [work] in whatever area we would be in", "they are part of the everyday" – and it was felt by one interviewee that Local Plans tend to influence each other, citing the example of Edinburgh and Glasgow councils pushing each other to improve their green ambitions. However, some concern was seen by interviewees working on the supply side and dealing with cross-region transport, who said they **find changing transport requirements a concern, suggesting that this is an area where some standardisation could be beneficial**. More importantly, interviewees noted that **in areas where house prices are low, local authorities may be reluctant to require more ambitious regulations**, assessments and necessary requirements for future-ready developments for fear of losing developer investment.

Benefits of environmental regulation

The literature review and the results of the 2017 *Help or Hindrance?* study[2] highlight clear relationships between environmental regulation and business benefits in the buildings sector, as summarised in Table 3.5. Overall, although some interviewees indicated that transition to a circular economy would be challenging given the current fragmentation of the supply chain, major systems benefits could be accrued if the buildings sector moved towards an effective circular economy – around health and wellbeing, fuel poverty and protection from climate change, including whole life cost savings and emissions reductions. **In terms of jobs and skills, the technical challenges of the sustainable transition in the sector require a skilled and growing workforce which generates "radically new approaches to transform the way we live, and the buildings in which we live"**.[29] These lead directly to major innovations in operations and processes, underpinned by a move to a more resilient sector where climate adaptation considerations are included in designs.

As in 2017, interviewees felt that green regulations play a role in influencing these mechanisms, in particular helping to control and drive systems benefits like higher quality homes, improved comfort levels and health in the home, cross-supply chain collaboration and cooperation, better consideration of natural systems and biodiversity, and better regional and local engagement of projects. Explanations for regulations' capacity to deliver such business and consumer benefits included observations that:

1. **Regulations affirm corporate reputations and provide a guarantee of standards**. This is fundamental to receiving a 'social licence to operate', particularly in the supply chain: 'more confidence, more credibility, more competitiveness';
2. **Regulations provide a level playing field**, driving cost-competitiveness for sustainable activities. Furthermore, many interviewees felt that the cost of compliance was often outweighed by the benefits of efficiency improvements or by the regulatory process helping to identify and justify cost savings in operations. In future costs would also be offset by savings in carbon taxes or other mechanisms.; and
3. **Regulations help to overcome sector inertia**: 'this is the way we've always done it'.

In terms of resilience, it was felt that the sector was still in the early stages of understanding the area – "it tends to be a tick box exercise". However, interviewees agreed that the area was emerging in design, that there were huge benefits to be gained in designing in a climate resilient way (including the delivery of shared services such as district heat connections, integrated green spaces and air quality improvements) and that sustainable design capabilities were a core component of business resilience:

> ***"It's clear that any business like ours, which isn't concentrating all of its attention... onto becoming a regenerative design practice is going to be obsolete and out of work within the decade... adapt or die at every scale.***

	GREEN BUILDINGS AND CO-BENEFITS	*HELP OR HINDRANCE?* 2017
JOBS	The job creation benefits of green recovery and sustainable transition is well-documented: the UKGBC[31] notes, for example, both the strong benefits of retrofit schemes for generating employment and the broader opportunity for a growing market for low carbon design and product solutions[31] as a means to create new jobs and develop skills.	The London Plan was found to have created a range of new jobs across the supply chain, ranging from design and consultancy through to product manufacture, construction and operation.
SKILLS	The link between sector transformation and the skills-growth potential of a greener construction industry has been seen in COVD-19 green recovery research, and outlined by sector leaders like the UKGBC,[32] Construction Leadership Council, World Green Building Council[33] and more. This may be of particular interest in the UK since the 2016 Farmer Review highlighted that the UK construction sector is highly vulnerable to skills shortages, with a lack of flexibility and versatility.	The environmental construction skills gap is being closed in some parts of the supply chain, though: 'the regulation is raising the bar in relation to skills, however it is not in itself sufficient to deliver the desired result.'
INNOVATION	The UKGBC[30] has highlighted that innovation is required to reduce the climate impact of the Built Environment Sector at scale; 'a need for new regulation or regulation changes', to achieve this. This is elsewhere[35] described by the UKGBC as '[innovation] supported by a favourable regulatory environment that favours a climate first approach'.	Innovation in design is held up by lack of skills in the supply chain to implement innovations. The scale of application of the London Plan is seen as important for investment.
SYSTEMS BENEFITS	The World Green Building Council has shown that green buildings can contribute to achieving at least 9 out of the 17 Sustainable Development Goals.[36] This includes green buildings improving people's health and wellbeing, saving water resources, contributing to circular economies and supporting renewable energy infrastructure. Savings on energy demand will help ease requirements and costs associated with high capital transition technologies like nuclear power, carbon capture and battery storage. Defra estimates that the value of net habitat created in a given year under biodiversity net gain planning requirements exceeds £250m.[37]	Not considered
RESILIENCE	C40 describes how cities have started to look more at direct impacts of climate risks in recent years.[37] Regulatory control mechanisms include building codes for extreme events, internal appliances within residential homes and requirements to measure and analyse data. Ensuring resilience may also have connected consequences on social, economic and environmental benefits – for example, studies link heat stress and labour productivity through overheating in offices and urban centres. [39]	Not considered

Table 3.5
Summary of literature around co-benefits of green construction

However, interviewees did note that they felt that achieving these benefits is limited by the fact that the circularity and systems-influencing nature of jobs, skills and innovation were not well covered by regulations at present. This is exemplified by designers increasingly working across the supply chain – such as with product manufacturers to ensure products were sufficiently low carbon as to be usable in design. Regulations are needed to recognise the complexity of this. One interviewee gave the example that regulation in the construction waste sector "is driving people to reuse but not necessarily directing them to reuse to a value that was equal to the [original] material... a blunt instrument".

Regulatory benefits will be maximised where they are cross-sectoral, compatible with circular economy thinking and consistent with regulations in connecting industries.

Furthermore, while regulations were felt to tie into a move towards more sustainable operations and associated benefits, respondents, as in the 2017 study, were clear that they were not the sole mechanism for change. In the example of skills, one interviewee explained that environmental regulation had informed the evolution of the business, which had then driven skills and jobs. Guidance and training, client buy-in, market access and technological availability are all examples of other drivers which need to accompany environmental regulation.

Brexit and COVID-19

Literature on Brexit has highlighted numerous potential challenges for the UK construction sector. A report by the All Party Parliamentary Group for Excellence in the Built Environment[40] summarises these as being linked to the need for stabilisation of the industry, particularly around protecting the workforce and international construction companies, attracting and training a skilled domestic workforce, and ensuring that the sector is 'future-proofed'. In particular, 'future-proofing' relates to productivity and the need for training and modern construction methods.

More immediately, COVID-19 has brought a significant reduction in activity in the UK and global construction industry. RICS Professionals surveyed across the UK reported a decline in business, with 80% seeing a decreased workload and 67% seeing a decrease in new business enquiries, with 65% of construction projects delayed, and half of sites being closed.[41] However, outlook reports indicate that this has somewhat abated in the latter half of 2020, with infrastructure activity beginning to rise.[42]

Interviewees tended to have similar views on the impact of COVID-19 and the development of environmental action and regulation. Some interviewees noted that there could be a serious negative short-term impact on costs and resource; contractors under significant financial pressures may have limited capacity to deliver to demanding environmental regulation. Others felt that COVID-19 could be a lens for innovation and behavioural change in the market. This related to its potential impact on project design and space utilisation and was not generally viewed as a challenge to sustainability requirements: "The general level of appetite to do stuff in the sustainability space… is ramping up, it's not going into a contraction". This often coincided with interviewees reporting that COVID-19 is making the threat of climate change 'concrete', pushing investors to consider planning and environmental regulations 'like never before'.

Respondents had a similarly mixed set of responses to the long-term influence of the UK exit from the EU and future policy development in this context, with most indicating that they were 'worried'. Some voiced concern that regulations might 'step backwards' from EU levels, lowering the incentive for ambitious action – "I'm very anxious that commercial expediency and a race to the bottom will be the default instinct post-Brexit" – and that the UK may suffer from being an isolated system where regulatory alignment and product standards are incompatible with international requirements from the EU Performance of Buildings Directive or similar. Many were worried about the future ability to recruit to the highest standard. Conversely, some felt that the UK has historically been a driver of natural environment protection and building standards, and therefore were 'cautiously optimistic' that regulatory standards would remain high. However, those that felt this noted that this was less certain for the case of protecting habitats and the principles of a circular economy.

Planning reform

The desktop study highlighted that consultation responses to the White Paper typically acknowledge the need to reduce complexity in the UK planning system, and the importance of a more user-friendly process.[43] Some developers have also felt that the proposed reforms will help deliver housing in 'one of the most challenging environments in recent memory'. [44]

However, in the majority, the Planning for the Future White Paper was met with a highly critical response from the construction sector.[45] Arguments against the proposals include a lack of concern for the structural causes of issues in the planning system, a lack of focus on social housing and a misdirected focus on deregulation as a means to design high-quality homes. Some bodies, like the UKGBC, have requested more clarity as to the specific impact of the reforms on nature protection and low carbon investment,[43] while others have voiced concern that the policies will make it easier to 'build the slums of the future' than to drive a 'green housing revolution'.[46] The Planning Secretary also saw widespread opposition from cross-party groups of councillors, who have expressed concern that they would have less oversight of developments.[47]

Similar criticisms were previously raised in the Future Homes Standard 2025 consultation. The BRE Group consultation response summarises reactions from groups across the sector.[48] They acknowledge the importance of the Standards in providing a clear minimum and highlight their potential in raising ambition internationally. However, they also voice concerns that the proposed regulations are orientated towards a 'culture of compliance' rather than performance and mandatory regulation, which limits the potential ambition, innovation and capture of associated benefits. They also argue that the standards show a lack of consideration for the wider market context and do not adequately capture key areas such as embodied carbon and digital transformation.

In interviews, respondents were similarly critical of planning reform. They felt it presents a backwards step on the development of local plans and adds disruption to processes without clear benefits. Some felt that it is siloed and inconsistent with other pieces of legislation or civil service actions, and lacks content on resilience and sustainability ambition.

Crucially, respondents felt that there was a clear step back from environmental regulation in the current announcements, with standardisation of sustainability assessments, expedited planning and loss of input from local experts and regulators through 'denuded' powers in Local Plans a threat to accountability and, in particular, to innovation. One interviewee explained: "I think as a principle it's wrong to think that any project isn't an opportunity to innovate, enrich, magnify agency... when you have generic solutions imposed upon you it ties your hands behind your back, on the assumption that you are broadly benign and broadly informed".

While it was suggested by one respondent that expedited planning could be beneficial where aligned with environmental goals, respondents across all areas of the supply chain indicated that current policy signals did not make positive or certain steps towards a more effective or beneficial suite of environmental regulations.

REQUIREMENTS FOR EFFECTIVE ENVIRONMENTAL REGULATION IN THE BUILDINGS SECTOR
Time to implement – 'what do I now have to do?'
Good environmental regulation in the buildings sector should be focussed on 'adding value' or 'outcomes', with a clear direction.
Coherent targets across different timescales, tightening over time, not 'dropping off a cliff edge'.
Regulations should not be designed using electoral cycles and administration timescales.
Clear enforcement, to prevent hidden costs of regulations and low up-take.
'There's no limit to the stringency of the legislation so long as it is all-encompassing.'

Table 3.6
Summary of literature around co-benefits of green construction

Policy design

The *Help or Hindrance?* 2017[2] study highlighted interviewee perceptions that 'good' regulation should be predictable and consistent: "future changes should be clearly signposted and there should be consistency [of direction] across geographical locations". Interviewees believed that "future policy development should support the accurate prediction of building performance, align stakeholders around performance outcomes, and provide greater transparency concerning actual performance in use".

Table 3.6 lists some interviewee responses to the question: 'What makes effective environmental regulation?' Most commonly, interviewees believed that regulation needed to tighten over time, with clear steps and direction towards transparent values and outcomes. This was considered key to avoiding getting 'stuck with decisions' from 'out of date systems.' Others described this as 'optimism': "policy that demonstrates really positive benefits rather than a break on the imagination… that's when I get really excited about it". Linked to this, much of the interviewees' frustration with planning reform and emerging policies were linked to a lack of policy certainty and a desire for a clear 'direction of travel'.

A second recurring answer was the need for regulations to operate outside of electoral cycles. This would prevent a culture of reinventing the wheel with incoming administrations, minimise mismatch with the timescales of enacting and measuring change, and avoid frustration when complex planning requirements and work were cancelled. Another key requirement was regulations that have broad scope and clear enforcement mechanisms – "people will always try to exploit it and get around it… don't just leave it to the coalition of the willing".

3.1.5 Recommendations

The findings of this section are wide-ranging, and can be summarised as follows:

1. Local Authorities as regulators play an important role in highlighting local sensitivities and targets, in influencing each other, in providing accountability and in proactively stewarding local areas. Their role should not be diluted in future planning policy, as current proposals suggest.
2. Regulations and Building Standards are not effective in isolation. **Skills and training, client buy-in, market access and technological availability all need to accompany good environmental regulation**.
3. The impact of COVID-19 may result in weakening of environmental compliance due to lack of resources. **Policy should move away from the culture of compliance to cultivate a more resilient supply chain, promoting investment and upskilling and sharing of resources to limit the impact of such shocks in the future**.
4. Having left the EU, regulatory ambition should not be reduced, and building standards kept high. **Alignment of the Future Homes Standards with comparable regulations and standards internationally** is important to support the continued operation of supply chains, an international workforce and UK firms' abilities to work overseas.
5. Regulatory design for future planning policy and building standards should have the following characteristics:
   a. Policy should be **cross-sectoral, compatible with circular economy thinking and consistent with regulations in connected industries** to maximise regulatory benefits. At present buildings' environmental regulation is siloed, with the circular economy typically consigned to waste policies, and with little consideration of embodied carbon, building end of life and material origin;
   b. **Targets, standards and benchmarks in future policy should show a clear timescale, tightening over time**. This provides policy direction and enables the buildings sector to upskill and invest to meet those targets; and
   c. Enforcement and **mandatory compliance for regulatory targets and requirements is needed**. This ensures that meeting such requirements allows ambitious firms to remain competitive and for new technologies and approaches to become cost-effective.

3.2 Waste & Resources

This section looks at the impact and effectiveness of environmental regulation for businesses in the waste and resources sector.

The study looks at the role of existing policy and the implications from emerging policy. Desktop research was carried out, and interviews took place with a variety of organisations operating in the sector. Questions to interviewees explored the perception of policy in the sector, looking specifically at the current EU Circular Economy Action Plan (CEAP) and the UK's national strategies on waste and resources. Also explored were the impact of public opinion, the effect of COVID-19 and the influence of the UK's exit from the EU. Interviewees were then asked for their perception on forthcoming regulation affecting the sector, including the Environment Bill and Plastic Tax, and for examples of good environmental policy. It should be noted that interviews were carried out in late 2020, prior to the conclusion of UK's EU exit transition period.

3.2.1 Key messages

Key messages about the impact and effectiveness of environmental regulation in the waste and resources sector from our literature review, cases studies and interviews included:

Regulation is necessary **to encourage collaboration across intersecting industries** and to capitalise on opportunities for cross-sector partnerships. **Policy needs to take a broad view of circularity and be adaptable** to a sector that is changing rapidly. The CEAP is broadly welcomed, but gaps around packaging reform and extended producer responsibility (EPR) have been identified by stakeholders. Along with a lack of clear timelines, this makes it difficult for all stakeholders to work on a level playing field, and it is hoped that national regulation can overcome this.

Enforcement must be clear, consistent and robust, holding government as the target setter and local authozrities as implementers to account and allowing businesses to operate in a fair environment. This requires both improved enforcement of existing policy, for example by maintaining a well-resourced Environment Agency, and a coherent strategy for enforcement of new policy. The Environment Bill creates a new Office for Environmental Protection (OEP) to hold government and public bodies to account on implementation of environmental law. If correctly mobilised, funded and furnished with enough power, this watchdog could prove a significant contributor to the delivery of environmental policy in the waste and resource sector.

The rise in public awareness around environmental issues is positive but must be responded to with due caution and consideration. Regulatory capacity needs to maintain focus on achieving the transition to a circular economy that uses resources efficiently and retains material value, and needs to capture the complexities inherent in this. It should be aware of public opinion but not be solely led by it. The recent focus on plastics has helped advance public awareness but must not detract from the development of interventions in areas that may not hold the same public attention, but through which greater environmental gains can be made (eg product design standards, extended producer responsibility). A framework such as the CEAP provides a strong conduit for this positivity and can help catalyse public demand.

The views of respondents echoed the findings of the *Help or Hindrance*? 2017[1] report, demonstrating again that **effective environmental regulation will drive jobs, skills and innovation** in the waste and resources sector, as well as providing **wider systems benefits across sectors, society and ecosystems, and contributing to business resilience**. This is supported by a recent WRAP study,[51] which reconfirms earlier suggestions that significant growth in the quantity and quality of jobs is supported by the transition to a circular economy.

Policy should act to provide stability to businesses across markets and to avoid confusion. It is crucial in protecting environmentally forward-thinking business and investor operations from fluctuation in high-carbon markets. It must be **supported with clear communication and messaging that instils confidence**.

Current policy and regulation still largely focus on the end of the materials cycle. This approach, and a relative absence of detail relating to consumption of products, is apparent in the four UK nations' strategies. The positive direction set by strategies such as **the Resources and Waste Strategy England 2018 needs to be better implemented in the immediate future**. There is **a risk that the circular economy and its translation could lose some power** if it is used as a vehicle to justify consumption. This can be tempered by introducing **effective supply (product standards, EPR) and demand (tax incentives, sustainable procurement) side measures to empower the public** to make environmentally and socially beneficial choices.

COVID-19 has led to some undesirable roll-back on the progress of environmental regulations, particularly around reusable and single use products, and has also contributed to delays to consultation on key provisions of the Resources and Waste Strategy, including extended producer responsibility. There is, however, a sense of optimism in that it **has allowed for a reassessment of priorities and increased appreciation of the importance of environmental protection**, and of circular and **localised supply chains and the additional resilience** they provide. **Brexit is seen as a high risk to the sector**, and the extent of transposition of EU legislation following the UK's exit from the EU needs to be clearly expressed to businesses to avoid leaving them exposed and uncertain.

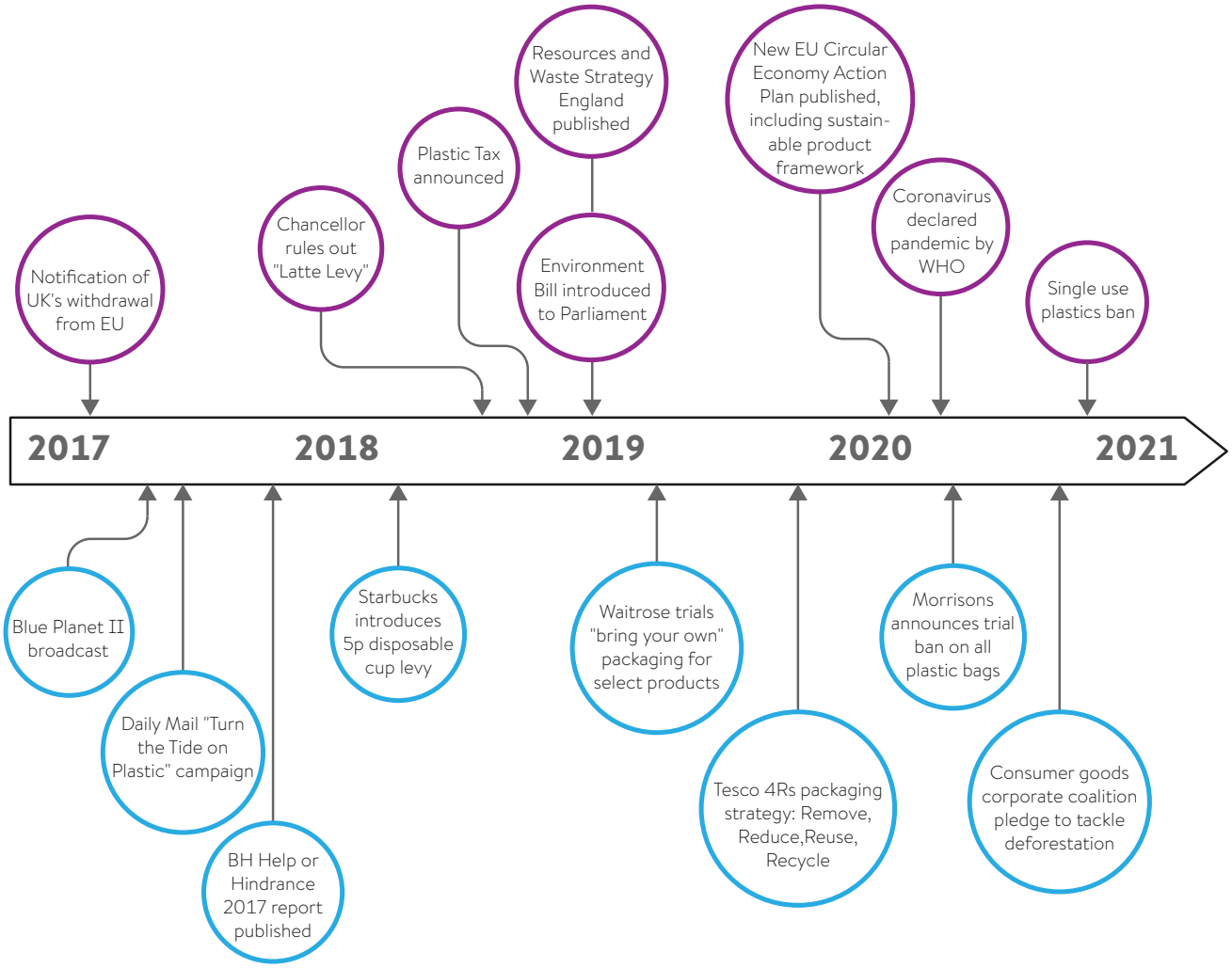
Respondents appreciated the ambition of emerging policy, but were quick to raise the importance of good environmental policy design, highlighting the need for **adaptability, a broad view of all aspects of the circular economy so as to accelerate collaboration, and a clear direction and target escalator** that gives businesses confidence to invest and innovate.

The Environment Bill can deliver a wide array of positive action that enhances the natural environment but needs **strength of language, clear short-term goals and more detail on the consequences of missing these goals** to see it transformed into a core piece of legislation that promotes innovation, jobs creation and environmental protection.

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREAT
CURRENT POLICY	■ Good ambition and inclusive consideration of circular economy goals	■ Lack of cross-sectoral focus ■ More indication of implementation strategy and timescale needed ■ Too much onus on the waste sector and end-of-pipe regulation	■ Create benefits across jobs and skills in this and intersecting sectors ■ Reduce carbon costs associated with this sector and intersecting sectors	■ Transposition into law is inconsistent ■ Progress is not fast enough and sometimes misdirected ■ Uncertainty and change in alignment with EU following Brexit risks loss of competitiveness and illegal activity
EMERGING POLICY	■ Signals the right intentions in some cases, such as with the Plastic Tax	■ Lack of cross-sectoral focus ■ More indication of implementation strategy needed	■ Foster innovation and support sustainable business ■ Willingness to use taxation to drive change	■ Public opinion can distract focus ■ Enforcement is weak and not sufficient to support policy ■ COVID-19 is causing roll-back of some planned environmental progress

Table 3.7
SWOT of current and emerging policy for the Waste Study

3.2.2 Summary of current regulations



The Waste and Resources sector plays an important role in the UK economy. In 2013, the Department for Environment, Food & Rural Affairs (Defra) estimated that core elements of the waste sector alone (collection, handling and treatment) generated £6.8 billion in gross value added (GVA), supporting more than 100,000 jobs in the process. Since the publication of the *Help or Hindrance?* 2017[2] study, the importance of considering resources alongside waste has continued to come to the fore, particularly when considering the value[53] in transitioning rapidly towards a circular economy. When waste and resources are considered as one, the value of the sector, according to the same 2013 study by Defra, rises to £41 billion in GVA supporting more than 670,000 jobs.[49] This larger figure includes the reuse, repair and leasing activities that form a critical part of a circular economy.

Reducing waste and preserving natural resources is a critical part of reducing the emissions associated with the waste and resources sector, according to the UK Climate Change Committee.[50] A recent paper by WRAP[51] estimates that the UK could benefit from the creation of an additional 500,000 jobs through the pursuit of a circular economy model, coupled with the injection of £75 billion GVA. This is tied to the environmental benefits associated with 21 million tonnes of materials savings, diversion of 38 million tonnes of material from landfill and incineration, and a reduction of 15 million tonnes CO_2e per year.[52] **Another recent study by the Ellen MacArthur Foundation found that tackling global emissions and reaching net zero cannot be achieved without the transition to circularity and the policy that underpins it.**[53]

The 2017 report noted that, even with an increasing landfill tax, the amount of waste material landfilled in the UK remained relatively high when compared to other EU nations. Recent figures from the Environment Agency indicated a 4% increase in waste material sent to landfill in 2019, suggesting that reinvigorated action and a clear new direction is required to help the sector further divest from disposal.[54]

This study reaffirms the need for reinvigoration, the importance of transitioning towards circularity across sectors and explores the framework presented by the European Union's Circular Economy Action Plan, alongside the uptake of the UK's national waste and resources strategies.

Measures in the EU Circular Economy Action Plan

The latest plan presents measures to:

- Make sustainable products the norm in the EU
- Empower consumers and public buyers
- Focus on the sectors that use most resources and where the potential for circularity is high such as: electronics and ICT; batteries and vehicles; packaging; plastics; textiles; construction and buildings; food; water and nutrients
- Ensure less waste
- Make circularity work for people, regions and cities
- Lead global efforts on circular economy

European Union Circular Economy Action Plan (2020)

The EU Circular Economy Action Plan (CEAP) is a continuation of efforts, initiated in 2015, to increase material circularity in the European economy. The CEAP 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. This framework encompasses initiatives throughout the life cycle of products targeting, for example, their design, promoting circular economy processes, fostering sustainable consumption, and ensuring that the resources used are kept in the economy for as long as possible. It also introduces legislative and non-legislative measures targeting areas where action at the EU level brings real added value. The plan is driven by the ambition to make sustainable products that last and to empower consumers to make sustainable choices, for their own benefit and that of the environment.[11]

Following the UK's departure from the EU, the EU's latest developments on the circular economy will still provide a signal of intent and continue to be important in informing the scope and direction of the UK's future framework on waste and resources.

Directives from the latest EU Circular Economy Package are being transposed into UK domestic law, and the UK governments have issued statements regarding alignment of their approach on several measures, including prevention of waste and preparation for reuse.[55] While this action has been welcomed, organisations in the sector have raised concerns about its timeliness with respect to packaging reforms and extended producer responsibility mechanisms (currently not due to come in until 2023), and about gaps in the transposition.[56] The headline 2035 percentage waste reduction target is being transposed but interim targets, against which the UK is not currently on track, are not. It is hoped that in the future the UK will look to match the ambitions of the Circular Economy Action Plan as it is implemented in the EU.

UK National Waste & Resources Strategies

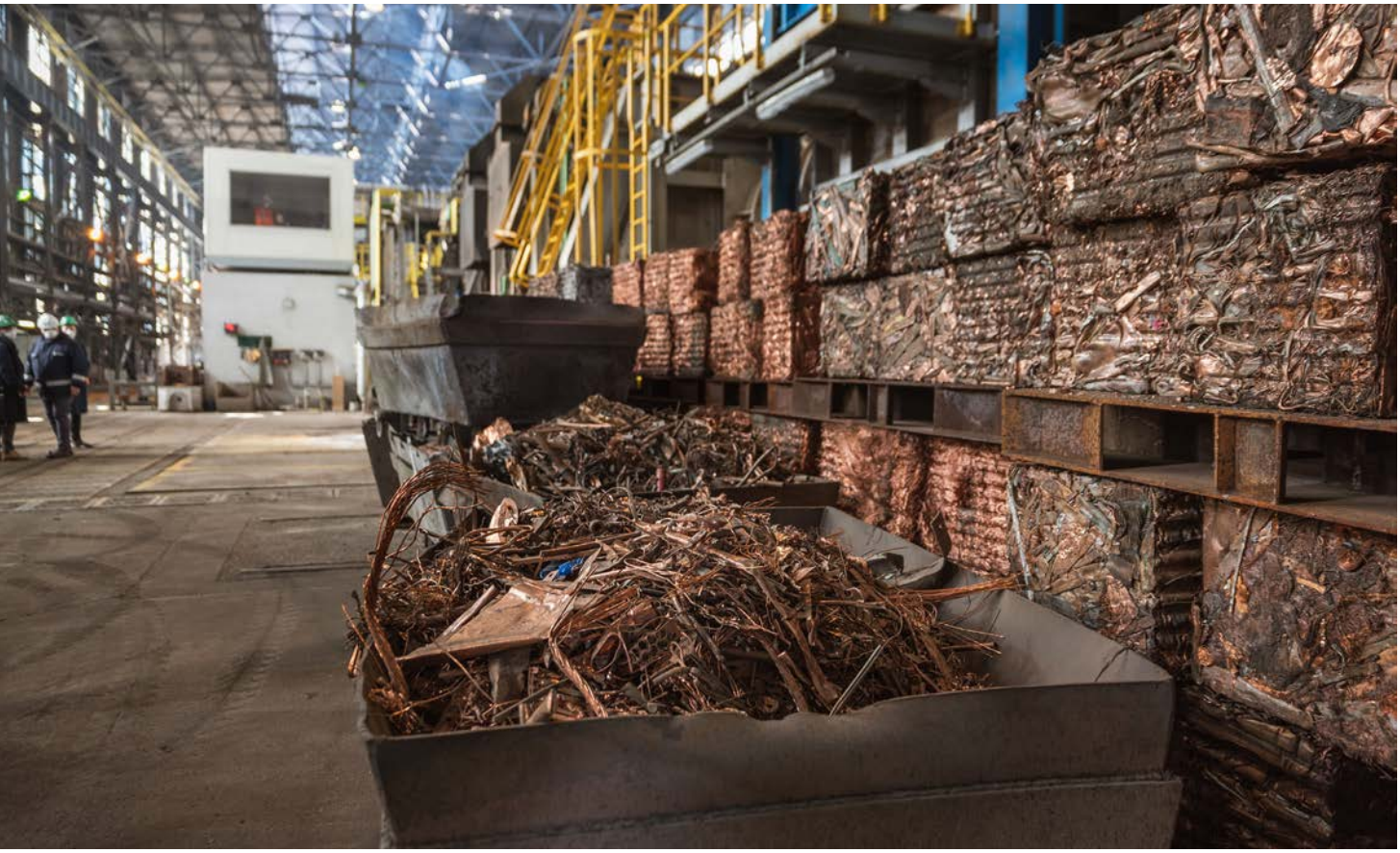
The UK's approach to moving to a circular economy continues to reflect many of the changes put forward as part of the CEAP. Many of the themes and provisions covered within the CEAP relate to areas of resources and waste policy where the UK nations are already actively involved, either through existing measures or where work is underway to take forward commitments made in their respective domestic waste strategies. Waste policy is largely a devolved matter in the UK and the devolved administrations are therefore responsible for strategy and policy relating to waste management.

Despite differences between the devolved administrations in the specifics of policy measures, national priorities and strategies for waste have been consistent in aiming to drive action further up the waste hierarchy and working to move to a more circular economy (Table 3.8). Focus too often remains at the end of the material cycle, including in the interpretation of extended producer responsibility, which does not give enough prominence to prevention and reuse, leaving the UK out of step with the EU's framework approach.[57]

	DEVOLVED ADMINISTRATION			
THEME	**ENGLAND**	**WALES**	**SCOTLAND**	**NORTHERN IRELAND***
RECYCLING	■ 50% recycling rate for household waste by 2020 ■ 75% recycling rate for packaging by 2030 ■ 65% recycling rate for municipal solid waste by 2035	■ 64% prepared for reuse or recycling in 2019/20 ■ 70% prepared for reuse or recycling in 2024/25	■ 70% recycling rate for remaining waste by 2025	■ Development of a new recycling target for local authority collected municipal waste
WASTE REDUCTION	■ 10% or less municipal waste to landfill by 2035 ■ Eliminate avoidable waste of all kinds by 2050	■ 100% waste reduction by 2050 – no waste sent to landfill or incinerators	■ 15% decrease by 2025 against 2011 levels	■ Development of a waste prevention programme
FOOD WASTE	■ Eliminate food waste to landfill by 2030	■ Halve avoidable food waste by 2025	■ 33% decrease by 2025 against 2013 levels	■ Landfill restriction on food waste
PLASTICS	■ Eliminate avoidable plastic waste by 2042	■ Phase out single use plastics	■ Ban on single use items under consultation up to January 2021	■ Implementation of legislation on carrier bags
CONSUMPTION	■ All plastic packaging placed on the market being recyclable, reusable or compostable by 2025	N/A	■ No more than 5% of remaining waste to landfill by 2025 ■ All plastic packaging to be economically recyclable or reusable by 2030	N/A

Table 3.8
Key aspects of UK national waste and resources strategies

*Northern Ireland currently developing targets



3.2.3 Summary of emerging regulations

Environment Bill

The forthcoming Environment Bill sets out an ambitious new governance framework that looks to protect and enhance the natural environment and aims to fulfil the government's commitment to be the first generation to leave our environment in a better condition. The Bill sets long-term binding targets for four priority areas, including resource efficiency and waste reduction, and creates a new watchdog, the Office for Environmental Protection (OEP) to hold the government and public bodies to account on its implementation of environmental law. An interim secretariat is to operate until the Bill receives Royal Assent and the permanent body can become operational. The Bill also enables regulations for establishing deposit return schemes and electronic waste tracking, gives powers to ban waste exports, and allows national authorities to introduce extended producer responsibility schemes.

The targets under consideration in relation to waste and resources are as follows:

- Increase resource productivity; and
- Reduce the volume of 'residual' waste we generate.

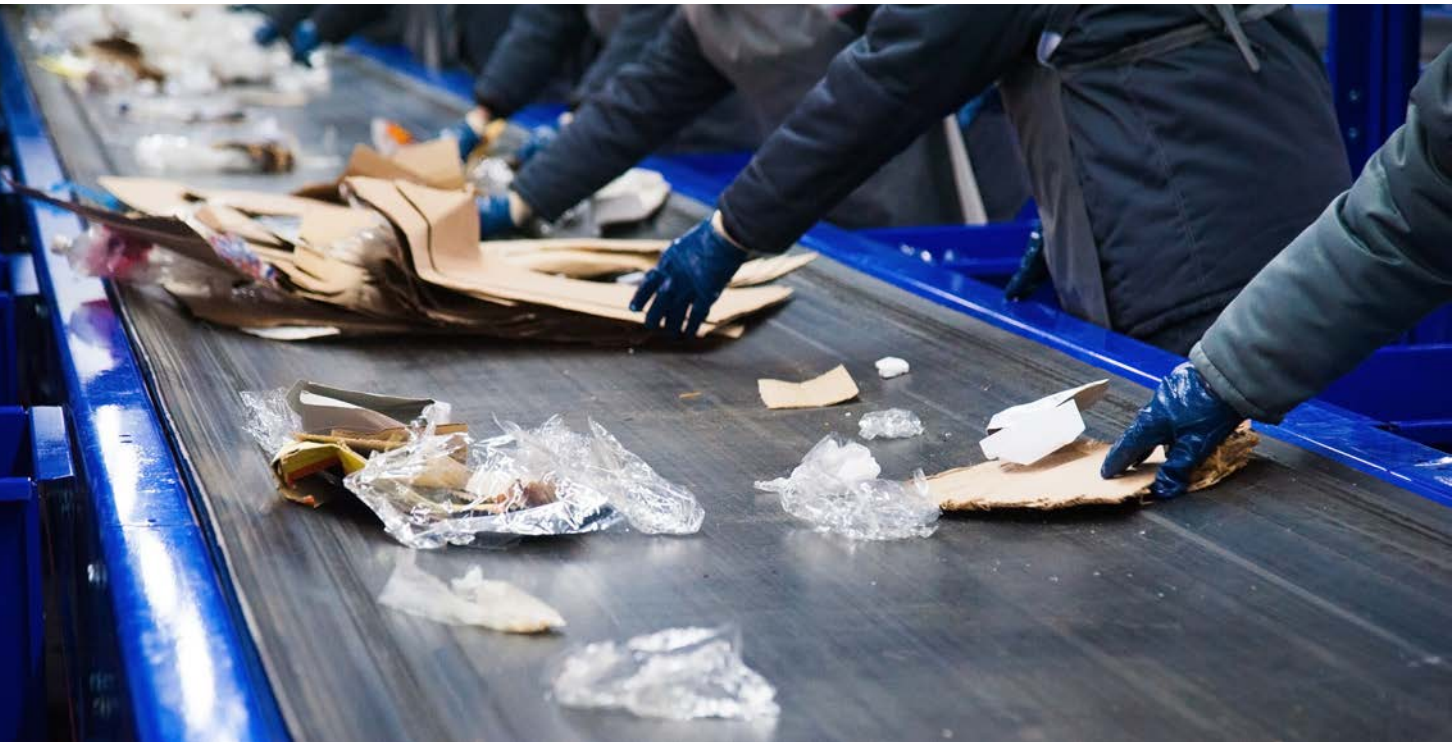
The Bill has been criticised for lack of clarity and direction, resulting in calls for improvement. This has included recommendations to strengthen the language in the Bill and accelerating work to establish a functioning and well-resourced independent watchdog, with clear powers and long-term financial security. Calls have also been made for the Bill to include a clear process for setting robust interim targets, and to elaborate on the consequences of missing interim measures and the remedial action required. Ultimately, the Bill needs to establish clear targets and ensure that these targets provide clear expectations for future policies, resulting in coherent and holistic improvements to the natural environment. This will help to create a stable business environment, promote innovation and provide a level playing field.[58, 59, 60]

RESPONDENTS' VIEW ON EMERGING POLICY: ENVIRONMENT BILL
Targets and their implementation: 'Targets are the easy part, delivering them is the hard work, and delivery may be several governments removed from the setters'.
Enforcement and accountability: 'The establishment of an overseeing body is key, along with its ability to hold to account'.
Scope of policy: 'The Environment Bill targets on waste reduction need to have a long reach up the value chain, as residual waste is not easily reduced without reducing consumption'. 'There needs to be a question and consideration around material value… targets may drive 5% improvement in recycling but that doesn't change the way products are produced and used'.
Providing direction: 'More attention needs to be paid to material demand… it's no good having a perfect recycling system if oil prices are so cheap that recycled plastic doesn't make economic sense'. 'End-of-waste is not sufficiently covered, and at the moment this hampers businesses in effectively utilising material that has been classified as waste'.
Public opinion: 'Packaging and recycling can represent a 'feel good' part of the circular economy for consumers and businesses, and policy needs to be aware of this'.

Table 3.9
Interviewee responses on the Environment Bill

Plastic Tax

Plastic packaging is packaging that is predominantly plastic by weight. The plastic packaging tax is to be set at a flat rate of £200 per tonne and applies to plastic packaging produced in or imported into the UK that does not contain at least 30% recycled plastic. The new tax to be introduced in April 2022 is intended to discourage the use of virgin plastic and create an economic incentive for businesses to use recycled material, stimulating demand and increasing rates of recycling collection, to shift away from damaging landfill or incineration processes. A key change, when compared to the previous policy proposal, is the applicability of the tax to plastic packaging around goods that are imported into the UK, not just unfilled packaging. However, packaging used for the transport of imported goods, such as plastic crates and pallet-wrapping, is excluded. In line with other taxes, civil and criminal penalties will be imposed for failure to comply with the tax, including penalties for failure to register, failure to file returns and failure to pay the tax. There is no mention, however, of how this will be enforced.[61]



RESPONDENTS' VIEW ON EMERGING POLICY: PLASTIC TAX
Targets and their implementation: 'It's a nice indicator that the UK is willing to use taxation to drive change, but the targets it's setting are not ambitious, and figures in parts of Europe are much higher, so there's a bit of a worry about how it will affect operations across Europe, and that the targets may conflict with wider goals around net zero and carbon' 'Regular review is required to ensure we remain vigilant to unintended consequences, for example the risk of increased overall plastic usage or the negative impacts of alternative materials'
Enforcement and accountability: 'The biggest worry is the inability to enforce. The bar needs to be raised so businesses are operating fairly and safely'
Scope of policy: 'There are challenges around the structure and how it evolves, and a key part of that is outlining how the funds are to be used. It also needs to do more to lock in extended producer responsibility' 'There needs to be some laddering of the thresholds, and some differentiation of material types and sources. This would send a clearer message and give investors more confidence' 'More attention needs to be paid to design decisions; there is a risk of driving the wrong recycled products through the policy, and we'll end up with a lot of product being disposed that can't be recovered'
Providing direction: 'Previously the Landfill Tax gave a much clearer initial positional guide and a better escalator, so giving direction and giving businesses a timeframe in which to adapt and innovate. If the Plastic Tax had that step change built into it that we all could see, then I think you would get a very different response from industry'
Public opinion: 'The plastics issue is high on the public agenda, but its prominence doesn't necessarily match its scale of impact'

Table 3.10
Interviewee responses on the Plastic Tax

Interviewees:

Waste industry:

- SUEZ

Sector overview:

- Zero Waste Scotland
- World Wide Fund for Nature (WWF)

Business/Supply Chain:

- Nestlé UK&I
- John Lewis Partnership

SME:

- KeepCup

3.2.4 Findings

Sector overview

The findings in *Help or Hindrance?* 2017[2] described a waste sector with a strong dependence on environmental regulation, particularly in an operational model that was increasingly moving away from the linearity of the past. It was noted that the regulatory framework provided clarity for businesses and investors, and reduced risks.

The review of literature and the responses from interviewees for this study found similar sentiments, describing the waste and resources sector as one with a good history of regulation and of respect for the importance of policy. There is a consensus, however, that policy is falling behind a changing sector and, while current efforts are welcome, "the pace and ambition of the regulatory framework needs to increase and it needs to align with net zero and reduced consumption and biodiversity loss", as well as doing more to address levels of the waste hierarchy above recycling, as part of a broader conversation with every element of the value chain. Cited by interviewees as an example of the need for faster progress on regulating supply chain due diligence was recent action by consumer good firms that saw "big businesses effectively lobbying for stricter legislation" on deforestation, forest degradation and land conversion.[62]

Respondents stressed the importance of regulation, but also that the current landscape demands regulation that is more adaptable in its design. One interviewee noted that "the right regulation is important, and not just new regulation but consistent review and overhaul of existing regulation". Respondents cited examples of new technology coming forward in the sector hampered by ill-fitting, outdated policy, such as the use of insects in processing of waste materials and the production of protein for animal or human consumption, where policy needs to bridge waste management, agriculture and food standards.[63] Other recent interventions, including for example levies on the use on single use plastic bags, should be studied so that lessons are learned, in particular around unintended consequences (eg impacts associated with alternative products), and are captured in any new regulation.

A recurring theme in the study was the crucial role played by enforcement and support and the need for strength in this area,[64] with one respondent noting that "the best policy is never going to be any good without enforcement". Cited as an example of this were recent cuts to the Environment Agency's Definition of Waste service,[65] particularly with the increasing importance of material end-of-waste status in making the transition towards a circular economy, and in ensuring material is not becoming consigned to being waste too soon.

The effect of public opinion

Since the 2017 report, there has been marked increase in the UK general public's awareness of environmental issues, with a focus in particular on plastic pollution (often referred to as the 'Blue Planet effect' after the issue was highlighted in the BBC's Blue Planet II documentary series). The impact of the resulting public pressure on businesses and government that followed this emerged as a dominant theme in literature and in conversations with interviewees.[65]

There is a consensus that, whilst this increase in general environmental awareness is undoubtedly very positive, caution must be exercised to ensure that reactions to this by businesses and policy makers are thoroughly considered and controlled. A recent study showed that human behaviour is complex and is driven by more than just knowledge, revealing that while the 'Blue Planet effect' raised awareness of plastic pollution, this did not translate to changes in plastic consumption.[66]

The last few years have seen a plethora of voluntary initiatives among a vanguard of sustainably minded businesses, largely targeting single use plastics.[53] There was concern from respondents that these changes may not have the required focus. Unless properly articulated, they risk poor compatibility with emerging systems, such as extended producer responsibility and may not fully leverage circular economy opportunities and could lead to an overall loss in competitiveness.

Respondents stressed that understanding these nuances and using policy effectively is key to ensuring that environmental progress continues to address the full transition towards material circularity. As one interviewee put it: "Public opinion can influence regulation in a way that doesn't accurately reflect complexities or priorities" and that public opinion "puts pressure on businesses and can lead to prioritising the wrong challenges".

The efforts of policy in some areas to keep pace with public opinion are welcomed, for example with levies on plastic bags and the banning of some single use products. However, these measures are widely criticised for not being broad enough in their scope[67] – "penalising single materials or products is not effective" – and need to look beyond the waste and resources sector to address wider issues in the design and supply systems, and the 'throwaway culture'.

It is essential that policy that is introduced in response to public pressure is not done so hastily, and that it addresses core environmental issues in the interests of a more resource efficient economy. Policies relating to products should cover the full design cycle, which accounts for the majority of a product's impact and is critical to reducing waste. There is a risk that, in responding to public opinion and being led by proactive businesses, policy is giving insufficient attention to measures that could deliver significant environmental progress on both the supply and demand side.

Brexit and COVID-19

The waste and resources sector was faced with considerable and growing risk in the lead up to the UK's exit from the EU. Key policy was delayed in its transposition to UK law and, whilst there is some commitment to ongoing collaboration, it is considered that there remains a risk of divergence from the positive direction set by the EU, and of environmental regulation being weakened as a result of narrow non-regression clauses in the exit agreement.[68] Consultation on the UK's national strategies remains behind schedule, while the EU continues to move forward with new policy on product obsolescence, repair strategies and single use products. This is leading to concerns that the sector and the environment will continue to face detrimental effects following Brexit.[69]

This view was echoed by respondents in this study, who raised concerns about the level of regulatory risk from Brexit both in terms of rolling back progress on environmental protection, and of the impacts on the labour market and international competitiveness that result from holes in the regulatory framework. One interviewee noted that regulation standards need to be upheld if innovation is to be fostered, and that the approach to updating UK policy at the moment is leading to "a lot being back ended, and a lot of concern for businesses in not knowing how they will have to respond". The new Environment Bill goes some way to assuaging these concerns but needs to ensure that interim measures are in place, in particular for the transition of oversight and enforcement, and for the ultimate establishment of an independent and well-resourced agency in the OEP. The Bill also needs to set strong interim targets for resource efficiency. This is of heightened importance because of the stalling of progress of the Bill through parliament. Progress on the implementation of England's Resources and Waste Strategy has also been slow since its introduction in 2018. Provisions contained within this strategy and with a clear link to net-zero goals, including those relating to deposit return schemes, extended producer responsibility, food waste collection and plastics recycling, were due for consultation in 2020 but Defra has since delayed these, in part due to Brexit and the ongoing global pandemic.[70]

The COVID-19 pandemic has had significant impacts to date on the waste and resources sector, with changes to lifestyle effecting material volumes and compositions and exposing weaknesses in current systems. In spring 2020, a large number of recycling facilities were forced to close and local collections came under strain.[71] Services are now largely recovering, but the repercussions on the wider sector and on attitudes to material value continue to be scrutinised as the UK looks to build greater resilience.[51]

Respondents in the interviews were largely aligned in their analysis of the impacts of COVID-19, highlighting the significant short-term negative effects, but with a generally more positive attitude towards the longer term. A major concern was around loss of progress on new regulation, with market changes and

lobbying causing delays, such as Scotland pushing back plans for its deposit return scheme.[72] It was noted that the pandemic is leading to some 'reassessment of global supply chains' and their resilience, with an 'increasing demand for traceability and provenance from consumers'. With regards to the importance of regulation in providing stability, one interviewee went on to note that "industry latched on to virus transmission fears and, because there was no regulation supporting reusables, was easily able to undo progress around packaging and single use items". This shift away from reusables, which are a critical element in the circular economy, was able to occur due to claims about hygiene, despite evidence to the contrary[73], so equally undermining progress made by innovative sustainable businesses. This roll back on progress is something interviewees felt needed to be targeted and reversed, with businesses needing "support to prevent these shocks and improve resilience".

Benefits of regulation

The findings of the 2017 report showed clear linkages between environmental regulations in the waste sector and the co-benefits considered, and descriptions of these finding are given in Table 3.1.1. **There are significant opportunities for more, increasingly varied, high-quality and stable jobs, as well as skills and innovation in the sector in the move towards a circular economy, and all respondents were again in agreement on this. The key theme that emerged was the increased scope of these benefits and of the regulation required to realise them. The waste and resources sector 'could (and needs to) become much more collaborative, and policy will drive this'.**

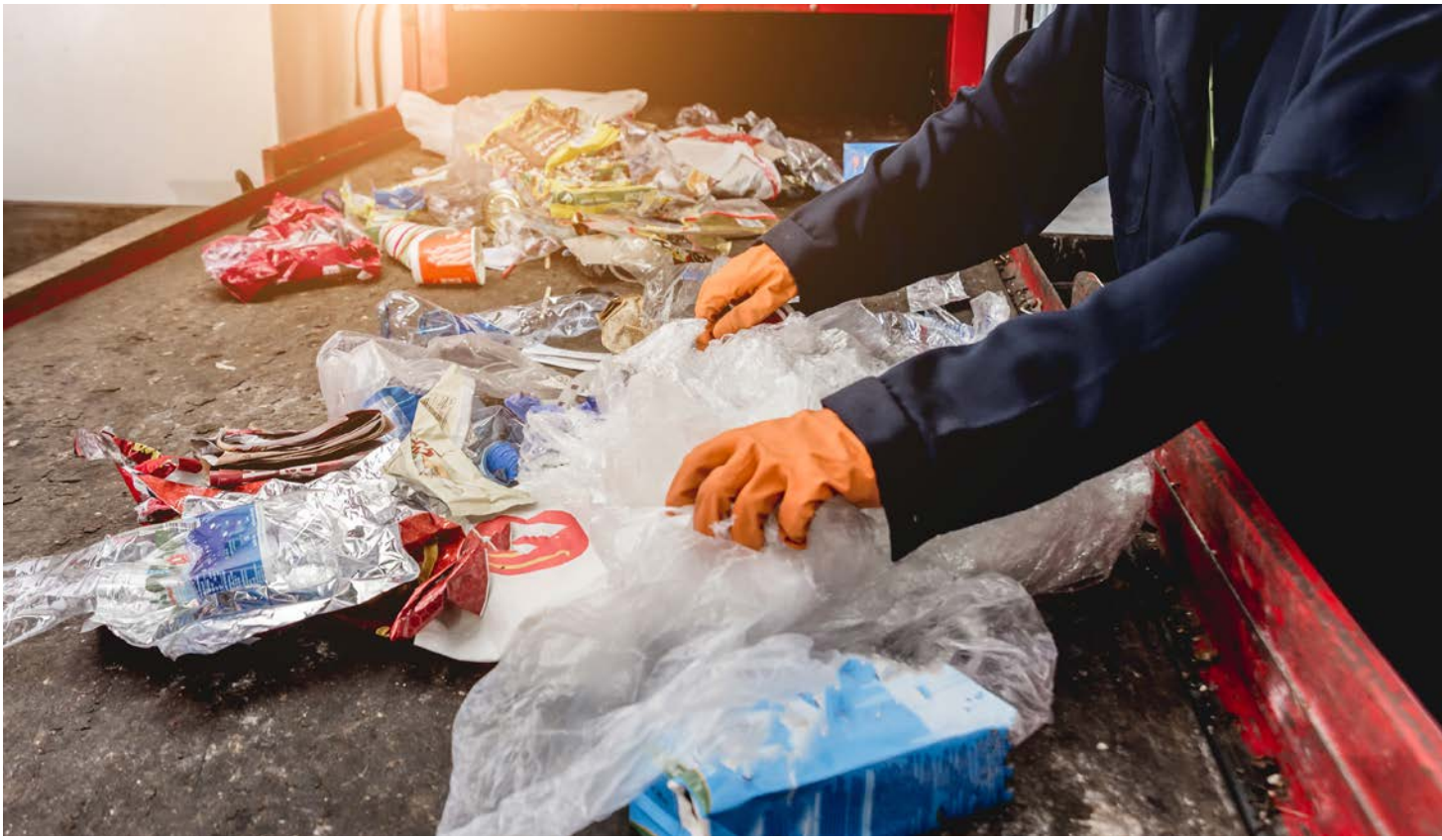
Adopting and implementing ambitions such as those contained with the EU CEAP would present "significant opportunities not just in delivering circular solutions but also in valorising economic, social and environmental gains from these solutions" and alignment of emerging policy in the UK with the EU's plan is important. Respondents noted that they were beginning to see waste businesses working more with producers and the supply chain, but that partnerships of this type are not forming quickly enough because "the policy needed to really drive it is still being discussed".

As with responses in the buildings and automotive sectors, it was felt that current and emerging policy increasingly failed to appreciate the complexity of economic circularity and so were limiting systems benefits. New businesses looking to innovate, in areas such as low carbon packaging and protein production, are hampered by out-of-date regulation, and by a lack of strong policy to insulate them against the volatility of their high carbon competitors. One interviewee noted that good policy would provide "opportunities not only for jobs and skills but also for integration of those different elements of the economy, and to build resilience" but also pointed out that there is a risk that "regulation in the sector focuses too much on the technical and stifles those opportunities".

Policy on its own however, cannot provide the innovation and resilience required for a successful transition towards Net Zero and a circular economy, particularly if "environmental regulation is seen as being at odds with economic growth". The respondents noted that government needs to provide more information, communication and support to businesses, for example through programmes that facilitate cooperation amongst businesses and industries. As was noted also in the 2017 report,[2] benefits are often only noticed on the ground in the long-term, and improved policy structure and support would give businesses reassurance of these long-term benefits and help to overcome nervousness around the short-term costs associated with systemic change to the way we value materials. The benefits of improved resource efficiency reach beyond the waste sector and will be felt also in, for example, the buildings and manufacturing sectors of the economy.

	WASTE REDUCTION, RESOURCE EFFICIENCY AND CO-BENEFITS	HELP OR HINDRANCE 2017
JOBS	Implementing policy to effectively accelerate the transition to circularity, and the infrastructure required in the collection, sorting and recovery of materials promises to generate higher quality jobs, and of sufficient number to offset any losses in landfill and energy from waste industries. The repair and leasing sectors already employ more than the waste treatment sector, and effective policy will see these grow.[57] Ensuring a consistent policy approach will temper any adverse impacts on jobs due to challenges in access to labour across geographies.	The implementation of the Landfill Tax led to job generation, with new jobs in other areas of the sector offsetting any losses at landfill sites. There were signals of continued net positive job generation due to wider increases in environmental regulation.
SKILLS	The changes to markets and systems that are required to achieve circularity in materials and resources are expected to be labour intensive initially when looked at against traditional disposal infrastructure. However, this will also provide opportunities for a greater range of skills in digital systems, process management and product design both within the waste sector and upstream in the product value chain, as well as routes for cross sector reskilling in areas not usually associated with waste management, such as human behaviour.[74]	Jobs created in the recycling and advanced treatment industries provide for a more highly skilled workforce. The introduction of Landfill Tax at a low rate gave the sector an opportunity to upskill.
INNOVATION	The transition to material circularity has been singled out by the UKRI as a key investment area for innovation potential.[75] Providing consistent regulation and clear support will give businesses in waste and resources and associated sectors across the supply chain the confidence to look at new models. Good policy will foster new markets in prevention of waste, encouraging reuse and redesigning packaging, and shield business from risk associated with resource fluctuation.[76]	The Landfill Tax was a step towards realigning the sector's appreciation of material value and provided enough clarity and competition across businesses in the sector to stimulate growth and investment in new treatment pathways.
SYSTEMS BENEFITS	Adaptable regulation that encourages waste and resources businesses to develop partnerships up the supply chain helps to build strength and contribute to benefits in other sectors, including offering savings in transport, complementing the development of renewable energy and realising synergies with agricultural feedstocks and wastes.	Not considered
RESILIENCE	COVID-19 and the global climate crisis are increasingly exposing the need for improved resilience in operational systems, including supply chains and waste management infrastructure. Policy that effectively assists with environmental protection and encourages resource circularity helps to tackle the fragility inherent in a linear system, and to create a more ecologically sound and socially just system. In the waste and resources sector this resilience might be realised through policy that increases cross sector-connectivity, improves diversity and redundancy of treatment options, fosters skills and innovation and broadens participation by stakeholders in emerging reuse and repair industries.[77]	Not considered

Table 3.11
Summary of co-benefits that result from effective waste reduction and resource efficiency policy



Policy design

The *Help or Hindrance*? 2017[2] study concluded that environmental regulation was key in supporting and controlling an effective waste sector, and that "regulations created many opportunities for the waste sector for new business models and increased activities up and down the value chain of materials and products". To achieve this, respondents noted that policy needs to be clearly defined and have a consistent approach to ensure fair implementation that aligns all businesses. The need for proactive reporting to authorities and for strong enforcement was also noted, with the maximum benefit occurring when policy is able to support long-term investment and provide the continuity required to establish new opportunities.

Interviewees in this study expressed similar sentiments regarding the need for effective environmental regulation to drive a circular waste and resources sector. Table 3.1.2 lists some interviewee responses regarding the challenges in creating good policy. They agreed that policy needs to show adaptability, both to accommodate a rapidly changing sector landscape and to allow meshing with policy in the wider industry, including responding to the EU Ecodesign Directive and the return of carbon pricing to the fore.[78]

To serve the environment and businesses in the sector, existing policy should be reviewed, and new policy implemented that is able to reach further up the supply chain. This should encompass product design standards and extended producer responsibility, stimulating consumer demand for efficient products through variable tax rates and sustainable procurement criteria. One respondent noted that it is not enough to target consumers, having clear standards to drive resource efficiency in the production of industrial goods would mandate improvement. Regulation also needs to send a clear message, and an important factor in sending the right message is the correct allocation of the cost across the material lifecycle. This echoes a recent poll by Viridor and YouGov, which indicated that the cost of recycling ought to be picked up by consumers.[78] Recent policy, such as the single use plastic bag levy, also provides lessons on the need to properly incentivise high waste hierarchy options including reduction, reuse and repair, and avoid diverting demand to harmful alternative products.

RESPONDENTS' VIEWS ON POLICY DESIGN: CHALLENGES FOR EFFECTIVE ENVIRONMENTAL REGULATION IN THE WASTE AND RESOURCES SECTOR
Scope of policy: Policy in the waste and resources sector needs to take a wider view, in order to develop 'better harvesting, better capture, better processing, better design of products and easier handling'. 'A relatively high volume of small, discrete policy actions is creating a false sense of security around environmental and circular economy policy'.
Communication and support: 'Regulation has to be able to get the right message across to businesses that perhaps have not had to worry about these things historically'.
Adaptability: 'Clunky regulations are causing a roadblock; they were built for a purpose but have closed some doors'.
Competitiveness: Effective and clear policy is needed to help overcome 'challenges in allowing businesses to collaborate, from a competition perspective'.
Public opinion: 'A lot of consumers don't have the luxury of engagement and awareness due to social inequity, and as such policy is essential to help do the environmental leg work upstream of the consumer. This is good for business competitiveness if done fairly'.

Table 3.12
Interviewee responses on the challenges around creating effective environmental policy

3.2.5 Recommendations

The findings of this section can be summarised as follows:

1. An effective regulatory framework based on consistent, flexible and evolving targets and standards is needed to **provide clarity to and reduce risk for businesses** in the waste and resources sector and across other associated sectors.
2. Reduced consumption and improved resource efficiency should be embedded across environmental policy and this needs to continue **to be updated and implemented with pace and ambition, and to better align with associated ambitions** including those relating to net zero, reduction of consumption and loss of biodiversity. It is important that guidance and regulation keeps step with science, technology and business.
3. Policymakers should look to **revise existing policy where necessary to make it fit for a transitioning economy**, such as with regulation relating to the definition of waste, as well as introducing new, more adaptable policy that aids and encourages innovation and collaboration. Policy should stimulate productive discussion and assist businesses and other stakeholders in working together to achieve shared goals.
4. Resource policies must **embrace supply-side (product standards, EPR) and demand-side (taxation to incentivise efficient products, sustainable public procurement) initiatives**, and encourage increased transparency and understanding across supply chains.
5. **Enforcement, support and clear messaging is key** in providing confidence and facilitating cooperation, and must be independent, comprehensive and transparent. This includes the need for autonomous and well-resourced overseeing bodies that are able to hold target setters and implementers to account.
6. Policy needs to help **manage public pressure and ensure that regulatory attention is not distracted from the core measures** required for environmental progress as a result of shifts in public attention. Effective regulation can catalyse public demand whilst maintaining focus on areas in which the greatest environmental gains can be made.
7. **Policy should provide stability and resilience**, as evidenced by the rollbacks and uncertainty presented by COVID-19 and Brexit. Continued alignment of UK waste and resources legislation with equivalent regulations and standards internationally is important in giving certainty to businesses.
8. Policy should **focus on driving collaboration within and across sectors** to achieve wider reaching systems benefits and facilitate the transition to a circular economy. Expanding the scope of regulation and building in flexibility to include sectors adjacent to the waste and resources sector will maximise environmental, social and economic benefits.

3.3 Automotive

This section explores environmental regulation as they relate to the automotive sector.

The current EU CO_2 emission targets and the 2030 ban on petrol and diesel cars and vans were analysed as the two main environmental regulations impacting the UK's automotive sector. Having left the EU, the current EU regulation will be retained until a Green Paper (expected in 2021) on UK's post-EU emission pathway is published. The impact of a 2030 phase out of diesel and petrol vehicles and Government proposals in the Transport Decarbonisation Plan were discussed in the interviews.

The impact of COVID-19 and Brexit on the transition to electric vehicles was also explored. Finally, respondents provided their views on features and desirable aspects of good environmental regulations.

3.3.1 Key messages

Key messages about the impact and effectiveness of environmental regulation in the automotive sector from our literature review, cases studies and interviews included:

Regulation will be a key driver for consumer behavioural change, innovating new technologies and enhancing UK businesses' competitiveness. Clarity of requirements, timelines and scale give business confidence to invest and develop the right solutions since it is a massive step change to move from hybridisation to full electrification.

- More stringent regulations come at higher compliance costs for the industry. However, **the right set of incentives, as opposed to penalties, along with clear timelines will push the industry to develop** and adopt new technologies at lower costs and also develop new partnerships and innovative business models.
- A clear **tax recovery mechanism** (e.g. on electricity for BEVs) is now required given the ban on petrol/diesel vehicles and to overcome the resulting tax deficit from phasing out diesel.
- Government support and industry innovation are together helping to reduce the total cost of EV ownership **but charging infrastructure supply remains a key barrier**. Continuous investments in this area is key to facilitate the transition to electric mobility.
- The complexity of the automotive sector supply chain and future mobility solution requires more **integrated and cross-sectoral regulations** linking the industry with mining, chemical, tech, built environment, materials recycling and energy sectors. The technologies for EVs would benefit from this domestic integration to reduce demand on imports and also achieve a lower carbon footprint. Not to mention the significant economic benefits of more diversified and skilled local workforce. Regulation plays an essential role to set the direction of R&D de-risking investment in these sectors. Today's sales provide the R&D investment for tomorrow's vehicles and technologies.

Environmental regulations enhance innovation, job creation and skills upgrade.

- Building on the 2017 version of this report, new findings highlight that regulations and the disruptive nature of innovation represent a significant **opportunity for retraining and restructuring**, especially in the supply chain (e.g. battery production) and in operations (e.g. charging infrastructure). **According to government figures, the shift to EVs would support around 40,000 new jobs in 2030 and leverage around £3bn of private investment**.[85] By 2040, 78,000 new jobs will be created in the new UK battery gigafactories and around 10,000 of these new jobs would be created in EV manufacturing.[112]
- The UK has the capabilities to **lead the way** to ultra-low and zero emission vehicles through world class research and innovation programmes (e.g. Industrial Strategy and UK Research Councils, Faraday Institute, Innovate UK). These institutions would play a key role to support public-private and research partnerships to meet the ambitious targets.
- **New business models** (e.g. MoS, V2H, V2G) on re-manufacturing and circular economy are emerging with governmental support. The incentive package under the new regulation should further support these business models.

Brexit and COVID-19 can have a significant short- and long-term impact on the options and opportunities required to comply with the regulatory framework and ambitious targets.

- Having left the EU, maintaining high environmental standards is still crucial for the UK to remain competitive. A free trade deal between the UK and EU now exists but leaves uncertainty around the long-term impact on UK businesses given that it is likely to evolve during its implementation. Respondents mentioned border tax adjustments on carbon as an option so that UK industry will not be penalised by low-cost inputs. Rules of Origin are key for the industry, with local content to benefit from preferential trade agreements.
- **COVID-19 is reshaping mobility trends** and having a short-term impact towards more active travel, which eventually resulted in fewer cars on the roads during lockdown periods. However, its long-term impact on the automotive sector is ambiguous and will depend on recovery plans. One in six jobs is at risk of redundancy in the UK automatic sector, highlighting the need to strengthen local supply chains and incentivise domestic players; and also to develop an integrated transport strategy to facilitate a shift to active and electric mobility as well as increased public transport, while protecting livelihoods.

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREAT
EU CO_2 EMISSION PERFORMANCE STANDARDS FOR NEW PASSENGER CARS AND LIGHT COMMERCIAL VEHICLES (2020)	■ Clear targets, time and scale	■ Current EU CO_2 emission standards are below the UK's level of ambition	■ Green Paper (expected in 2021) will regulate the UK's post-EU regulations. Opportunities to be at the forefront of regulations	■ Potentially less ambitious CO_2 targets due to the UK's higher average vehicle weight of their fleet
EMERGING POLICY	■ Great ambitions, ahead of other European countries and clear statement of intent to industry and consumers ■ EV and EV battery manufacturing identified as a strategic priority ■ Strong R&D, new tech and innovation base	■ Lack of clarity on actions to achieve ambitious targets ■ Lack of clarity on EVs taxation and government source of revenue ■ More focus required on cross-sectoral integration and cross-modal regulations ■ Skills gaps	■ Potential to strengthen public and private investments to fill the charging infrastructure gap ■ Harness UK industry potential to lead the transition and benefit from existing market advantage ■ Circular economy frameworks (Batteries and Tyres)	■ Loss of tax revenue ■ Benefits could leak out to other countries (car and battery/ materials level). ■ Disruption to supply chain ■ Grid, RE and charging infrastructure upgrade required

Table 3.13
SWOT of current and emerging policy case studies for Automotive

3.3.2 Summary of current regulations

The automotive sector remains a major part of the UK economy, contributing 3% to annual GDP in £82bn turnover, and providing 823,000 jobs. It is a sector with a highly globalised supply chain and manufacturers investing in production plants across the world to match market demand with best value production. Across the UK the automotive industry accommodates: 6 mainstream car manufacturers, 20 R&D centres, 9 engine manufacturers, 6 design centres, and 2,500 suppliers – to name a few.

As with buildings, vehicles are major contributors to greenhouse gas emissions and improving their efficiency has been a key part of global environmental regulation. CO_2 emissions from transport accounted for 34% of total UK emissions in 2019, despite decreasing by 2.8% compared to the year before.[80]

In 2019, the UK's committed to bring all greenhouse gas emissions to net zero by 2050, becoming the first major economy to pass net zero emissions law. Transportation is the largest emitting sector and it has a key role to play in meeting this ambitious target.

Environmental regulations in the automotive sector have been largely led by the EU[81] and for the purpose of this study we have focused on the impacts of transferring the CO_2 emissions from passenger cars (EC) 2019/631 into UK law.

The impact of the government announcement of bringing forward the sale of new petrol and diesel cars to 2030 and the anticipated impact of the Transport Decarbonisation Plan – currently under consultation - are also investigated.

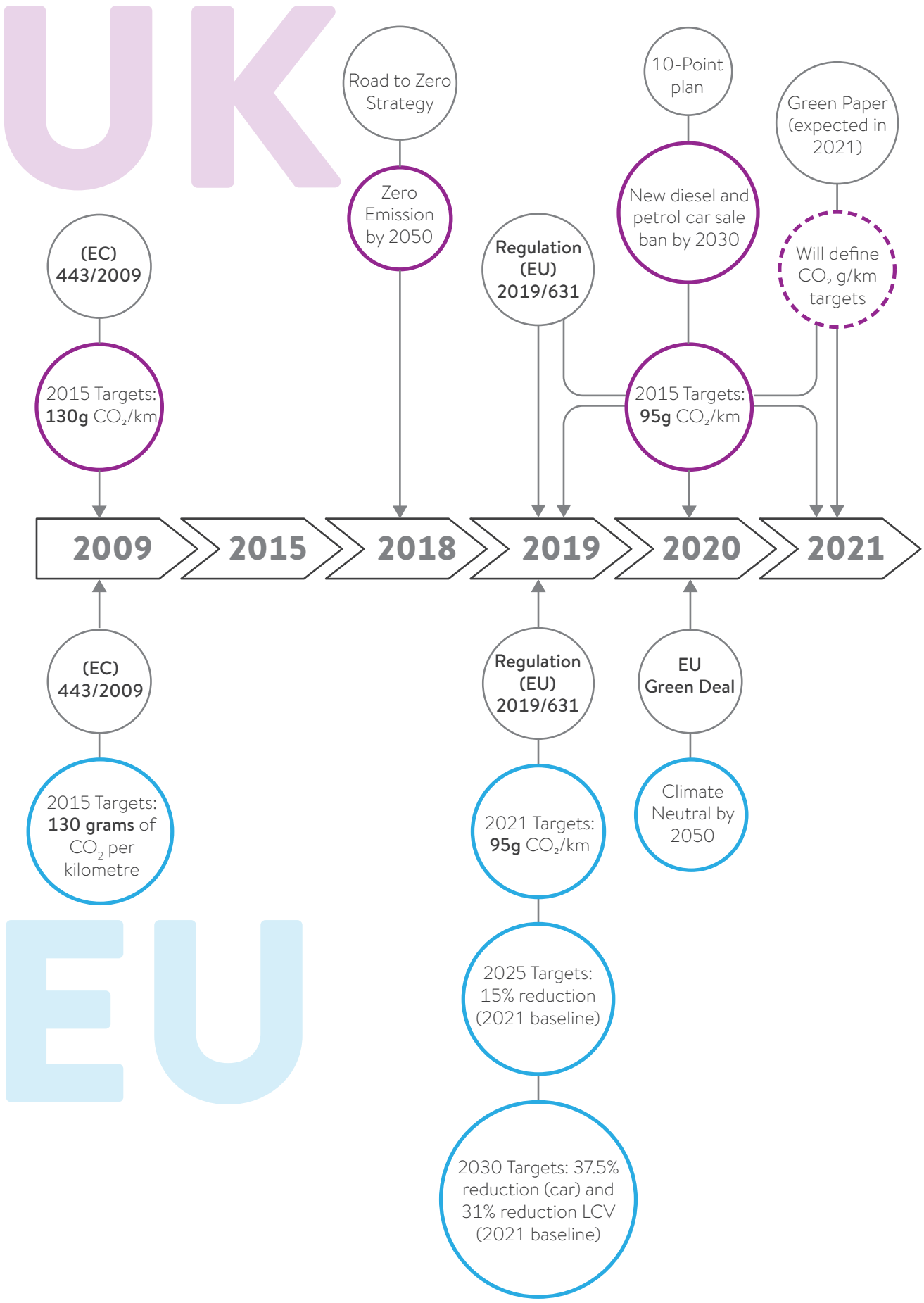


Figure 3.1
Development of automotive regulations and targets in EU and the UK

Figure 3.1 shows the development of EU CO_2 emission standards, comparing it to emerging UK policies to achieve Net Zero by 2050.

The current EC 2019/631 regulation includes target for 2020 (95g CO_2/km for cars and 147g CO_2/km for vans); in 2021 these targets will be converted into Worldwide Harmonised Light Vehicle Test Procedure (WLTP) and will form the basis for the 2025 and 2030 targets. The 2025 and 2030 targets are defined as a percentage reduction from the 2021 baseline and summarised in the Table 3.1.4 below.[82]

	CAR	**LCV**
2021	95g CO_2/km	147g CO_2/km
2025	CO_2 emissions reduction of 15% according to 2021 baseline (following conversion to WLTP)	CO_2 emissions reduction of 15% according to 2021 baseline (following conversion to WLTP)
2030	CO_2 emissions reduction of 37.5% according to 2021 baseline	CO_2 emissions reduction of 31% according to 2021 baseline

Table 3.14
CO_2 emission targets: EC 2019/631

As the UK has left the EU, the UK government confirmed that following the end of the transition period (31st December 2020), the European regulations 2019/631 will be copied into UK law. However, the government announced that a Green Paper will be released in 2021 to provide more clarity on the UK's post-EU emission regulations and the CO_2 grams/km pathway to and beyond 2030. This will ensure that UK CO_2 emissions targets are aligned with the ambitious net zero targets.

Current CO_2 emissions targets are based on the average vehicle mass of manufacturers fleet compared to the average mass of the EU fleet. A statutory instrument corrects for deficiencies from retaining an EU regulation in UK law and amends the regulation to ensure it functions in a GB-only context. As per the Northern Ireland Protocol, Regulation (EU) 2019/631 will continue to have direct effect in Northern Ireland and the domestic version of the regulation will only have effect in GB.

By transferring the EU regulations on CO_2 performance emission standards into GB-law, the government will:

- Retain policy that supports the delivery of our wider ambitions to reduce CO_2 emissions from transport in support of net-zero;
- Provide certainty to vehicle manufacturers on plans for regulation following the transition period and minimise additional reporting burdens;
- Ensure that GB[82] regulation is at least as ambitious as the regulatory regime established in the EU; and
- Enable the government to assume the obligations and functions, currently performed by the European Commission, to ensure the regime continues to function in a GB-only context[83].

3.3.3 Summary of emerging regulations

From Road to Zero Strategy (2018) to the 10-Point Plan (2020)

In November 2020, 'The ten-point plan for a Green Industrial Revolution'[85] was launched, confirming the end of sale of petrol and diesel cars and vans by 2030, 10 years earlier than the February 2020 announcement.

> ***"From 2030 we will end the sale of new petrol and diesel cars and vans, 10 years earlier than planned. However, we will allow the sale of hybrid cars and vans that can drive a significant distance with no carbon coming out of the tailpipe until 2035.***

The Government is considering the date of 2035 for an end to the sale of hybrid cars that are powered by electric batteries as well as traditional motors. However, this will not be confirmed until the Government publishes the Green Paper on the UK's post-EU emissions regulations and the CO_2 targets this year. The Government will need to ensure that the tax system encourages the uptake of EVs and that revenue from motoring taxes keeps pace with this change, to fund public services and infrastructure in the UK.

Earlier in 2018, the government launched the Road to Zero Strategy,[86] a document that sets out a long-term vision for the UK to lead the world in zero emission vehicle technology and have zero emission cars on roads by 2050. The strategy provides a comprehensive 46-point plan with £1.5 billion in funding to decarbonise road transport. Plug-in electric vehicle (EVs) is the elected technology to facilitate the transition to decarbonisation of cars and vans. Several key measures identified in the strategy support government commitments to build a cleaner road transport sector and put the national automotive industry at the forefront of technology advancement:

- enabling a massive expansion of green infrastructure across the country;
- reducing emissions from the vehicles already on the UK's roads; and
- driving the uptake of zero emission cars, vans and trucks; the long-term ambition of zero emission cars by 2050.

Implementation of the strategy is mainly through electric vehicle support actions – e.g. financial aid for the purchase of an electric vehicle, procurement of electric vehicles by the government, information and awareness-raising campaigns, exchange groups involving government, industry, and consumer groups – and through regulation, i.e. keeping the ambition level of EU vehicle emission standards.

Phase out of petrol and diesel vehicles in other EU countries. Source: ICCT

Norway's 2025 target is the most ambitious for phasing out combustion-engine vehicles. The Norwegian government's 2017 Transport Plan states that sales of passenger cars and light vans shall be zero-emissions from 2025 onward. Under the plan, preconditions are 'improvements in technological maturity in a way that zero-emission vehicles will be competitive in relation to conventional vehicles.'

Denmark set a 2030 target to stop sales of new gasoline and diesel cars and a 2035 goal to bar new PHEVs under its October 2018 Climate and Air Plan. To reach this goal, the plan lists specific measures, including incentives for purchasers and owners of electric vehicles such as waiving registration taxes on car purchases, lower periodical ownership taxes, lower taxes for company cars powered by electricity, discounts on parking, and the use of bus lanes.

Ireland proposed that legislation effective in 2030 ban the sale of new fossil-fuel cars, according to its August 2019 Climate Action Plan.

The Netherlands set 2030 as the latest point for requiring 100% emission-free new passenger cars in its June 2019 Climate Agreement. Measures to implement the target include the accelerated roll-out of charging infrastructure and tax incentives.

France set a 2040 goal for ending the sale of new passenger cars and light commercial vehicles using fossil fuels, according to the Mobility Guidance Law.

Automotive Technology Decisions for 2030s must be made today

Average CO_2 emission levels for new passenger cars in the EU and current/proposed regulatory target values

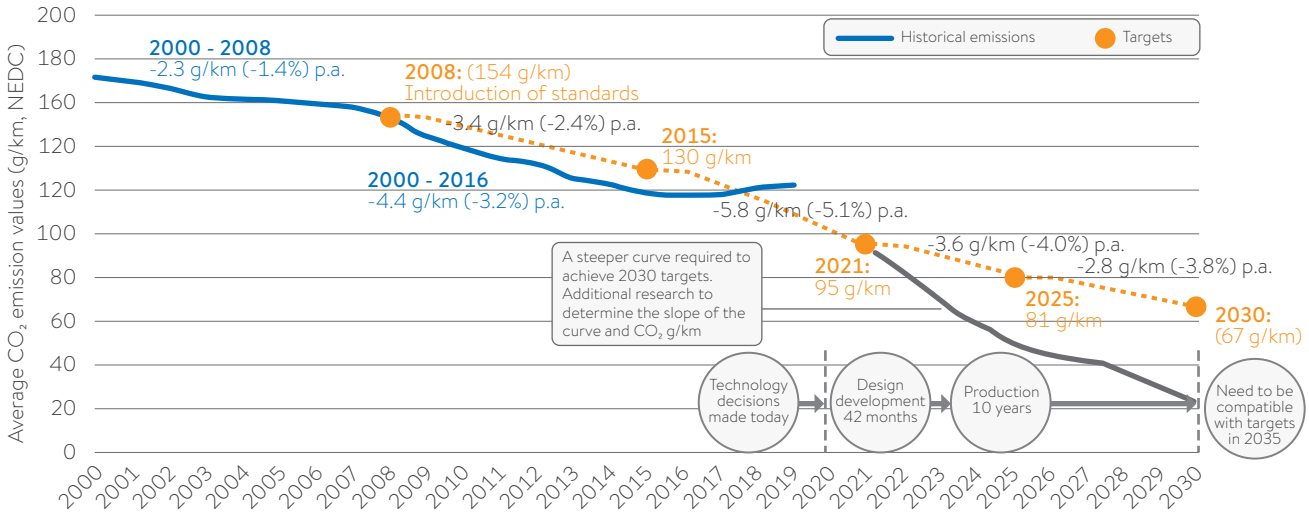


Figure 3.2
BH analysis based on Faraday Battery Challenge data. Average CO_2 emission levels for new passenger cars in the EU and current/proposed regulatory target values. Source: Innovate UK interview response and Buro Happold analysis.

The Road to Zero Strategy was built on the commitments of ending the sale of new conventional petrol and diesel cars and vans by 2040 which has now been superseded by the recent 2030 ban announcement. However, some of the concerns highlighted with the targets set out still apply – for example, the timing of phasing out conventional hybrids and short-range plug in hybrids. In addition, a 2019 British Vehicle Rental and Leasing Association (BVRLA) analysis in collaboration with Ricardo showed that within one year of its launch the Road to Zero Strategy was falling short on tax policy, charge point access and in reaching the 25% target of ULEV government cars by 2022.[87]

Other key challenges highlighted included: the provision of an adequate charging network and the uptake of electric vehicles,[88] information asymmetry on total cost of ownership,[89] lack of clear policy on trade[90] and a need for short-term target actions to accelerate the market to zero emission vehicles.[91]

The government commitment to ban sales of petrol and diesel car by 2030, is part of the wider policy around the acceleration of the transition to zero emission vehicles and includes funding for £1.3 billion to accelerate the roll out of charging infrastructure. In addition, £582 million is intended to extend the Plug-in Car, Taxi and Motorcycle grants to 2022-23 to ensure that cost parity is achieved between EVs and ICE vehicles and facilitate the uptake of EVs. It is expected that the transition to zero emission vehicles could support up to 40,000 new jobs in 2030 and can save around 300MtCO_2e to 2050.[85]

Transport Decarbonisation Plan (2020)

In March 2020, the government launched a consultation to develop a plan to accelerate the decarbonisation of the transport sector introduced in the 'Road to Zero' strategy. The Transport Decarbonisation Plan,[92] still in consultation at the time of writing, will set out detailed actions to deliver emissions reduction in the transport sector. The plan envisages six strategic area summarised below:

1. Public transport and active travel being the natural first choice for our daily activities. Less use of private cars and a convenient, cost-effective and coherent public transport network;
2. **From motorcycles to HGVs, all road vehicles will be zero emission**. Technological advances, including new modes of transport and mobility innovation, will change the way vehicles are used;
3. Goods will be delivered through an integrated, efficient and sustainable delivery system;
4. Clean, place-based solutions will meet the needs of local people. Changes and leadership at a local level will make an important contribution to reducing national GHG emissions;
5. **The UK will be an internationally recognised leader in environmentally sustainable, low carbon technology and innovation in transport; and**
6. The UK will lead the development of sustainable biofuels, hybrid and electric aircraft to lessen and remove the impact of aviation on the environment and by 2050 zero emission ships will be commonplace globally.

It is acknowledged that, while the transition to zero emission vehicles is crucial, a change towards more active travel and fewer vehicles on the road will be required to ensure significant emissions reduction. We support Aldersgate Group's response to the consultation: "Improving the overall efficiency of the transport system will be just as important as investing in new technologies and infrastructure. This means taking a whole system approach to transport, rather than treating different modes of transport in silos. This will require the government to develop an integrated transport network strategy which brings together road, bus, and rail planning, improves the accessibility and reliability of public transport, requires housing developments to be better connected to sustainable forms of transport, and shifts more goods onto the rail network to improve the efficiency of the freight system". A coordinated, cross-sector and cross-modal approach is vital to achieve a net zero targets in the transport sector.

3.3.4 Findings

Impacts of regulations

The desktop study and responses from the interviews highlighted that **there is a continued consensus around the overall positive impact of environmental regulations in the automotive industry since the 2017 version of this study.**

The literature review and responses from interviews clearly welcomed the retention of the EU emission targets in UK law since this gives confidence to businesses that high environmental standards are maintained as the country leaves the EU. However, criticisms have been raised around the fact that the simple adoption of EC 2019/631 into UK laws is a missed opportunity for the UK to reform legislation and meet wider needs.[93] In light of targets that are being considered as part of emerging policies in the UK, namely 'The Road to Zero (2018) and the Transport Decarbonisation Plan (2020), ClientEarth reports that EU targets are insufficient to drive a shift away from petrol and suggest the introduction of a binding minimum zero exhaust emission vehicle mandate on motor manufacturers to set a clear path towards a complete phase-out of petrol, diesel and hybrid vehicles by 2030.[94] The 2030 ban would help cut car emissions to the equivalent of 46 $MtCO_2e$ by 2030, according to a report by New Automotive, a transport thinktank backed by Quadrature Climate Foundation, from an equivalent of 68 $MtCO_2e$ today.[95] However, this forecast is still almost 40% higher than the interim target set by the government's official climate advisers, the Climate Change Committee, to cut car emissions to 32.8 $MtCO_2e$ by 2030. The proposed Environmental Bill and its stringent Air Quality limits by 2022 might also impact the industry for example through powers under the Bill to recall vehicles that do not conform to standards. Further consultation is expected in 2021 to set the targets and metrics to be used.

Interviewees:

- Supply Chain: Michelin, Johnson Matthey
- Business: John Lewis Partnership
- Industry overview: Innovate UK

Regulation and Government ambition is already having an impact on sales of EVs and Hybrids in the UK

EVs are recognised in the 'Road to Zero' as the most credible technology option to deliver UK ambitions. SMMT reported that their popularity is rapidly growing in the UK and registered a 112.1% growth in registrations of new battery electric and plug-in hybrid cars from Jan-July 2019 to Jan-July 2020, with 39,119 BEVs and 26,955 PHEVs registered in first seven months of 2020. In 2020, the BEVs had a 4.7% market share (+3.7 points compared to 2019) and PHEV covered 3.3% of the market (+1.1 points compared to 2019). It is interesting to note that diesel and petrol still have 17.8% and 59.6% market share respectively.[96] Despite the encouraging growth in the uptake of electric vehicles, there are concerns around the massive efforts the 2030 ban will require to ensure a shift to electric cars.

Large scale shift to EVs would lower cost of ownership

The literature review highlighted that, for consumers, the initial cost of EV and concerns around public charging infrastructure are key obstacles to acquiring an EV.[97] Looking at the impact of the transition on costs, it is argued that short-term costs will be outweighed by medium and long-term savings when switching to electric[98] and interviewees highlighted that electric cars tend to have higher capital cost but lower operational costs. It was also reported that as 'the cost of EVs fall compared to ICEs it will reduce the total cost of ownership'. As lithium-ion battery technology evolves and production ramp up, cost parity is expected in 2023. The cost of lithium-ion batteries has decreased dramatically from $1,000 per Kwh in 2010 to $156 per kWh in 2019 with a projected cost of $61 per kWh in 2030.[99] However, the regulatory package has a key role to make EVs more affordable. The UK government is actively supporting the achievement of cost parity between EVs and ICE vehicles through the extension of the Plug-in Car, Taxi and Motorcycle grants to 2022-23 and the roll out of low cost charging infrastructure. Regulating for the ban on sales of petrol and diesel vehicles, the regulation will lead to mass production of EVs reducing their per unit manufacturing cost. Similarly, the mass roll out of charging infrastructure and smart grids would reduce the cost of charging. These measures along with incentives such as grants and exemptions mentioned above will reduce the total cost of both purchasing and running EVs.

Investment in renewables and charging infrastructure will need to underpin EV rollout

Interviewees emphasize that ambitious targets would require massive investment in renewables and charging infrastructure. According to Wood Mackenzie,[100] a global consultancy specialising in energy and renewables, electricity demand from the uptake of electronic and hybrid vehicles will reach 12 TWh or 3% of total electricity demand in the UK after 2025, requiring over 400,000 new public charging points at an investment cost of over £30 billion.

According to ZapMap,[101] as of November 2020 there are 20,408 charging points in the UK, installed in 12,932 locations, for a total number of 35,546 connectors within these devices. Greater London has the most charging points (25.9% of the total) followed by the South-East (13.7%) and Scotland (12.4%); the areas with the fewest number of charging points are Wales and Northern Ireland (1.5%). The number of connectors is growing, almost doubling between 2017 and 2019. Data also show that rapid chargers saw the most significant growth in the UK from just over 30 CHAdeMO connectors in 2011 to over 7000 rapid connectors across CHAdeMO, CCS, Tesla and Type 2 Rapid chargers by the end of 2019. The highest increase for CCS connector types between 2018 and 2019 was due to the emergence and demand for ultra-rapid charging speeds. Given that most private cars are parked overnight, most electric car owners rely on home charging. Underpinning this rapid expansion of charging points has been government financial support through various schemes such as the Electric Vehicle Homecharge Scheme (EVHS).[102] Similarly, incentives to businesses, organisations, charities and local authorities are offered to install charge points at their premise through the Workplace Charging Scheme (WCS).[103]

Experience from other EU countries and consumer surveys shows the importance of incentives for consumers to choose EVs

Despite encouraging growth in the number of charge points infrastructure (albeit mostly in larger/dense cities) and expected lower total cost of ownership, a SMMT survey showed that motorists are not ready for a full switch to electric.[104] This would change under the current proposed regulation, highlighting that continued government support with long-term commitment to incentives will be critical for the transition. The Electric Vehicle Energy Taskforce reported that a combination of business models and government support can deliver a UK wide charging infrastructure, providing equitable access for all. Interviewees highlighted that, beyond infrastructure provision, incentives are needed to offer affordable cars to consumers. However, while 'incentives will encourage changes earlier, the danger is that you have to wean people off subsidies as time goes on.'

The ambitious targets, if supported by the right frameworks and incentives, would create massive opportunities for the UK automotive, chemical, technology and energy sectors; and their value chains

Looking at innovation opportunities from transition to electric, the UK is well positioned and has the capabilities to lead the way to ultra-low and zero emission vehicles. Analysis from the Faraday Challenge and discussion during one interview clearly shows that the UK battery manufacturing capacity would have to increase from 2 GWh in 2020 to 100 GWh in 2035. Investments in local battery manufacturing would also boost job creation. For example, the planned battery plant in South Wales would create around 3,500 jobs.[105]

Looking at the battery supply chain, Figure 3.3 shows that 56% of the battery pack value exists in battery materials/elements and 25% in the Giga-factory. One of the interviewees echoed that investment in 'Gigafactory on its own doesn't get where the industry needs to be in terms of position in the battery electric vehicle infrastructure' but a strong and well-developed local supply chain is required.

In interviews, there was a consensus around the importance of understanding the complexity of the automotive industry and its supply chain in order to capture the economic benefits connected to the transition to EVs. Most of the companies in the battery supply chain are not directly part of the automotive supply chain but closer to the chemical and energy sectors, hence cross-sectoral integration is crucial. An E4tech report[105] showed that UK EV making is set to grow rapidly and that the automotive industry would strongly prefer UK-built batteries to keep supply chains short and shipping costs down. The study also found that the UK chemical industry could capture a £4.8bn per annum share by 2030, but this can only be achieved through cross-sectoral collaboration.

All interviews recognised that in order to generate benefits to the national economy a new generation of EVs would have to be produced in the UK rather than being imported. One of the world's best-selling electric vehicles, the Nissan LEAF, is manufactured in Sunderland; the world's first electric 'black cab' is made by LEVC in Coventry; and the UK's research and development capabilities are world-class. Following the establishment of the first and largest battery production facility in Europe (the AESC battery plant in Sunderland) in 2010, the UK have a decade of experience in EV battery cell and pack production. New players from Germany, Poland, Hungary and the UK (Arrival and Tevya) are entering the highly competitive global EV market.

One of the interviewees mentioned that 'being at the forefront of the regulation and boosting innovation was key if the UK wanted to show strong leadership by banning petrol/diesel vehicles ahead of Europe.'

In line with its Industrial Strategy, government has been supportive of technological development and scaling-up capacity for battery manufacturing through investments into the Faraday Battery Challenge. Between 2017 and 2022, £318 million has been secured to develop cost-effective, high-performance, durable, safe and recyclable batteries to capture a growing market. Britishvolt, the start-up battery manufacturer will set up the UK's first battery Gigafactory at the site of the Blyth Power Station in Northumberland. The company is aiming to have the plant up and running by the end of 2023. The firm will invest a total of £2.6 billion in the project, which makes it the largest industrial investment in the North East since Nissan's arrival in 1984. The new Gigafactory will also provide 3,000 jobs for the region, as well as 5,000 more across the plant's supply chain.

19%

Finished good

Final product: Battery pack

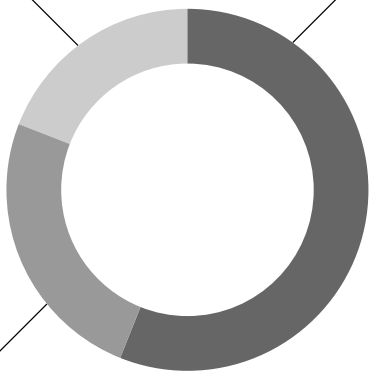
- Module case and connectors
  - Module
- Busbars
- BMS system
- Pack case

25%

Giga factory production

Final product: Cells

- Tabs
- Coated separator
- Soft pack film or coated metal shells
- Electrolyte solvents, electrolyte salts
- Electrolyte solution



56%

Raw material and processing

- Coal tar pitch
- Needle coke
- Co sulphate
- Ni sulphate
- Mn sulphate
- Lithium carbonate/hydroxide
  - Anode active material
  - Copper foil
  - Solvents
  - Additives
  - Binders
  - Cathode act
  - Aluminium foil

Figure 3.3
Battery supply chain by value added. BH analysis based on Faraday Battery Challenge data

The main risks are around the integrated nature of the support, infrastructure investment and incentive package required and the tax deficit from the declining sales of petrol/diesel vehicles.

The 2030 ban is a strong signal by the Government to catalyse change.[107] However, criticisms have been highlighted in terms of readiness from both industry and consumers. As one of the respondents highlighted, 'going from the current low BEV market share of new vehicles to 100% in 10 years is very challenging and will require a significant package of policy support and incentives.'

Interviews emphasized that understanding whether the additional costs of this transition will be transferred to the consumer or absorbed by the government will depend on a clear taxation decision (e.g. on renewable electricity) to overcome the tax deficit from declining sales of petrol and diesel vehicles. Government has been considering reviving road pricing plans to counter lost tax revenues from the increasing adoption of electric vehicles (EVs).

Benefits of environmental regulation

The updated literature review and responses from interviewees confirmed the positive impact of environmental regulations in the automotive sector. For example, the CCC estimates that reducing transportation emissions in line with net zero emissions will save £5 billion a year to the UK economy.[108] Key benefits of environmental regulations are summarised in Table 3.1.5.

In line with the previous report, regulations maintain a catalysing role in enhancing innovation, job creation and skills upgrade. New findings from emerging policies highlight that the disruptive nature of innovation represents a significant opportunity for retraining, especially in the supply chain and in the operation side.

	POTENTIAL CO-BENEFITS IN THE AUTOMOTIVE SECTOR	HELP OR HINDRANCE 2017
JOBS	■ A Faraday report[109] suggests that job creation will outpace job losses in the UK but only if the UK secures both EV and battery manufacturing. ■ Government figures from the Ten Point plan indicates around 40,000 new jobs in 2030 and leveraging around £3bn of private investment. ■ The transition to electric vehicles could create around 32,000 new jobs by 2030[110]. News jobs are created in the network, construction and service sector supply chains, with the average wages within these increasing by 0.1% attributed to EV uptake.[111] ■ Another Faraday study[112] reports that by 2040, 78,000 new jobs will be created in the new UK battery gigafactories (31.4% of the total) and in their battery material supply chains (55.7%). Of these 78,000 new jobs, around 10,000 would be created in EV manufacturing. For example, the planned battery plant in South Wales would create around 3,500 jobs.[113]	Overall, positive impacts with indirect job creation incurred down the component supply chain.
SKILLS	■ An Ecuity[114] study reports that, as large automotive capacity in the UK switch to ULEV technology, jobs will be preserved across all skills levels. Ongoing R&D activities in the low emission vehicles and infrastructure sector will likely increase demand for highly skilled researchers in the longer-term (2025-2035). A WWF[115] report reinforces the transferability of skills in the manufacturing sector; EV and ICE assembly tend to be similar. ■ Multiskilled professionals comfortable with chemistry, mechanical and electrical engineering are crucial to support the shift to EVs, requiring a substantial investment in new talent.[116]	Regulations complement the innovative nature of the industry.
INNOVATION	■ A competitive regulatory environment is a driving force to achieve global leadership in the development of CAVs, AVs and electric mobility. ■ Growth in the electric market vehicle has the potential to open opportunities to new entrants, mainly start-ups, across the industry.[117] UK start-ups are leading the way in electric vehicle production (e.g. Arrival), battery storage (e.g. Zenobe Energy), charging stations (e.g. POD points) and home charging (EO Charging) among others. ■ Innovative new partnerships such as the Skyline project,[118] are a cross-industry first. Data from the automotive industry, charge point operators and electricity networks are being shared and utilised to target investment and pave the way for the net zero transport revolution. ■ Another partnership, UK Electric Fleets Coalition,[119] recognises the leading role businesses have in the switch to electric and have been created to advocate for accelerating the transition and increase business participation.	CO_2 emissions reduction of 31% according to 2021 baseline

Table 3.15
Summary of literature review around co-benefits of regulations in the automotive sector

	POTENTIAL CO-BENEFITS IN THE AUTOMOTIVE SECTOR	HELP OR HINDRANCE 2017
Systems benefits	■ Following increasingly stringent exhaust emission limits, emissions of carbon monoxide, particulate matter and nitrogen oxides have reduced significantly.[120] ■ Recent C40 research[121] demonstrates that climate actions towards cleaner transport in combination with a decarbonised grid have positive impacts on improving health and air quality. ■ Additional co-benefits[122] of actions to tackle transport emissions link to public health benefits through increased active travel and improved air quality; improvements to the economy and employment through industry and innovation; reduction in inequality where those who generate less noise and air pollution are disproportionality impacted by pollution.	
Resilience	■ Disruptions caused by COVID-19 clearly showed the complexity and fragility of the global automotive supply chain, the need to urgently increase supply chain resilience and shift to local supply chains. A changing climate and greater frequency and/or severity of hazards may increase disruptions in supply chains[123] that interrupt production, raise costs, hurt corporate revenues, and lead to higher prices or shortages for consumers. For example, Japanese car manufacturers produced at least 750,000 fewer cars because of the 2011 Thailand flood.[124] ■ A Faraday Institute Research[125] study highlights that, when vehicle producer and battery manufacturers are in close proximity, synergies in terms of greater flexibility for just-in-time production, greater reliability of supply chains against policy changes and climate shocks, and the formation of a knowledge ecosystem around battery systems can be achieved more smoothly. ■ Innovative vehicles technologies and legal instruments such as tax incentives for low carbon products and processes are crucial to reduce vulnerability to climate change.[126]	

Brexit and COVID-19

The automotive sector has benefitted from access to the European market, with highly integrated supply chains and a significant demand for UK-built cars across the region. The European and UK automotive sector are deeply integrated, with 69% of cars registered in the UK imported from the EU and 55% of UK assembled cars exported to the EU in 2019. Looking at the supply chain, around 80% of imported components arrive from the EU, and 69% of British-built components are exported to the EU.[127]

The new trade deals the UK are seeking globally present opportunities to promote ambitious environmental standards abroad and strengthen its economic competitiveness through the export of low carbon goods and services.[128] The interviews highlighted that there are concerns around the impact of Brexit on future trade deals and it was largely agreed that maintaining high environmental standards is crucial to remain competitive.

Going forward, some of the solutions that would help the industry to navigate through Brexit and COVID are given below:

- **Trade agreements which do not disrupt the automotive supply chains**. Even though a Brexit deal with the EU has now been agreed, the long-term impact on the UK's automotive sector depends on ongoing sector specific discussion with EU. In addition, preferential access to non-EU key markets around the world, such us Japan, Turkey, South Korea, Mexico and Canada would also affect its competitiveness.[129]
- **Agreement on rules of origin** will be critical to calculate CO_2 emissions and to ensure competitiveness of the UK automotive sector. The European Automobile Manufacturers' Association (ACEA) has called on the EU to adopt a less restrictive stance on UK auto firms' access to the EU market, pressing it to 'reconsider its position' on the rules of origin that will be used to decide whether goods will qualify for tariff-free trade.[130] It is highlighted that, if a post-Brexit trade deal with the EU is not reached, cars coming into the UK could be as much as 30% more expensive than petrol and diesel vehicles due to 10% import tariffs.[131]
- Interviews also suggested that, going forward, **border tax adjustments on carbon** (e.g. similar to the EC's Green Deal) could be an option to ensure that 'UK industry is not going to be penalised by low-cost inputs with a much higher carbon tariff associated with them when importing cars.'

COVID-19 is having an impact both on the global demand and supply in the automotive sector due to economic and social lockdowns. The IEA estimates that around 2 million jobs (about 15% of the global workforce) in the automotive industry are at risk globally due to the impacts of lockdowns during the pandemic.[132] A closer look to the UK shows that up to one in six jobs were at risk of redundancy in the UK automotive sector due to impact of COVID-19. [133]

It is argued that, as countries seek to recover from COVID-19 crisis, investment in transport can be a catalyst for recovery. In England, a low-carbon and renewable energy economy is expected to create about 694,000 direct jobs in 2030, rising to over 1.18 by 2050.[134] A positive link between green recovery from COVID-19 and jobs creation have been highlighted in a recent Greenpeace report.[135] The study estimates that an investment of £100bn over the lifetime of the current parliament would create around 1.8million jobs in the automotive sectors.

Reduced travelling is also changing the way people move. An increase in active travel has been registered during the pandemic and it is expected that it's impact will last in the short-term.[136] However, interviewees argued that long-term impact on the automotive sector is ambiguous and will depend on recovery plans. Conversely, disruptions to supply chain due to COVID-19 are leading to calls for a more localised and resilient automotive sector.

Policy design

Effective regulations requires a substantial lead time for the industry. Interviewees applaud regulation as a driver for change and innovation, however they need to be signalled very far in advance in order to allow technology to adapt. Clarity of regulation and sensible timescales between the regulation being proposed, finalised and finally implemented gives businesses the confidence to invest in and develop the right solutions to meet requirements. When starting a car concept programme, the industry and government must understand what the regulation is going to be, not only at launch but 10 years after launch in order to generate a strong return on investment. The UK sector benefitted from this regulatory clarity when transitioning from combustion engines to hybrid technologies. However, this next step change to EVs is far more complex and challenging given the cross sectoral dependency for manufacturing of EVs and requirement for cheap and widely available charging infrastructure.

It was also reported that 'the aspirations are brilliant but there are limited actions on implementation, support and outreach'. 'We need to see actions sooner rather than later.' In order to achieve net zero by 2050, more ambitious targets, clear milestones and more support for a faster transition is required in the form of innovation grants, skills and training programmes, recycling and circular economy programmes (e.g. batteries, tyres, precious metals), financial grants to owners, supporting SMES/start-ups and more scrappage schemes.

A major worry for the automotive industry is the supply chain and its resilience. Most of the supply chain has gone abroad and it therefore takes longer to source the products and materials (i.e. during COVID). The automotive industry has responded to improving resilience in the supply chain and advocated for the government to do the same by strengthening local supply chains, imposing border taxes and circular economy frameworks.

The global battery supply chain currently relies on unsustainable environmental and social practices. But it doesn't have to be this way, and more social, environmental and ethical mining and sourcing regulations are required. The UK would have to influence and support international policy on sustainable mining. Otherwise, this could affect the competitiveness of the UK industry if global standards are not as stringent as the UK. In order to remain competitive, the UK can't fall behind when it comes to the regulatory landscape in the transition to EVs.

RESPONDENTS' VIEW ON POLICY DESIGN: CHALLENGES FOR EFFECTIVE ENVIRONMENTAL REGULATION IN THE AUTOMOTIVE SECTOR
Clarity, certainty and scope of regulation is critical for compliance and competitiveness.
Ambitious targets exist but lack of action and implementation support. Need for action sooner rather than later.
Regulation in the form of incentives and clear timeline will support the business case for R&D and technologies required to transition to EVs.
The UK has a very high environmental standards which should be maintained in any future free trade deals.
Incentives for new technologies are better than penalties for phasing out old tech.
The UK has capabilities but industry needs to be supported in the right way or the benefits will leak out to other countries.
Manufacturing can be encouraged (battery components, tyres) with greater emphasis on circular economy frameworks.
Historically government departments are not very good at working together. Integration is a challenge, make sure that incentives and behaviours are consistent. Understanding modal shift integration into the EV-RE system is going to be crucial.
Hybridization in general provided huge competitive advantage to the UK. Moving to EVs is a significant step for the UK and will require another major step change.
More cross-sectoral and cross discipline collaboration and partnerships are required to achieve the targets and achieve a smoother transition.

Table 3.16
Characteristics of good policy design

3.3.5 Recommendations

1. There is a very consistent message from the interviews and literature review that there is a **lead time** to consider. Regulation does drive change but needs to be signalled 7-10 years in advance in order to allow technology to adapt. Clarity of regulation, sensible timescales between the regulation being proposed, finalised and finally implemented gives business the confidence to invest in and develop the right solutions to meet the requirements.
2. Transition to EVs requires **a coordinated package of measures and incentives to influence consumers, automotive players and other sectors** such as chemical, tech, buildings and energy. Regulation should incentivise partnerships and collaboration within and across sectors. This is crucial given the increasingly integrated nature of mobility with other sectors.
3. Another consistent message coming out of the research and interviews is that the **ambition and resolve shown by the Government to transition to EVs is positive and in the right direction. However, the implementation plan is weak and requires stronger emphasis** in strategy documents and policies. The concern focuses on the following points:
    a. Co-ordinating energy and transport planning to ensure we have the right infrastructure in the right place
    b. Grid integration and communication between EV drivers, electricity consumers and the energy system
    c. Greater standardisation across the charging network to ensure it works resiliently, efficiently and securely
    d. Financial incentives for purchasing EVs and to ensure that the potential energy storage capacity of millions of electric vehicles is used to reduce peak demand
    e. A smart grid, delivering smart charging to smart electric vehicles requires accessible data. Frameworks need to be developed to facilitate the appropriate, secure sharing of this data
4. The cross-sectoral role of industry to support the transition should be strengthened through **research partnerships and demonstrator projects**. For example, the automotive sector would have to undergo a massive transition in its supply chain to scale-up processing of battery components. Metal shortages pose a significant risk for the UK's EV ambitions. The UK has capabilities in mineral processing – processed graphite is exported to China which could be diverted to battery manufacturing. The chemical sector is big in the UK; part of the challenge is to harness that capability and redirect it towards the battery supply chain.
5. **Jobs and skills opportunities should be captured and retained in the UK.** Policies and enabling frameworks are required to support innovation and research, promote start-ups and attract new people in the industry and create greater diversity.
6. **Understanding modal shift integration into the EV system** is going to be crucial. This will require strong monitoring frameworks and smart data sharing systems.
7. The EV transition will benefit from **greater actions on resource efficiency** (especially for batteries and tyres). OEMs want their next generation vehicles to be as low carbon as they can throughout their lifecycle. OEMs and supply chains are becoming more serious about their net zero commitments and require greater Government emphasis on remanufacturing and Circular Economy' concepts to reduce the carbon footprint of EVs.
8. When focusing on EVs and the infrastructure they require, we should place this within the context of **integrated transport** where reduction of journeys through urban design and good town planning enhances walking and cycling.
9. The long-term impact of COVID-19 on the UK automotive sector and its recovery depends on on ongoing sector specific discussion, in light of the trade agreement reached with the EU (its largest partner). Securing ambitious trade deals, rules of origin and environmental standards is crucial to overcoming the challenges that Brexit and Covid-19 could have on the sector.

4 Cross-sector comparison and conclusions

4.1.1 Since *Help or Hindrance?*: public and business attention, Brexit and COVID-19

All three sections looked to understand the potential influence on environmental regulation of the major changes in the political and societal landscape since the 2017 report was published, namely the renewed public attention to environmental issues, the UK's exit from the EU, and the major impacts of COVID-19.

In terms of public attention, all sectors report increasing public and business interest in sustainability, with an emerging focus on circular economies and the importance of wider systems benefits and non-financial metrics like health and wellbeing, air quality and job creation. This enthusiasm was seen to lead to businesses outperforming regulatory requirements, though interviews in the waste sector warned that the public reactions is not always aligned with the most effective or important areas of action.

Neither COVID-19 nor Brexit were seen to be a long-term disruption to this direction of travel. However, concerns were raised in the buildings and waste sector about regulatory rollbacks and the potential slowing of regulatory progress given resource constraints.

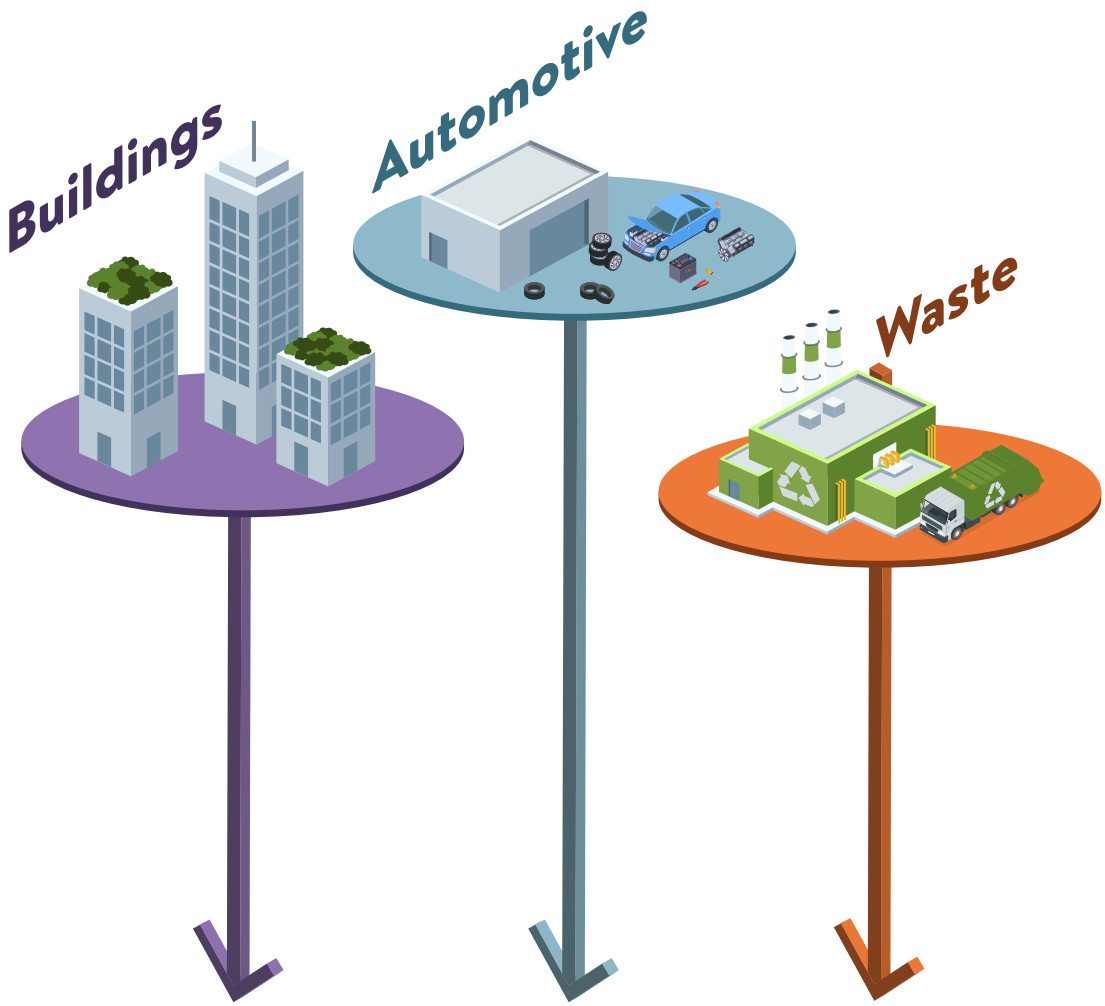
The importance of empowered regulators was stressed across interviews. Respondents noted the need for clear and well-funded enforcement strategies to ensure regulation is effective, and highlighted the role of local authorities in designing and managing policy that aligns with local needs and priorities – though concerns were raised that these bodies require adequate funding to do so effectively.

IMPACT	BUILDINGS	WASTE	AUTOMOTIVE
PUBLIC/ BUSINESS ATTENTION	High appetite for change in the sector, companies beginning to lead sustainability ambition, outstripping building regulations. Major investor and client focus.	Rise in public awareness around environmental issues is positive but must be received with caution to ensure that reactions by businesses and policy makers are thoroughly considered and controlled.	High international and public interest, social justice is a key point, with green energy and circular economy rising up the agenda.
COVID-19	Some concerns around environmental rollbacks, lack of enforcement and resource constraints limiting speed of change. No major influence expected.	COVID-19 has led to some undesirable roll-back on progress of environmental regulations, but it has allowed for increased appreciation of the importance of environmental protection.	COVID is reshaping mobility trends and is having a short-term impact towards more active travel. However, its long-term impact on the automotive sector is ambiguous and will depend on recovery plans.
BREXIT	Major concerns about reduction in levels of ambition and mismatch with international regulatory standards having repercussions on supply chains and international competitiveness.	Post-Brexit transition is seen as a high risk to the sector, with a fear that current gaps in transposition of EU legislation will leave businesses exposed and uncertain.	Concerns around the impact of Brexit – largely agreed that maintaining high environmental standards is crucial to remain competitive.
REGULATORS	Interviewees saw the expertise and insight of local authorities as important to setting, maintaining and guiding climate and energy policy that was aligned with local interests and infrastructure, though noted added challenges in areas with relatively low house prices. Lack of funds delay planning and limit enforcement capabilities.	Enforcement and pro-active reporting to authorities is key to providing confidence and facilitating cooperation, and must be independent, comprehensive and transparent.	Ambitious targets must be met under government commitments, requiring a significant package of policy, incentives and standards. At present there is limited action on implementation, support and outreach.

Table 4.1
Key themes and their impact on perceptions of environmental performance and regulations

4.1.2 Benefits of environmental regulation

CURRENT REGULATIONS WORK IN SILOS...



Lack of cross-sector thinking in local spatial strategies
Failure to link new developments to local integrated transport networks results in increased dependence on private vehicles

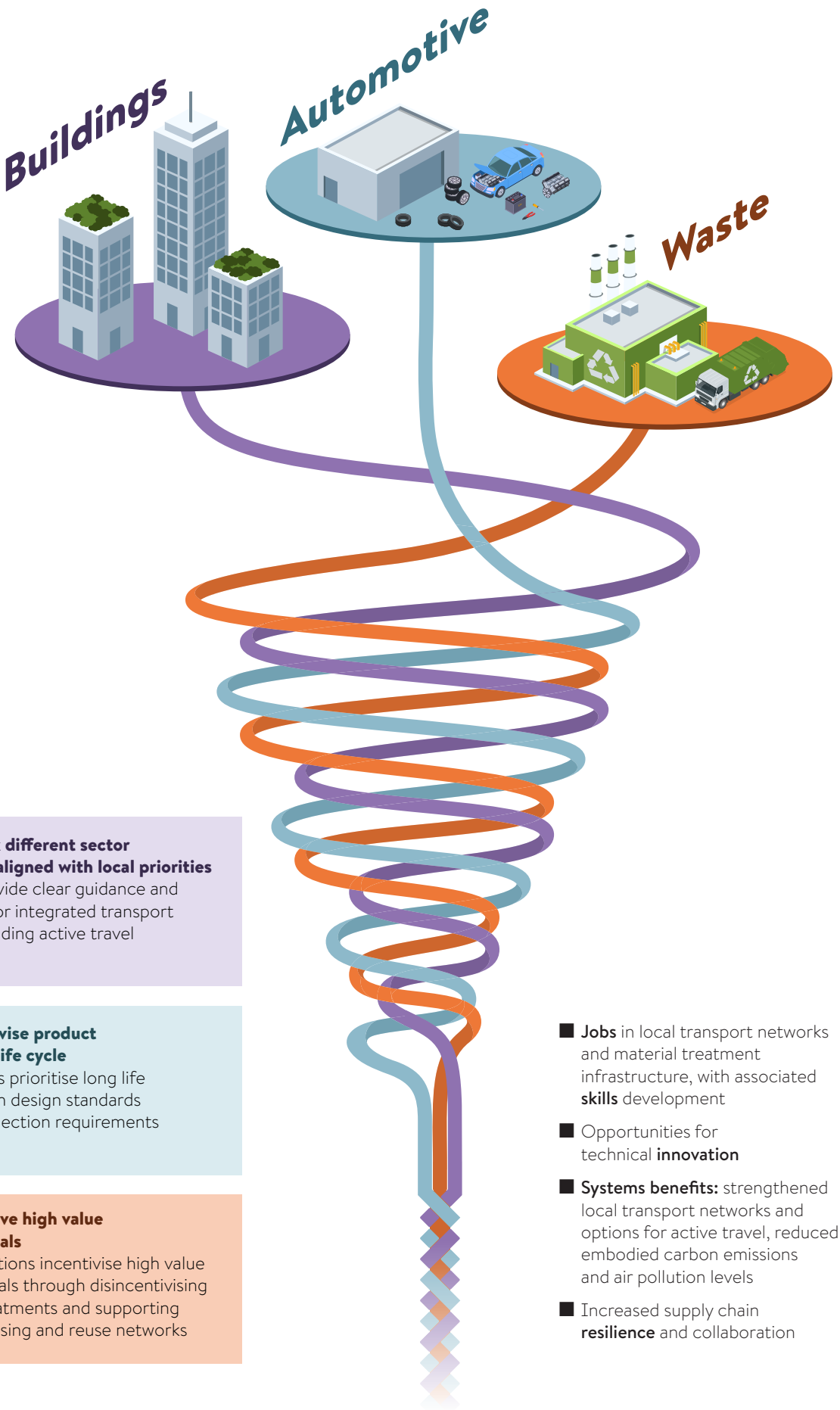
No requirements to consider full life cycle in design
Designing for longevity, reuse or remanufacture is not prioritised, resulting in continued high rates of production

Material value not captured in standards
Low hierarchy materials treatment options that don't retain materials' value are incorrectly incentivised

- High journey times, fuel costs and congestion with poor access to amenities and places of work
- High rate of disposal and predominance of low hierarchy treatment
- Depletion of virgin resources and fragmented supply chains threatens business resilience
- Sector stasis restricts innovation, evolution of diverse skills, and contributes to a lack of action on pollution and carbon emissions

Figure 4.1
Case Study: tyre manufacture under poorly aligned policy (left), and with an alternative system of well-designed, integrated policy (right)

...BUT NEED TO BECOME INTEGRATED AND CROSS-SECTORAL



Local plans link different sector requirements, aligned with local priorities
Local plans provide clear guidance and requirements for integrated transport strategies, including active travel and mobility

Policies incentivise product design for full life cycle
Product designs prioritise long life of tyres through design standards and material selection requirements

Regulations drive high value reuse of materials
Disposal regulations incentivise high value reuse of materials through disincentivising low priority treatments and supporting material processing and reuse networks

- **Jobs** in local transport networks and material treatment infrastructure, with associated **skills** development
- Opportunities for technical **innovation**
- **Systems benefits:** strengthened local transport networks and options for active travel, reduced embodied carbon emissions and air pollution levels
- Increased supply chain **resilience** and collaboration

As in the 2017 study, the sectors considered in this study were deliberately diverse, seeking to establish whether, overall, environmental regulation can be good for business and the UK economy. In this update, once again the answer is yes, but interviewees felt that regulations must come with other measures in order to harness benefits and drive systems change – including skills development, client appetite, supply chain access and technological availability.

Crucially, interviewees explained that environmental policy was an essential driver for sector reform and overcoming industry inertia, which subsequently delivers varied systems and economic benefits. In addition, this study found that businesses and investors are increasingly looking to non-financial metrics of success: quality of life, health and wellbeing, biodiversity and resilience – both business resilience to changing political and market trends, and resilience to climatic change.

A key common finding in the study was also that, while environmental regulations do currently harness benefits across the spectrum (Table 4.2), interviewees felt that these benefits, and particularly systems benefits such as health and wellbeing, air pollution levels, affordability, biodiversity protections and supply chain collaboration, would not be maximised while sectors were siloed. **A shift to multidisciplinary regulation that is compatible with and supports a circular economy is needed to make progress towards net zero and sustainable operations of UK industry**. This means bringing together key environmental and industrial strategies to consider regulations that cover a suite of carbon emission reduction policies, resources and waste policies, natural environment restoration policies, innovation and finance aligned with the government's broader social, environmental and economic goals, and with well-funded, coordinated enforcement efforts where necessary.

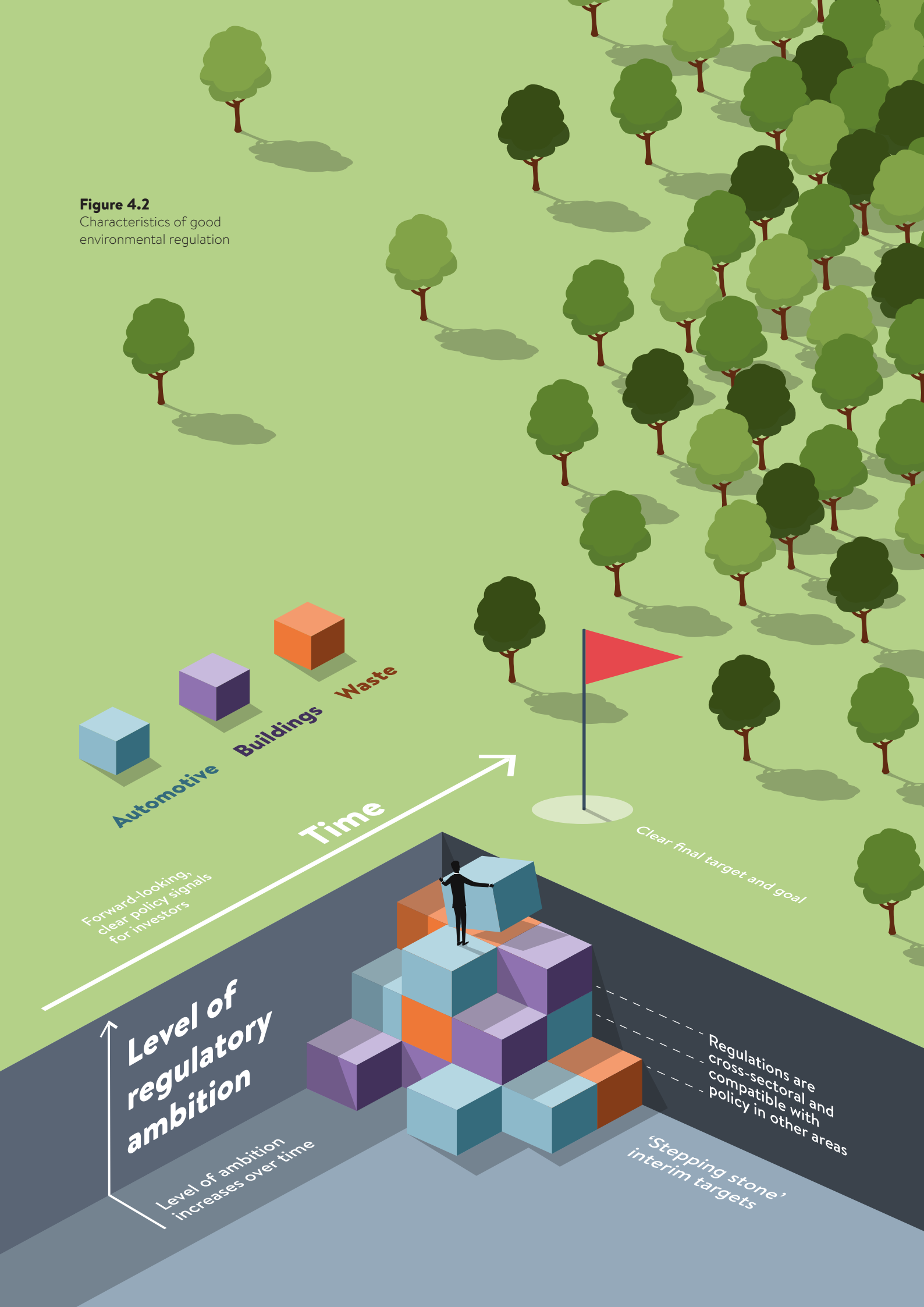
Figure 4.1 illustrates the example of the many benefits available from the application of circular principles are applied, in this example to tyre manufacture. Here, integrated policies that look to manage excess uptake, establish high value materials processing infrastructure and drive innovative design and materials selection result in wide-ranging community and business benefits to air pollution, skills development, carbon emissions, supply chain resilience and more.

Direct and positive impacts of regulations on jobs, resilience – both for businesses and in terms of supply chains – and innovation were reported across sectors thanks to the major changes all may see in moving to circular systems, introducing new technologies and developing new markets. This picture was more indirect for skills, with sectors finding that regulations shaped sectors, which would then require new skills.

IMPACT	BUILDINGS	WASTE	AUTOMOTIVE
JOBS	Direct job creation associated with infrastructure changes and requirements, and in consultancy through navigating regulation and innovating. The GLA estimates that in 2018 the London Plan was directly linked to creation of jobs through developer commitments.	Policy to effectively accelerate the transition to circularity, and the infrastructure this will require in the collection, sorting and recovery of materials, promises to generate a net increase in jobs. WRAP estimated this could be up to 500,000 additional jobs, coupled with a gross value added to the sector of £75 billion.[51]	In a transition to EVs around 30,000 new jobs could be created by 2030. These would be created in the network, construction and service sector supply chains. This has been started with a policy ban on new fossil-fuelled cars, but a shift to manufacture is needed.
SKILLS	Substantial skills requirement, particularly in high quality skills sector and design. This is driven by sector change, in turn shaped by regulation.	Changes required to achieve circularity in materials and resources are expected to be labour intensive, with cross-sector, digital and design skills requirements also expected.	High skills requirement in a transition to ULEV technology, across all skill levels. Significant opportunities for retraining especially in the supply chain.
INNOVATION	Policy is stimulating innovation in all areas of the supply chain, particularly around circular economies and embodied carbon. The GLA estimates that in 2018 over £100m was invested in the heat networks and technologies stipulated in the document, while Defra estimates that the value of net habitat created in a given year under biodiversity net gain planning requirements exceeds £250m .	Good policy will foster new markets in prevention of waste, encouraging reuse and redesigning packaging. Strong consensus that regulations have driven innovation and change, the key factor to achieve global leadership lies in the UK's competitive regulatory environment. In June 2020, the government announced £73.5 million investment for advanced technology to cut carbon emissions.	Concerns around the impact of Brexit – interviewees largely agreed that maintaining high environmental standards is crucial to remain competitive.
SYSTEMS BENEFITS	Environmental regulation drives system reform, which has major healthcare, quality, affordability, biodiversity and other benefits.	Adaptable regulation encourages partnerships across the supply chain, and builds strength and synergies with benefits across other sectors.	Future mobility solutions require integration across sectors with associated regulations to optimise systemic benefits. Popular interest is tied to social justice, emissions and circular economies.
RESILIENCE	Environmental regulations and resilience are not yet well-aligned, but in theory environmental regulation will be essential to manage climate adaptation.	Policy that effectively assists with environmental protection and encourages resource circularity helps to tackle the fragility inherent in a linear system.	Disruption from COVID has indicated that support is needed to build sector resilience.

Table 4.2
Comparison of key impacts in each sector

Figure 4.2
Characteristics of good environmental regulation



4.1.3 Characteristics of good regulation

The characteristics of good environmental regulation identified in this study align closely with those highlighted in the 2017 report – 'it must be ambitious, clear and consistent, giving players certainty and a clear direction of travel'. These findings were further demonstrated in this study, with all sectors finding a particularly strong emphasis on regulation as a means to signal industry direction and pathways, with the desire for clear direction amplified amid the high uncertainty of recoveries from COVID-19 and Brexit.

The importance of consistency was also highlighted more strongly in this study. Many interviewees flagged a lack of joined-up thinking across sectors and electoral cycles being hugely disruptive to business and a barrier to both integrated, cross-supply chain and circular operations and the necessary lead times for new technological development. Lead times were also mentioned across the sectors in the context of the importance of regulations tightening and developing over time – a particular concern in the buildings sector.

Cross-sectoral interviews described that this 'forward looking' strength of regulations was also paramount for regulations capable of driving a circular economy (Section 4.1.1). One interviewee explained that the important features of regulation for a circular economy are those which 'achieve the structural elements that encourage circularity… show responsibilities… [and provide] basic regulations on allowable emissions and disposal to seal the [resource] cycle.'

As was illustrated in 2017, our findings are clear that **good regulations are not effective alone. Policies on skills, training, taxation, financial investment and strategy are all necessary to support environmental regulations in order to capture the full range of benefits of transitions to more sustainable systems.**

BUILDINGS	WASTE	AUTOMOTIVE
■ Aligns with existing processes and reporting structures, e.g. companywide financial reporting or building processes such as planning and leasing. ■ Minimal disruptive retractions and amendments to existing regulation. ■ Clear enforcement and accountability. ■ Regulatory requirements tightening over time and with clear direction. ■ Responds to the time scales of the industry (i.e. mid-term perspective rather than short-term).	■ Supports long-term investment through continuity, clear definitions and compliance mechanisms ■ Provides consistency to businesses across markets and to avoid confusion. ■ Delivered with clear communication, enforcement and messaging that instils confidence.	■ Aligned with EU regulation ■ Ambitious regulation and bigger economies of scale targeted. Scale and regulatory certainty are important to reduce compliance costs. No OEMs or suppliers will produce vehicles and technology just for the UK, and only target markets where there is scale and growth. ■ Regulation signalled in advance to allow technology to adapt and ensure lead times are available.

Table 4.3
Review of findings in relation to current and emerging policies

4.1.4 Current and emerging regulation

All three areas of study looked to review the impact of current legislation, and gauge opinion on a suite of emerging policy.

The waste and resources sector's policy focus on the circular economy was praised by interviewees (Section 4.1.1). However, it was felt that the full complexity of the circular economy, the need for high value recycling and reuse of materials and the need to integrate with other sectors was not captured by existing regulations.

The emerging legislation in the automotive sector has been seen as having provided similar certainty and ambition but more stringent regulations have come at higher compliance costs for the industry, with interviewees clear that it will be crucial to determine whether these are transferred to the customer or absorbed by government. While emerging policy is ambitious, concerns have been raised around the technical accuracy of transposing EU regulations to the UK, a lack of cross-sector thinking and the need for clear interventions for charging infrastructure provision and government support for re-manufacturing.

The existing policy considered in the buildings sector, the London Plan, was widely seen as a driver of innovation, particularly in emerging areas around the circular economy and embodied carbon. Conversely, the potential deregulation and lack of sustainability content in proposed English planning reform documents was a major concern. These reforms were largely viewed as failing to meet any of the characteristics of good legislation (outlined in Table 4 3) – being both without clear direction, enforcement and accountability detail or consistency with other departments and areas, and pertaining to disruptive retractions and amendments without full explanation and justification.

The study therefore highlights a mixture of successes and popularity in emerging environmental regulations across sectors, though largely existing regulation is seen to be a forceful and important driver of business sustainable innovations and other benefits aligned with investor, employee and public opinions. However, findings across all sectors highlighted the need for regulations to be increasingly integrated and cross-sectoral, driving circular economic systems.

		BUILDINGS	WASTE	AUTOMOTIVE
EXISTING LEGISLATION	Benefits	Has driven innovation and investment, key to sector reform and associated benefits.	Good ambition and inclusive consideration of circular economy goals.	Provide certainty to vehicle manufacturers and ensure that UK regulation is a least as ambitious as the EU.
	Weaknesses	Siloed, circular thinking focussed on waste sector.	Lack of cross-sectoral focus, more indication of implementation strategy and timescale needed, too much onus on end-of-pipe.	Concerns around comparing the UK fleet to the EU average vehicle mass would lead to a weakening of emissions targets, as UK vehicles are, on average, heavier than the EU average.
EMERGING LEGISLATION	Benefits	Potential to align expedited and deregulated components with circular and sustainable principles.	Good level of ambition, the transition it heralds towards circular thinking is essential.	Good level of ambition to meet the net zero target by 2050.
	Weaknesses	Loss of local authority powers, potential reduction in environmental ambition and enforcement, risks capping business ambition and slowing innovation.	Current and emerging policy fails to appreciate the complexity of economic circularity, limiting systems benefits. Enforcement must be clear and consistent.	Cross-sectoral regulations, clear interventions for infrastructure provision.

Table 4.4
Review of findings in relation to current and emerging policies

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