



Leading on Clean Growth

The Government Response to the Committee on Climate Change's 2019 Progress Report to Parliament – Reducing UK emissions

Presented to Parliament pursuant to section 37 of the Climate Change Act 2008

October 2019



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Ministerial Foreword

Andrea Leadsom

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Secretary of State for Business,
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2019 has been a pivotal year in the fight against climate change. As the scientific evidence of the dangers of global warming continues to mount, and as people of all ages call for urgent action, the message to governments around the world is clear: act, and act now, to protect the future of our planet.

The UK has long been a leader in clean growth – cutting emissions while growing the economy. We were the first country to set a long-term emission reduction target in law, and since 1990 we have reduced emissions by over 40%¹ while growing the economy by more than two thirds². We have a thriving low carbon economy, with turnover in the sector growing more quickly than GDP in 2017, supporting almost 400,000 jobs across the country³.

But our success to date is not a reason to delay action – it provides the argument for going further and faster. By taking action to cut emissions, we can protect our planet while putting UK businesses at the forefront of the zero carbon revolution.

The Committee on Climate Change's (CCC) annual Progress Report, published in July, recognised the progress that has been made. It also set out some tough messages about the need for further action across the economy – taking our success in the power sector, where we achieved record levels of low carbon generation last year while reducing coal-fired generation to

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its lowest ever share, and replicating this across all sectors of the economy.

This government has heard that message – from the Committee, from businesses, and from people across the whole country.

In June this year, the UK became the first major economy in the world to set a target in law for “net zero” emissions, ending the UK’s contribution to global warming in three decades. That target is an immense challenge for the whole of society – but not only is net zero achievable, it can and will be the growth story of the 21st century.

Targets are important – but on their own they are not enough. They must be backed by clear and decisive action. This report sets out the action that is being taken across all sectors of the economy, delivering through the strong frameworks we have established in the Clean Growth Strategy and the Clean Growth Grand Challenge under our modern Industrial Strategy.

And today we are setting out further actions that we will take to deliver net zero and meet our carbon budgets.

We are consulting on ambitious proposals for new minimum energy efficiency standards for rented business buildings, which will potentially save businesses around £1 billion per year in energy costs by 2030.

A new, holistic Transport Decarbonisation Plan is under development to step up the pace of progress towards a cleaner, more sustainable and innovative transport network.

And in order to strengthen the cross-government effort to deliver clean growth we will, after we leave the EU, establish new governance arrangements to drive forward our efforts – potentially including a new cabinet sub-committee on climate change.

This builds on what we have delivered over the last year. Since legislating for net zero emissions in the summer, we have already announced around £2 billion to support decarbonisation in a range of sectors – including investment in hydrogen and low carbon technology in industry, electric vehicles and charging infrastructure, and projects to accelerate rollout of carbon capture and storage technology.

The latest Contracts for Difference auction saw contracts awarded to renewable energy projects that will create enough generating capacity to power around 7 million homes – with the costs of new offshore wind projects falling by a remarkable two thirds between the 2015 and 2019 auctions⁴. This demonstrates the scope for advances in technology to deliver unprecedented cost reduction.

And we will set out further detail on how the UK will make progress towards our net zero target in the National Infrastructure Strategy this autumn.

In addition to our progress at home, the UK remains at the forefront of international action on climate change. In September, we were formally nominated by our international partners to host the vital COP26 climate negotiations in 2020. We intend to use this role to catalyse ambitious global action to cut emissions further, and harness growing momentum to take us closer to delivering the goals of the Paris Agreement. At the recent UN Climate Action Summit, the Prime Minister announced that the UK will double its international climate finance to £11.6 billion in the period 2021 to 2025.⁵ In assisting developing countries, we will draw on the breadth and depth of the UK's expertise to support the transformational and systemic change needed to deliver a net zero world.

We remain grateful to the CCC for their scrutiny, analysis and expert advice, which will be more vital than ever as we accelerate the low carbon transition and set the UK on a firm path to net zero. The challenges ahead are immense – but the rewards of action will be greater still. This government has listened to the science and the clear message from across society – and we are redoubling our efforts to drive down emissions while seizing the economic opportunities at hand, as we lead the world towards a cleaner, net zero future.

Executive Summary

In June 2019, the UK government underlined its commitment to building on the UK's proud tradition of climate leadership by amending the Climate Change Act (2008) to set a new target of achieving net zero greenhouse gas emissions by 2050. This world-leading target, which makes the UK the first major economy to legislate for net zero, will bring an end to our contribution to climate change in three decades. However, setting this target is only the start: to achieve net zero emissions it is clear that we will need ambitious action in all sectors of the economy, supported by technological innovation as well as robust policy frameworks.

It is now two years since the Clean Growth Strategy was published, setting out ambitious policies and proposals for tackling climate change and driving clean growth right across the country.

In that time, we have continued to bring forward plans across all sectors, including: an action plan for deploying carbon capture, usage and storage (CCUS) technology,⁶ a £315 million Industrial Energy Transformation Fund⁷, the Offshore Wind Sector Deal,⁸ a 'Future Homes Standard'⁹ to ensure that all new homes are energy efficient and fit for the future, the Road to Zero strategy¹⁰ to support deployment of electric vehicles, and the 25 Year Environment Plan¹¹ setting out our commitment to leave our natural environment in a better state than we inherited it.

Through our modern Industrial Strategy, we are supporting clean growth and ensuring that the UK reaps the economic benefits of the low carbon transition. The global shift towards a low carbon economy is one of the greatest industrial opportunities of our time, and there is a huge prize at stake for countries and businesses that lead the way in developing the technologies,

services and infrastructure needed to drive cleaner, sustainable growth. That is why we are investing over £3 billion to support low carbon innovation in the UK¹², and have established two 'missions' through the Clean Growth Grand Challenge: to at least halve the energy use of new buildings by 2030; and to establish the world's first net zero carbon industrial cluster by 2040 and at least one low carbon cluster by 2030¹³.

The action we are taking is making a difference – cutting emissions while growing the low carbon economy. The latest Low Carbon Economy Index by PwC, published in September 2019, shows that the UK has decarbonised its economy faster than any G20 country since the start of the 21st century¹⁴. Our provisional data for 2018 indicates that emissions are down by 44% since 1990, and down 3% since 2017, having fallen six years in a row¹⁵. This year saw confirmation that the UK has achieved its second statutory carbon budget (2013-17)¹⁶ and projections show that we are on track to meet the third (2018-22)¹⁷. Meanwhile, turnover in the low carbon sector was up 7% in 2017¹⁸, growing more quickly than UK GDP¹⁹.

However, we know that this is not enough. Since publishing the Clean Growth Strategy, we have received a stark message from the Intergovernmental Panel on Climate Change (IPCC) on the global challenge of meeting the Paris Agreement goals, and the catastrophic impacts of significant global warming. There has also been an inspiring step change in public concern over the effects of climate change, as evidenced by the wave of activism we have seen in recent months – not just in the UK, but across the globe.

In its 2019 Annual Progress Report to Parliament, the Committee on Climate Change (CCC) made

clear that transformational change is needed to meet the fourth and fifth carbon budgets (2023-32) and set us on a path to net zero, building on the great strides we have made in decarbonising the power sector. The government²⁰ welcomes the CCC's advice. We have listened to its call to action, and now we are strengthening our work to rise to the challenge we have set ourselves.

Since legislating for net zero, the government has committed around £2 billion to support decarbonisation in sectors across the economy from industry to transport. In July, we published our landmark Green Finance Strategy, setting out our approach to greening financial systems and mobilising finance for clean and resilient growth. And at the UN Climate Action Summit, the Prime Minister announced that British scientists and innovators will be able to access up to £1 billion of aid funding to work in partnership with developing countries to transform their energy sectors, reduce their emissions and meet global climate change targets²¹.

Alongside this report, we are going even further as we set out a range of ambitious plans.

We are consulting on a proposed trajectory of EPC Band B by 2030 for minimum energy efficiency standards in non-domestic rented buildings, which currently account for around a third of energy consumption of all non-domestic buildings. This could save businesses £1 billion per year in energy costs by 2030. We are also committing to consult in 2020 on introducing mandatory in-use energy performance ratings for non-domestic buildings in the private sector, which will be key to helping businesses to understand and improve the actual energy performance of their buildings.

We are developing our Transport Decarbonisation Plan to put transport on a pathway to net zero. This will bring forward bold new measures to help to reduce emissions, including through the modal supply chain and stronger support for place-based leadership.

After we leave the EU, we will also establish new governance arrangements to drive forward

our efforts across the whole of government to deliver net zero, potentially including a new cabinet sub-committee on climate change.

Beyond our borders, we continue to play a leading role in the international fight against climate change. The UK has long been at the heart of efforts to encourage faster emissions reduction and clean growth in other countries, and we have recently been nominated to host the crucial COP26 climate negotiations next year – testament to our global credentials as an ambitious and effective leader on climate change.

Business as usual will not deliver our stretching targets and fulfil the UK's obligations under the Paris Agreement. Our achievements in the power sector show what is possible with strong government policy, innovation and the ingenuity of British business: a rapid decline in the use of coal in electricity generation from 39% in 2012 to just 5% in 2018²², record levels of renewable generation and, this year, the longest coal-free streak since the Industrial Revolution.

The challenge is to raise ambition and accelerate action in order to replicate this success elsewhere, especially as we move to tackle sectors that are harder to decarbonise. This is a challenge we must embrace. In doing so, we can drive economic prosperity across the whole country, create high-value jobs and improve our quality of life – all while protecting the future of our planet.

Structure of the Report

This report sets out the government's response to the Committee on Climate Change's 2019 annual Progress Report to Parliament²³, assessing progress in reducing UK emissions over the past year and the impact of government policies.

It is published in conjunction with the government's response to the Committee's biennial assessment of progress in preparing for the impacts of climate change in England²⁴, which

provides a first evaluation of the government's second National Adaptation Programme.

The structure of the report is as follows:

- The Introduction sets out the UK's progress in reducing emissions, our policy approach through the Clean Growth Strategy and the Clean Growth Grand Challenge, our key achievements over the last 12 months, and the implications of our new net zero target for government policy. It also addresses the CCC's recommended 'strategic priorities' for government: embed net zero policy across the whole of government; make policy business-friendly; put people at the heart of policy design; and support international increases in ambition.
- Chapters 1-5 assess our progress in reducing emissions and respond to the CCC's specific recommendations across the key sectors in the Clean Growth Strategy: Power, Buildings (domestic and non-domestic), Industry (including CCUS and hydrogen), Transport, and Natural Resources (including agriculture, forestry, land use, waste and F-gases).
- Chapter 6 provides an update on action to reduce emissions in Scotland, Wales and Northern Ireland – recognising the importance of action in all parts of the UK to meeting our climate targets.
- Annex A assesses our performance against the economy-wide and sector-level metrics set in the Clean Growth Strategy to benchmark progress.
- Annex B provides an update on progress against the milestones for 2018/19 we committed to in the Clean Growth Strategy and the government's response to the CCC's 2018 Progress Report in October 2018.
- Annex C sets out an updated list of ambitious actions and milestones for the coming year across all sectors of the economy.

Introduction

Strengthening the UK's climate leadership

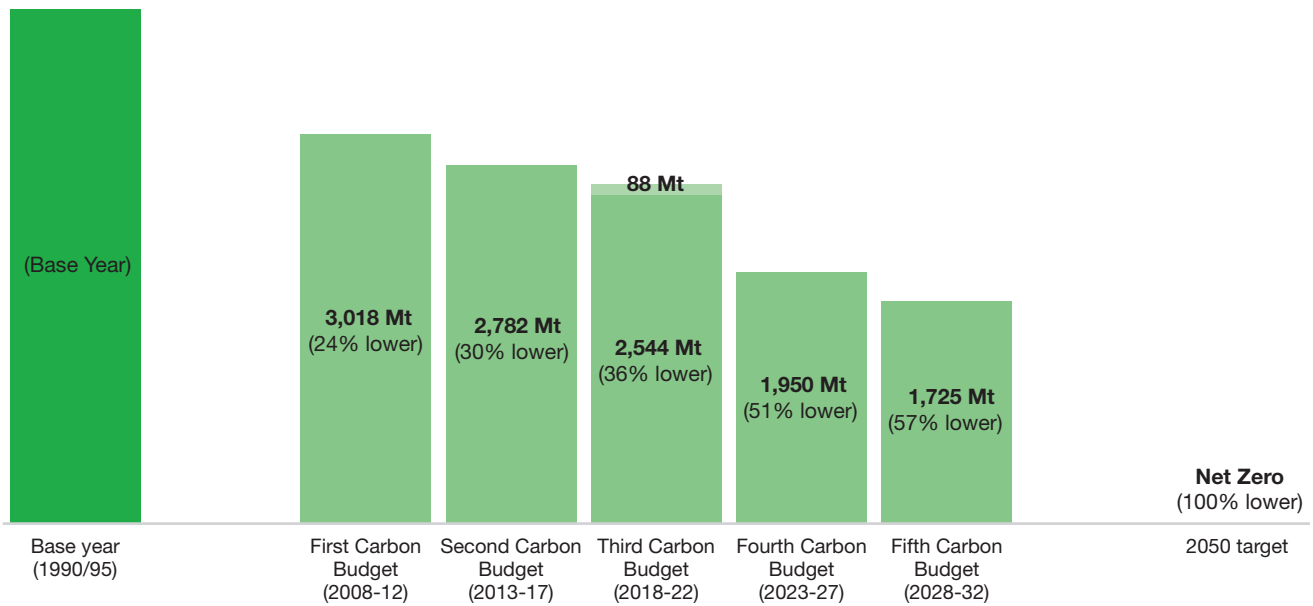
Climate change is undoubtedly one of the most pressing global challenges of our time. The effects of rising global temperatures are already being experienced in many parts of the world – including rising sea levels and increases in certain types of weather extremes, along with a loss of biodiversity linked to human activity.

In October 2018, a special report by the Intergovernmental Panel on Climate Change (IPCC) warned that the impacts of climate change will be much more severe if global temperatures rise to 2°C above pre-industrial levels, compared to the effects of a 1.5°C rise. It is clear that unprecedented global action is needed to limit warming to 1.5°C in order to reduce the risk of dangerous climate change²⁵.

The UK has long been at the vanguard of action to tackle this threat – from Margaret Thatcher's speech to the UN in 1989, to the Climate Change Act in 2008, to the key role we played in securing the Paris Agreement in 2015. The UK's historic new target to reach net zero greenhouse gas emissions by 2050 – making us the first major economy to enshrine such a target in law – further cements our position as a world-leader in responding to this ecological crisis. Achieving net zero will bring an end to the UK's contribution to global warming.

The Climate Change Act (2008) made the UK the first country to introduce a legally binding, long-term emissions reduction target. It also introduced our framework of carbon budgets to provide a clear trajectory towards that target, capping emissions in successive five-year blocks.

Figure 1: UK carbon budgets and 2050 target

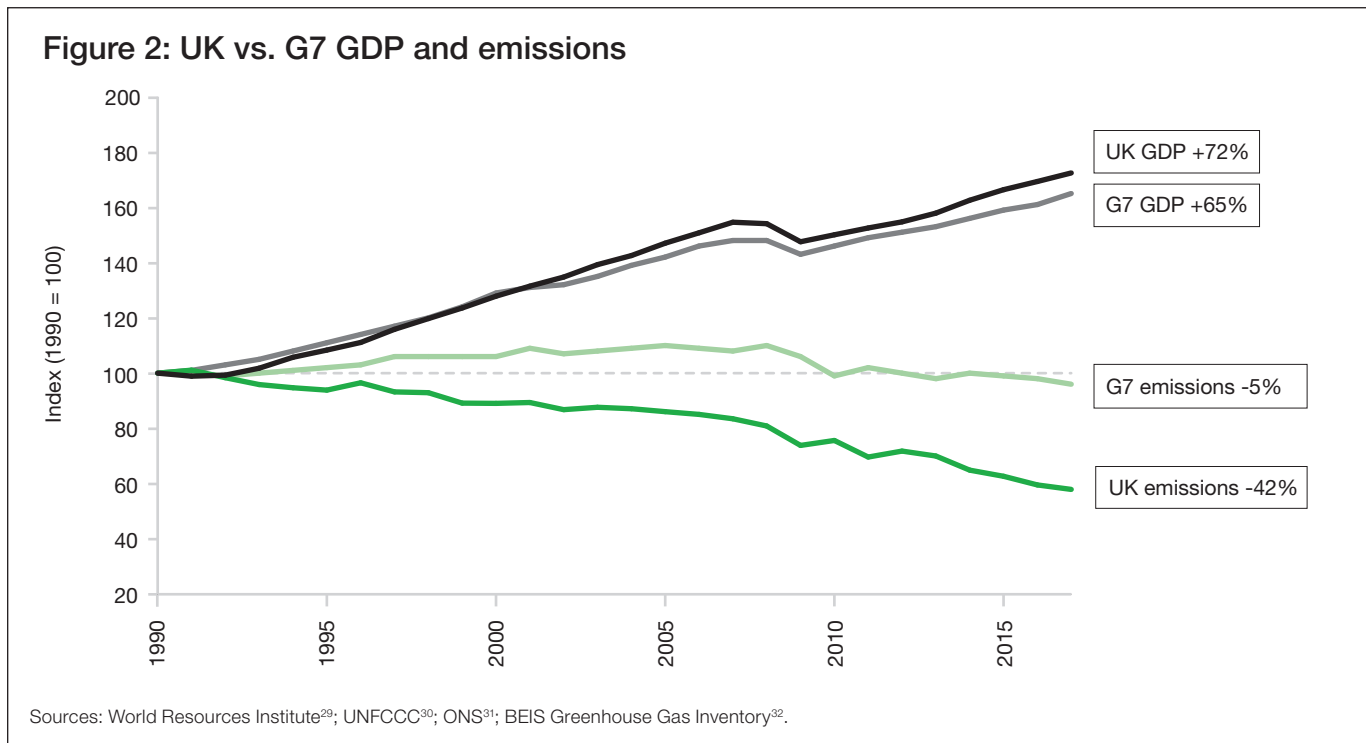


Base year emissions are revised each year, so the percentage reductions against carbon budgets are subject to change. The UK has carried forward 88Mt of overperformance from the second carbon budget, which changes the third carbon budget level to 2,632Mt (equivalent to a 34% reduction on base year emissions). However, the UK has no intention of using this overperformance to meet the third carbon budget - it will act solely as a contingency against changes in the base year emissions and will be released once it is clear that it will not be needed.

Source: BEIS; UK Legislation.

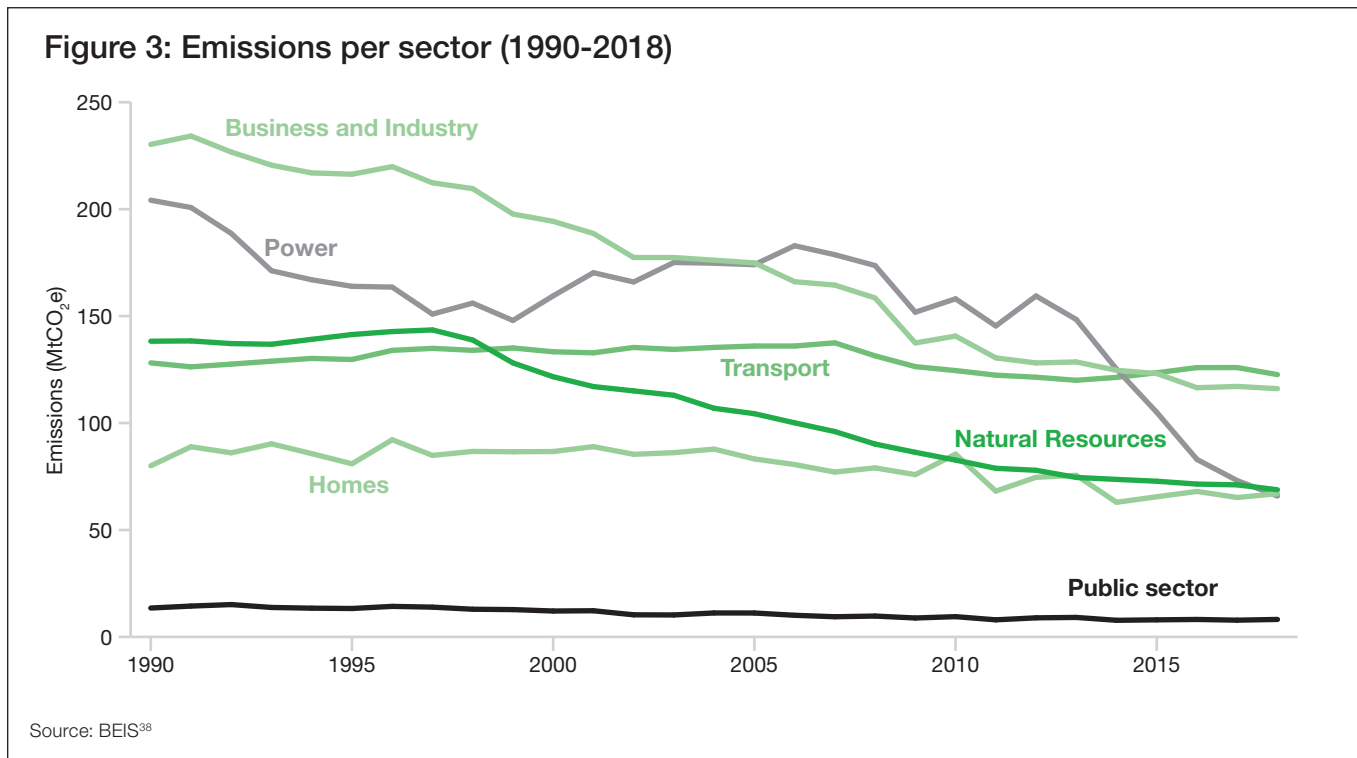
Through this strong legal framework and ambitious policy action, we have shown that cutting emissions and growing the economy go hand-in-hand – reducing our emissions by 42% between 1990 and 2017²⁶ while growing the economy by more than two-thirds²⁷. This

is the strongest performance of any country in the G7 on a per person basis²⁸, driven by the rapid progress we have made in cleaning up the power sector and phasing out the traditional use of coal.



The UK over-achieved against its first carbon budget (2008-12) by 1.2%³³, and new statistics published this year confirmed that we exceeded the required emissions reduction in the second carbon budget (2013-17) by nearly 14%³⁴. According to the latest projections, we

are on track to meet the third carbon budget (2018-22)³⁵ while achieving economic growth of over 7% over that period³⁶. We have already seen encouraging progress, with provisional figures showing that emissions fell by a further 3% in 2018 compared to 2017³⁷.



The great strides we have made in decarbonising the economy are demonstrated by the improvement in our emissions intensity ratio (EIR), which measures the amount of greenhouse gases (tonnes of carbon dioxide equivalent) produced for each unit of Gross Domestic Product (GDP) created. In 1990, our EIR was 712 tonnes per £m of GDP. This has fallen by more than two thirds to 230 tonnes per £m of GDP in 2018, which is 3.8% lower than in 2017 (see Annex A). This has been supported by strong growth in the UK’s low carbon economy: latest official statistics show that turnover in the low carbon sector was up 7% in 2017³⁹, growing more quickly than UK GDP⁴⁰.

Performance against our domestic climate targets is based on greenhouse gas emissions from sources within the UK, consistent with the requirements of the Climate Change Act and the agreed international approach for estimating and reporting emissions under the United Nations Framework Convention on Climate Change (UNFCCC). UK reporting therefore does not include emissions from the manufacture of imported goods, which are instead reported in the country of manufacture. Nevertheless, we

are committed to reducing our emissions in a way that avoids any ‘offshoring’ of emissions to other countries. The Department for Environment, Food and Rural Affairs (Defra) has published experimental statistics on the UK’s consumption emissions since 1997, and these suggest that our emissions are also falling on a consumption basis – by 21% between 2007 and 2016, and by 6% between 2015 and 2016⁴¹.

Our domestic achievements are reflected in the UK’s climate leadership on the world stage. Building on the momentum of the Paris Agreement, we have continued to encourage other countries to take action to reduce their emissions – for example, by growing the Powering Past Coal Alliance, supporting the agreement of the Paris Rulebook at COP24 in Katowice and, most recently, announcing that we that we will double our International Climate Finance from £5.8 billion to £11.6 billion from 2021 to 2025 to drive clean and resilient growth in developing countries⁴². The UK has also been nominated to host COP26 in 2020, in partnership with Italy, and we are determined to use this conference to promote tangible action

to deliver the transformational change required by the Paris Agreement.

While our achievements to date are impressive, there is no doubt that the task ahead is momentous. Meeting the fourth and fifth carbon budgets and setting the UK on a clear pathway towards our net zero 2050 target is a challenge that will require an unprecedented step up in policy action across the whole economy.

Delivering the Clean Growth Strategy

The government welcomes the Committee on Climate Change's latest Progress Report to Parliament, which assesses our progress towards the UK's emission reduction targets. We are pleased that the CCC has recognised our continued record of delivering clean growth, stating that this provides a "powerful international example" that can inspire other countries.

As the CCC notes in its report, the government's policies in the power sector have helped to drive renewable energy generation while bringing down costs and cutting our use of coal. More than half of our electricity was generated from low-carbon sources in 2018 with a record 33% coming from renewables⁴³, and this year Great Britain achieved a fortnight without coal-powered generation for the first time since the Industrial Revolution. We are committed to going further as we deliver on our pledge to phase out generation from unabated coal by 2025. This will include government working in partnership with industry through the Offshore Wind Sector Deal, published in March 2019, ensuring that we build on our global leadership in this technology⁴⁴.

However, we agree with the Committee that the pace of these achievements has not been matched in all sectors of the economy. While

good progress is being made in a number of areas, our focus must be on ensuring that our success in the power sector is replicated across the board.

The Clean Growth Strategy, published in October 2017, provided an ambitious blueprint for accelerating clean growth across the UK⁴⁵. The Strategy sets out 50 key policies and proposals to drive progress across all areas of our economy and society – improving our homes, improving business and industry efficiency, accelerating the shift to low-carbon transport, enhancing the benefits and value of our natural resources, and delivering a clean, smart and flexible power system fit for the future.

The Strategy shows how we intend to cut emissions and meet our climate change objectives at low cost to UK taxpayers, consumers and businesses, while maximising the wider economic and social benefits of the low-carbon transition such as cleaner air, lower energy bills, industrial opportunity, high value green jobs, an enhanced natural environment, and improved quality of life.

There are close synergies between the Clean Growth Strategy and our modern Industrial Strategy. The Industrial Strategy aims to harness the economic opportunities of the clean growth transition – building on existing strengths and growing new pillars for the economy of the future, while addressing specific decarbonisation priorities through the Clean Growth Grand Challenge missions.

We have made strong progress in delivering on the Clean Growth Strategy and the Clean Growth Grand Challenge over the last twelve months – our key achievements are set out on page 12.

10 Key Achievements on Clean Growth in 2018-19

Over the last 12 months, we have:

1. Become the **first major economy to legislate for a net zero greenhouse gas emissions target**, replacing our previous target to reduce emissions by at least 80% from 1990 levels by 2050.
2. Achieved a **record 53% share of electricity generation from low-carbon sources including renewables**⁴⁶, supported by policies including the Contracts for Difference scheme, while continuing to transition away from the use of coal.
3. Launched the **Offshore Wind Sector Deal**, setting out a strategic approach to deliver increased offshore wind capacity, with potentially 30GW installed by 2030, while boosting the UK economy and continuing to reduce costs⁴⁷.
4. Launched the **second mission under the Clean Growth Grand Challenge: the Industrial Clusters Mission**, which aims to establish in the UK the world's first net zero carbon industrial cluster by 2040 and at least one low carbon cluster by 2030⁴⁸. This follows the Buildings Mission, announced in May 2018, which aims to at least halve the energy use of new buildings by 2030⁴⁹.
5. Announced an **Industrial Energy Transformation Fund** with £315 million of government funding⁵⁰ – an important part of our approach to helping businesses with high energy use to decarbonise and reduce their energy bills.
6. Published our **Carbon Capture, Usage and Storage (CCUS) Action Plan** and made progress on its implementation⁵¹. This includes investing in the development of the technology and undertaking a review of delivery and investment frameworks to accelerate deployment, in line with our ambition of having the option to deploy CCUS at scale during the 2030s.
7. Committed to a **Future Homes Standard** which will see new build homes future-proofed with low carbon heating and the highest standards of energy efficiency by 2025⁵².
8. Published plans through the **Resources and Waste Strategy**⁵³ and **Clean Air Strategy**⁵⁴ to leave our natural environment in a better state than we found it by minimising waste, moving towards a circular economy in England and improving air quality.
9. Continued to support the **record uptake of electric vehicles** through consumer incentives while making strong progress in **supporting the UK's growing electric vehicle charging infrastructure**, including the launch of the £400 million Charging Infrastructure Investment Fund⁵⁵.
10. Published our **Green Finance Strategy**⁵⁶, setting out a comprehensive approach to greening the financial sector and catalysing the investment in green infrastructure, technologies and services that will be needed to deliver our net zero target.

While we should take pride in these achievements, this is tempered with recognition of the scale of the task ahead of us. We agree with the Committee's emphasis on the need for further, faster action, both to meet our existing carbon budgets and to put us on track to deliver net zero emissions by 2050.

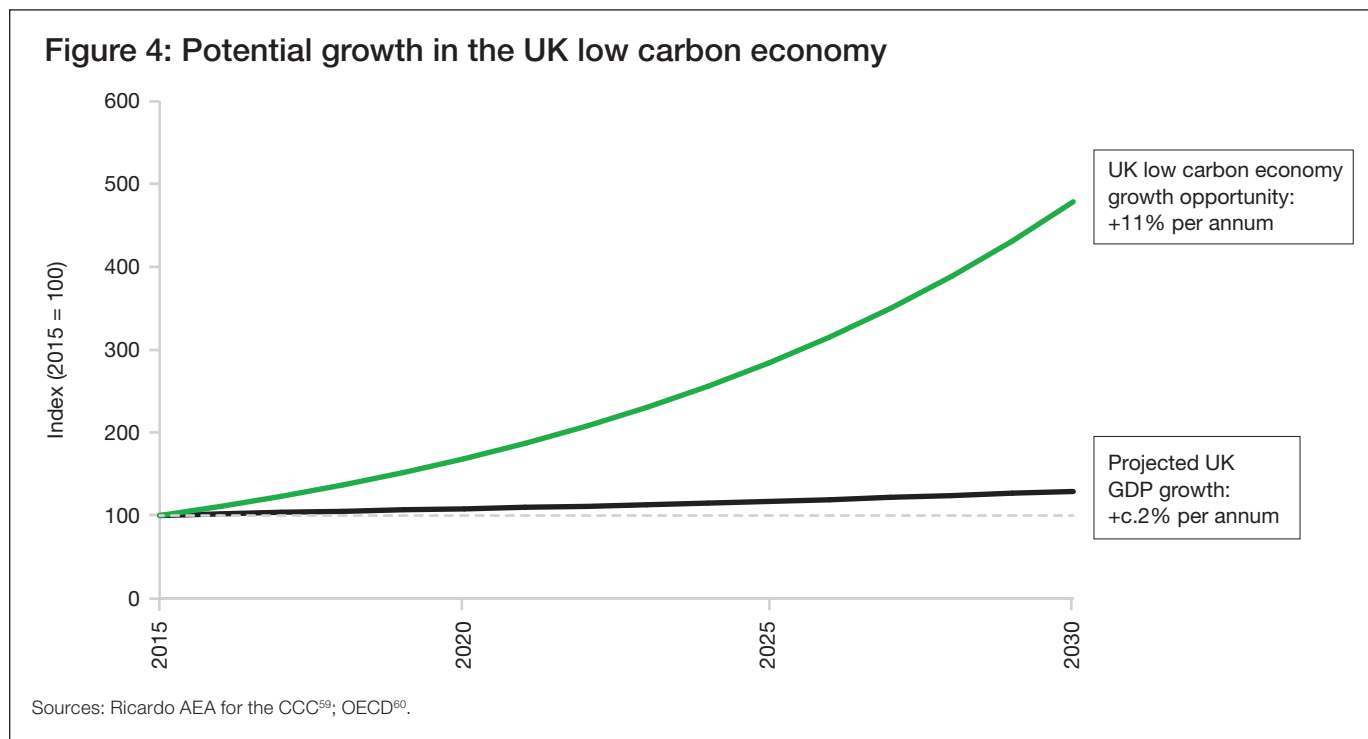
As the Committee has noted, current projections show a shortfall to meeting the fourth and fifth carbon budgets (2023-32). However, we share its view that the foundations in the Clean Growth Strategy provide the right basis for future action, and that these foundations must be further developed into firm policy, ambitious implementation and a co-ordinated approach across all sectors. This will be a priority for the

government moving forward. We will also explore opportunities to go further on key aspects of the Strategy, working in partnership with stakeholders including the business community, scientists, innovators, academia and civil society.

Capturing the opportunities of moving to a net zero economy

The transition to a net zero economy presents a major opportunity for the UK to be a

world-leading hub for jobs, businesses and exports in low carbon sectors. Already there are almost 400,000 jobs in low carbon businesses and their supply chains across the country and low carbon exports are worth billions of pounds each year⁵⁷. According to one estimate, the UK low-carbon economy could grow more than four times faster than the rest of the economy between 2015 and 2030 – delivering up to £170 billion of exports and supporting up to 2 million jobs⁵⁸.

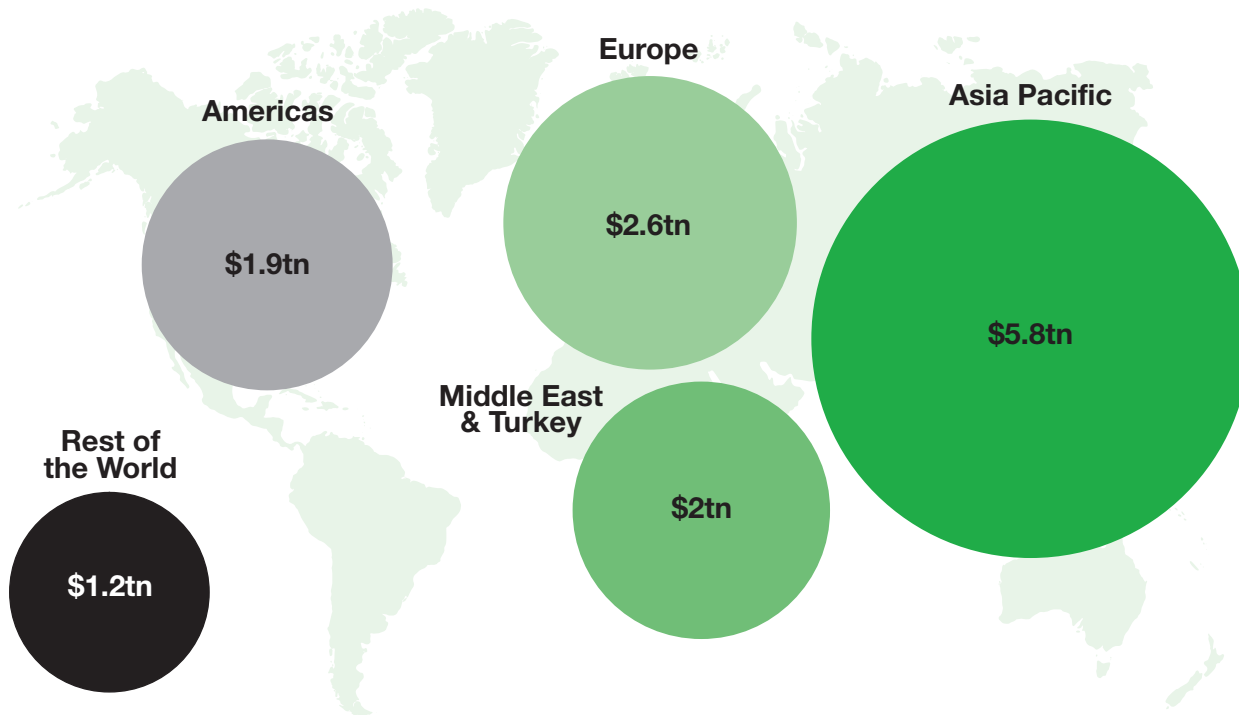


To realise these opportunities, the government has placed clean growth at the heart of our Industrial Strategy by making it one of four ‘Grand Challenges’ – global trends that the UK is determined to be at the forefront of. By aligning our Clean Growth and Industrial Strategies, we are ensuring that our policies across government on skills, business support, innovation, infrastructure and regional growth help to deliver emissions reductions and promote our strengths in low carbon technologies, systems and services.

We are focusing on areas where the UK has established or emerging strengths, in order

to capitalise on significant future markets and export opportunities. These include technologies and approaches central to the shift to a net zero economy such as electric vehicles, smart systems, green finance and offshore wind. For example, the UK is a global leader in offshore wind with the largest installed capacity in the world, and our Offshore Wind Sector Deal sets out how we will work with industry to deliver increased capacity while boosting the economy, creating new export opportunities and thousands of new jobs.

Figure 5: Global markets in clean energy



Investment in power generating capacity by region, 2019-50, (\$ trillion, 2018 real). Image source: BloombergNEF

The world is shifting to cleaner economic growth, through the use of low carbon technologies and efficient use of resources, and there will be significant opportunities for UK businesses. This global shift will transform all sectors of the global economy, including power, transport, construction, energy-intensive industries and agriculture. Some commentators expect to see \$13.3 trillion invested in new power generation assets between now and 2050, of which 83% will be into zero-carbon technologies.⁵⁶

As we leave the EU, the UK will have the chance to develop a forward-looking, independent and far-reaching trade policy to help overcome market access and investment barriers in emerging low carbon markets.

Innovation is crucial to both help UK businesses capture some of these opportunities, as well as to solve some of the technological challenges that underpin climate change. We are investing over £3 billion in low-carbon innovation through to 2021⁶² – going beyond the £2.5 billion we committed to in the Clean Growth Strategy – and

this investment will help to grow our low carbon economy. We are focusing our innovation spend where this can bring down the systems costs of delivering our climate targets and where the UK has expertise, building on our strengths in sectors such as advanced manufacturing, automotive, aerospace and nuclear.

Low carbon innovation

In the last year we have announced a range of new low carbon innovation programmes through the Industrial Strategy Challenge Fund⁶³:

- **Driving the electric revolution** – £80 million of funding to help the UK seize the economic opportunities from the global transition to clean technologies and electrification.
- **Future flight** – £125 million to show how innovative flight solutions, such as electric planes with vertical take-off capability and goods and service drones, will radically transform how we fly and reduce flight's environmental impact.
- **Industrial decarbonisation** – Up to £170 million to develop and deploy low carbon technologies in one or more heavily industrialised areas, aiming to create at least one low carbon cluster by 2030.
- **Manufacturing made smarter** – Up to £130 million to help make the UK a global leader in industrial digitalisation, delivering a 30% increase in manufacturing productivity by 2030.
- **Smart sustainable plastic packaging** – £60 million to develop a new generation of advanced and sustainable plastic packaging to reduce single-use plastics, increase recyclability and the amount of plastic packaging that is recycled, and ultimately reduce the amount of plastic waste entering the environment.
- **Small Modular Reactors** – £18 million for the creation of innovative mini nuclear power stations which are smaller and less expensive to build than traditional nuclear plants.

We are investing in the UK's most important asset – our workforce – to ensure that people have the right skills to deliver the low-carbon transition and thrive in the high-value jobs this will create. STEM, digital and technical skills will be essential, and the government has announced substantial spending commitments to develop these skills in schools. We have also introduced T Levels as the technical equivalent of A Levels – including T Levels for Construction, which will help to develop the skills needed for sustainable construction so that our buildings are energy efficient and fit for the future.

Industry has pledged to provide 1,000 work placements for T Level students through the Construction Sector Deal⁶⁴. In addition, the Offshore Wind Sector Deal commits to supporting the development of a sector-wide

curriculum to deliver a skilled and diverse workforce across the country, whilst challenging the sector to more than double the proportion of women working in the industry to at least 33% by 2030⁶⁵.

As our economy evolves, it is vital that this transition is managed in a way that is fair and just. We are committed to supporting workers and communities who may face disruption as we move away from high-carbon industries, by providing them with opportunities to retrain and re-skill so that the benefits of clean growth are experienced by people across the UK. This was underlined when the UK signed up to the Silesia Declaration in December 2018⁶⁶, promoting efforts to ensure that no workers or communities are left behind in this transition.

Achieving net zero emissions by 2050

On 27 June, the UK became the first major economy to legislate for net zero greenhouse gas emissions, by amending the 2050 target in the Climate Change Act from an 80% reduction compared to 1990 levels to a net zero emissions target. We are indebted to the CCC for their comprehensive and ground-breaking advice⁶⁷ on setting this target, which was requested in light of the IPCC's seminal report on the impacts of global warming of 1.5°C. The advice was clear that a target of net zero by 2050 is feasible with known technologies, achievable through strong policy action, and would meet our obligations under the Paris Agreement. The government will aim to achieve this target through ambitious domestic action.

Introducing a net zero target is a landmark moment for the UK. It means that we will continue to lead the international effort to stop global warming with credibility and authority. However, setting this target also serves as a rallying cry for other countries to similarly increase their ambition.

We recognise that while our previous 80% target would have been highly challenging to meet, the challenge of net zero is even more profound and must be backed up by strong policy. Achieving net zero emissions will require a fundamental and sustained transformation of our whole economy – including our homes, transport, land, businesses and industry, and how we generate and use electricity.

This will include a step change in progress in a range of areas that will be critical to our decarbonisation objectives: for instance, to enable CCUS to be deployed at scale; deployment of low carbon heating in buildings; fuel switching measures in industry; accelerated uptake of ultra low emission vehicles; adoption of low carbon technologies and methods in agriculture; and ambitious rates of tree planting. It is also likely that we will need to start to deploy greenhouse gas removal technologies such as

direct air carbon capture and storage (DACCS) and bioenergy with carbon capture and storage (BECCS) to offset residual emissions in sectors that cannot be decarbonised fully.

It is clear that unprecedented levels of investment will be needed in low carbon infrastructure, services and technological innovation, particularly in less mature technologies that have not yet been demonstrated at scale in the UK, such as low carbon hydrogen production, DACCS and BECCS. That is why, along with our continued support for green innovation, we published our landmark Green Finance Strategy in July. This set out a strategic framework for delivering this investment and accelerating green finance, with the overarching objective of aligning private sector financial flows with clean, environmentally sustainable and resilient growth, while strengthening the competitiveness of the UK financial sector.

Nevertheless, the CCC's analysis suggests that the net zero transition can be delivered within the same cost envelope as was estimated for our 80% target when it was set in 2008 – approximately 1% to 2% of GDP in 2050. It also has the potential to bring huge economic benefits as set out above, allowing us to build on existing strengths, develop nascent low carbon industries, and capitalise on the export opportunities they present.

We welcome the CCC's agreement that the Clean Growth Strategy and the Industrial Strategy provide the right frameworks for the action we will need to take. We are committed to building on these strong foundations to deliver the deep emissions reduction needed across the economy. In the year ahead, we will continue to bring forward new policy and set out our further plans, including through our heat policy roadmap next summer.

Delivering a net zero economy must be a joint endeavour across the UK, encompassing all parts of society including the devolved administrations, local authorities, businesses, academia, charities and the British people. The UK government is committed to working with

these and other stakeholders to ensure that we capitalise on the unique contribution that each part of society can make.

There is no doubt that achieving net zero will require an unprecedented and sustained effort over the next three decades. However, our impressive record in cutting emissions while

strengthening the economy shows that such a feat is possible. Now is the time to look to the future with hope and rise to the challenge we have set ourselves – to lead the world in tackling the greatest environmental threat of our time and leave the environment in a better state for future generations.

The CCC's four 'strategic priorities'

We welcome the four 'strategic priorities' identified by the CCC to support the delivery of net zero. These align closely with our current approach, and the government is committed to further action in each of the areas identified in order to build on the progress we have made to date.

1. Embed net zero policy across all levels and departments of government, with strong leadership and coordination at the centre.

The whole of government must play its part in delivering our new, ambitious net zero target.

The proposals in the Clean Growth Strategy rely on concerted action across government departments to ensure that our clean growth objectives are embedded throughout all of our policies on homes, business and industry, transport, agriculture, forestry, land use, waste and power.

The importance of a whole government approach is reinforced by the Industrial Strategy, which provides a framework for ensuring that clean growth is supported by our broader economic policy across skills, innovation, infrastructure, business support, exports and regional growth.

We have put processes in place to oversee this action and ensure the successful delivery of the Clean Growth Strategy. For example, the Inter-Ministerial Group on Environment and Clean Growth was established in early 2018, bringing together ministers and officials from across government to discuss matters related to clean growth, decarbonisation and wider environmental policy. A new inter-departmental body has also been created to convene senior officials from over a dozen departments, every month, to discuss cross-cutting issues relating to the government's approach to climate change.

Our aspirations have benefited from leadership and engagement from the heart of government. The former Prime Minister announced that the UK would become the first major economy to legislate for a net zero target; and in setting out his priorities, the current Prime Minister has underlined the government's commitment to lead the world in delivering that target⁶⁸.

We also recognise that government has a responsibility to lead by example in the switch to low carbon. We have made strong progress towards the Greening Government Commitment to reduce central government greenhouse gas emissions by 43% by the end of 2019/20⁶⁹, while we are also taking action to ensure that carbon reduction is embedded throughout the government's public procurement.

As we plan the reforms across the economy to meet net zero, a crucial issue will be how we meet the costs of the transition in a fair and balanced way. In June, it was announced that HM Treasury will take forward the world's first comprehensive review by a finance ministry into both the costs and the benefits of transitioning to a net zero economy. The review will consider how to achieve this transition in a way that works for households, businesses and public finances, as well as how we can ensure that this is compatible with our plans for a thriving and competitive economy.

However, it is clear that delivering the net zero target will require faster, more ambitious and joined-up action across all parts of government. That is why we will establish new governance arrangements after we leave the EU, in order to strengthen the cross-government effort and drive forward progress with the pace and ambition required.

2. Make policy business-friendly, with incentives that support businesses to innovate and switch to low-carbon solutions.

Business will be a key driving force behind net zero – whether that is through improved energy efficiency and low carbon heating in business premises, industrial companies switching to low carbon fuels and processes, or pioneering businesses developing new innovations and the green technologies of the future. This transformation offers huge opportunities for UK businesses, including lower energy bills, higher productivity, and access to new export markets for low carbon goods and services.

We have continued to bring forward measures to support businesses to cut their emissions and take advantage of these opportunities, as detailed in Chapter 3. This includes introducing a Streamlined Energy and Carbon Reporting framework to incentivise energy efficiency and emissions reduction in large businesses; announcing new funds to drive the transition to low carbon technologies and processes in industry, including a £315 million Industrial Energy Transformation Fund⁷⁰; and seeking views from stakeholders on a new energy efficiency scheme focused on SMEs.

The Energy Savings Opportunity Scheme supports qualifying businesses to identify cost-effective energy saving measures. Incentives such as the Climate Change Agreements scheme and the Industrial Heat Recovery Scheme are also helping to drive reductions in energy use and encourage investment in energy efficient technologies such as low carbon heating. We are committed to delivering a package of measures that will improve business energy efficiency by at least 20% by 2030⁷¹, in line with our commitment in the Clean Growth Strategy – reducing emissions while helping businesses to save money through lower energy costs. This includes the plans to improve the energy performance of business buildings set out in this response.

To support businesses developing the newest low carbon technologies, we are investing over £3 billion in innovation which will help to grow and scale up new low carbon businesses in sectors as diverse as tech, engineering, finance, energy and construction⁷².

The UK's export strategy⁷³ made supporting clean growth trade and investment a priority for the UK government, and we are looking to build on our existing strengths in areas such as ultra-low emission vehicles, offshore wind, smart systems and green finance. In addition, we are taking action to build strong low carbon supply chains across the UK through our sector deals in nuclear, automotive and offshore wind.

The government will continue to work in partnership with business to support further action on clean growth, including through our 'Green GB & NI' campaign. This will build on the successful 'Green GB & NI Week' held in October 2018 – a fantastic week of clean growth action which saw more than 100 events taking place across the UK. Over the course of the week, more than 60 businesses made significant pledges worth millions to cut emissions while continuing to grow the green economy.⁷⁴

3. Put people at the heart of policy design. Develop a strategy to engage with the public over the choices they can make especially on heating, diet and transport, that will reduce emissions and bring other benefits like improved health.

The public will have a crucial role to play in helping the UK to reduce its emissions to net zero by 2050, particularly through the choices that individuals and households can make in the areas the CCC have identified such as heating and transport. 'Green GB & NI' is the key vehicle for government to engage with the public on climate change – aiming to raise awareness of the pressing challenges we face in addressing climate change, the action that people themselves can take to reduce their carbon footprint, as well as the economic opportunities of clean growth.

The next Green GB & NI Week will take place in early 2020.⁷⁵ The week will be themed around how particular parts of life in the UK will evolve as we move towards a net zero future, such as having cleaner and warmer buildings, cleaner modes of transport (e.g. electric vehicles), and reducing our waste with new green technologies all over the UK.

Enhanced public engagement on climate change will also be an important part of our preparations for the UN Climate Conference Presidency in 2020. We will take an 'All of Society' approach to the Presidency, and the COP26 Summit will be the culmination of a year of climate action bringing together businesses, organisations, cities and regions and civil society.

Young people are also being given the chance to shape our future climate policy. On 20 September, the Youth Steering Group, led by the British Youth Council, submitted a report to government on three initial priority policy areas: climate, waste and recycling, and biodiversity loss. We plan to continue to work with the Group to understand how the government can embed their recommendations in our work.

These initiatives will each help to inform our strategic approach to engaging with the British public over the action that they can take to deliver a net zero future.

As we design our policies to decarbonise the economy, we are focused on making it easier for people to shift towards a greener and more sustainable way of life. On transport, for example, we are supporting the uptake of electric vehicles through consumer incentives (e.g. the plug-in car grant), raising awareness through the Go Ultra Low Campaign, and investing in the UK's charging infrastructure to make it easier for people to own and charge an electric vehicle. We are also taking action to encourage higher levels of cycling and walking and to make roads safer for those who choose these options (see Chapter 5).

To help people to reduce their energy use at home, we have introduced the Simple Energy Advice service – a new, digitally-led service which provides impartial and tailored advice on how homeowners can cut energy bills and make their homes more energy efficient. We are continuing to roll out smart meters to households across Great Britain to give people more control over their energy use, whilst supporting a number of projects aimed at driving down home retrofit costs and encouraging green mortgages. In addition, the government continues to support low carbon heating installations through schemes such as the domestic Renewable Heat Incentive, which has already supported more than 70,000 installations in households across the country⁷⁶ (see Chapter 2).

We are taking action to ensure that the products people buy are more sustainable and resource efficient – for instance, through our commitment to new product standards, extended producer responsibility and better consumer information in the Resources and Waste Strategy (see Chapter 3). We also intend to develop a new National Food Strategy, which will help to ensure that our food system is built upon a resilient and sustainable agriculture sector which considers its climate impact (see Chapter 4).

4. Support international increases in ambition and celebrate the UK ambition, using the UK's new net zero target and position as nominated host of COP26 to help encourage increased effort elsewhere.

We are pleased that the CCC recognises the UK's proud tradition of international leadership on climate change. The Climate Change Act has inspired other countries including France, Finland and Mexico to institute their own binding domestic climate legislation, and we have also been at the forefront of international action to drive emissions reduction and clean growth.

As hosts of COP26, we intend to encourage the highest possible ambition on climate change mitigation, adaptation and transforming finance flows towards low greenhouse gas emissions and climate-resilient development. The UK is the first major economy to legislate for net zero emissions by 2050 and we will use this example to inspire others to set their own net zero targets. We want every country to submit refreshed, more ambitious Nationally Determined Contributions and long-term strategies by COP26.

The UK is among the largest contributors of public climate finance and is committed to providing support which is transparent, transformative and in line with the needs and priorities of developing countries. We are providing at least £5.8 billion of international climate finance between 2016 and 2020⁷⁷, which has already helped 57 million people cope with the effects of climate change, supported 26 million people to access clean energy, and reduced or avoided 16 million tonnes of CO₂⁷⁸. We are doubling our climate finance commitment to £11.6 billion from 2021 to 2025⁷⁹. At the recent G7 Summit, the UK also pledged to contribute £1.44 billion to the Green Climate Fund over the next four years⁸⁰. This doubles the UK's previous contribution of £720 million between 2014 and 2019⁸¹.

The UK and Egypt led the Resilience and Adaptation strand at this year's UN Climate Action Summit. As co-leads, we delivered a Call for Action for the world to step up preparations for the impacts of climate change – endorsed by over 110 countries and 70 organisations. This important declaration puts the need to adapt to the impacts of climate change at the top of political agendas, and by endorsing it, countries have committed to supporting the most vulnerable and putting climate risk at the centre of their decision making.

We are also promoting global alliances to encourage clean growth, such as the Powering Past Coal Alliance, which now has over 80 members.

Chapter 1: Progress on Reducing Emissions from the Power Sector



10 Key Achievements in the Power Sector

Since last year, we have:

1. Launched the **Offshore Wind Sector Deal**, setting out a strategic approach to deliver increased offshore wind capacity with potentially 30GW installed by 2030, while boosting the UK economy, enhancing growth in the regions, continuing to reduce costs and increasing diversity in the sector⁸². The first major initiative from the Sector Deal was launched – a **£250 million Offshore Wind Growth Partnership** which will help UK companies seeking to grow their business in the rapidly growing global market by promoting collaboration, increasing competitiveness and productivity, supporting innovation and attracting new entrants⁸³.
2. Achieved a **record 33% of electricity generation from renewables in 2018**⁸⁴, up from 29.2% the previous year⁸⁵. The increase was driven by a 13.4% increase in renewable capacity, to 20.6GW⁸⁶. The **low carbon share of electricity generation rose to a record 52.6%** in 2018⁸⁷.
3. Broken our record for coal-free electricity generation, achieving Great Britain's **first coal-free fortnight since the Industrial Revolution** (18 days 6 hours)⁸⁸. Coal's share of generation dropped to a record low of 5.1% in 2018⁸⁹.
4. Completed the **third Contracts for Difference (CfD) allocation round**, with contracts awarded to 12 new renewable energy projects totalling around 5.8GW new generating capacity⁹⁰. This is 2.4GW more than was secured in the second allocation round (2017) and enough to power around 7.2 million homes⁹¹. The costs of offshore wind are now around 30% lower than the second auction (as low as £39.65/MWh)⁹².
5. Published a number of key public consultations and reviews which demonstrate the government's continued **progress towards developing the energy infrastructure** we will need to meet net zero, including proposals for a Regulated Asset Base financing model for new nuclear projects⁹³ and developing business models for deploying carbon capture, usage and storage (CCUS) projects⁹⁴.
6. Introduced the **Smart Export Guarantee** which, from 1 January 2020, will ensure homes and businesses installing solar, wind or other forms of low-carbon generation of up to 5MW receive a payment for each unit of electricity they export to the grid⁹⁵. This will encourage suppliers to competitively bid for this electricity, giving small-scale generators their best market price, while providing the local grid with more clean, green energy.
7. Continued to reform the energy system to deliver **greater system flexibility**, in order to integrate significant volumes of low carbon generation, transport and heat. This includes continuing to deliver the Smart Systems and Flexibility Plan; creating a legally separate system operator in National Grid; commissioning a 1GW subsea interconnector between the UK and Belgium (NEMO Link); and launching reviews of data, codes and engineering standards in the energy system.
8. Reformed the **Capacity Market** to enable intermittent renewables (wind and solar) that are not in receipt of other forms of government subsidy to participate.
9. Achieved a **major milestone for the UK's nuclear new-build industry** in June 2019 with Hinkley Point C reaching its biggest milestone yet: J-zero, the completion of the base for the first reactor. This means that the construction of the nuclear buildings above ground can now begin.
10. Announced that the government is developing proposals to invest in **innovative small modular reactors (SMRs)**. The government is looking at an initial award of up to £18 million to a Rolls Royce-led consortium, who have proposed a significant investment of more than £500 million focused on designing a first-of-a-kind SMR⁹⁶. This money is alongside up to £45 million of government funding in the Advanced Modular Reactor programme, with project bids currently under consideration⁹⁷.

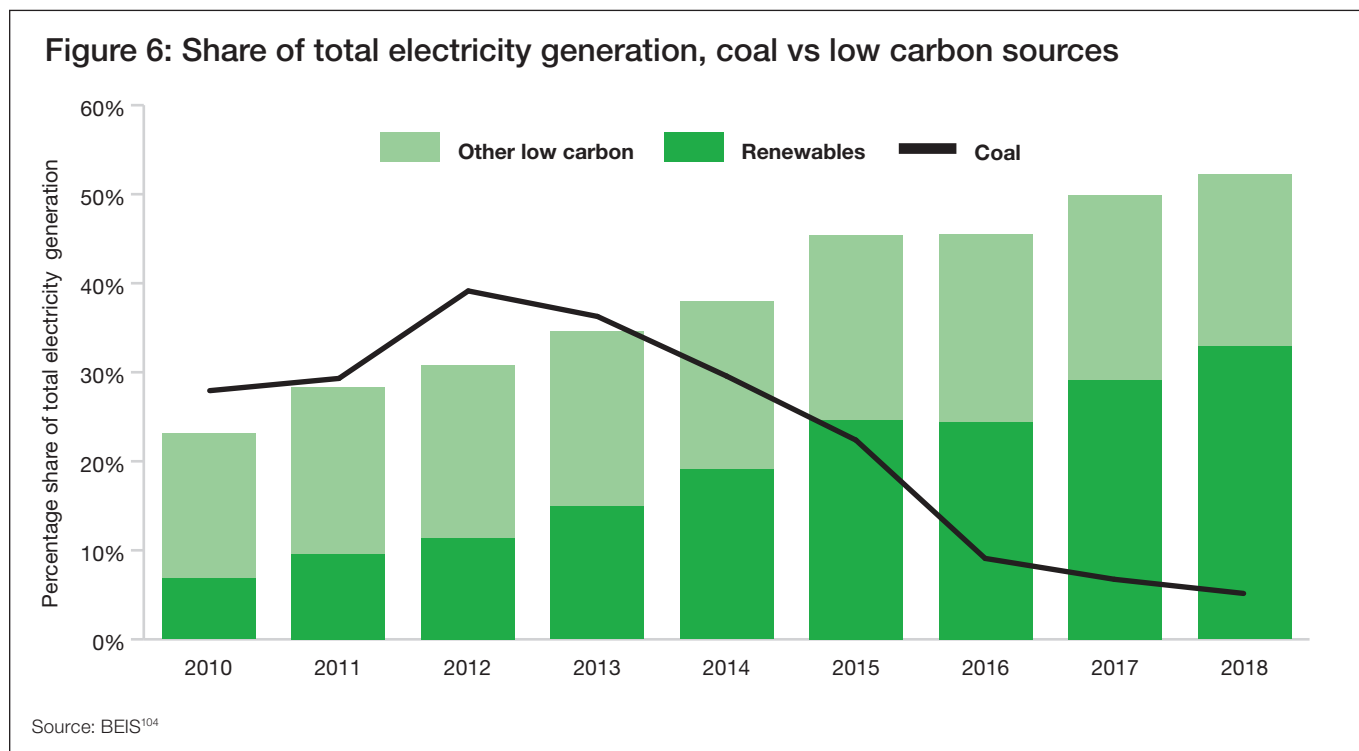
Summary of Progress

We welcome the Committee on Climate Change’s finding that emissions continue to fall in the power sector. In 2018, carbon dioxide emissions from power stations were down 10% on 2017 levels and 68% lower than 1990 levels⁹⁸, as we have switched from coal to gas and renewable power with the continued contribution of nuclear. This has been assisted by falling costs and more efficient low carbon technologies, brought about through early policy action, innovations and growth in deployment.

In the past 10 years, the renewable capacity in the electricity sector has increased significantly, from 7.3GW in 2008 to 45.9GW in Q2 2019⁹⁹.

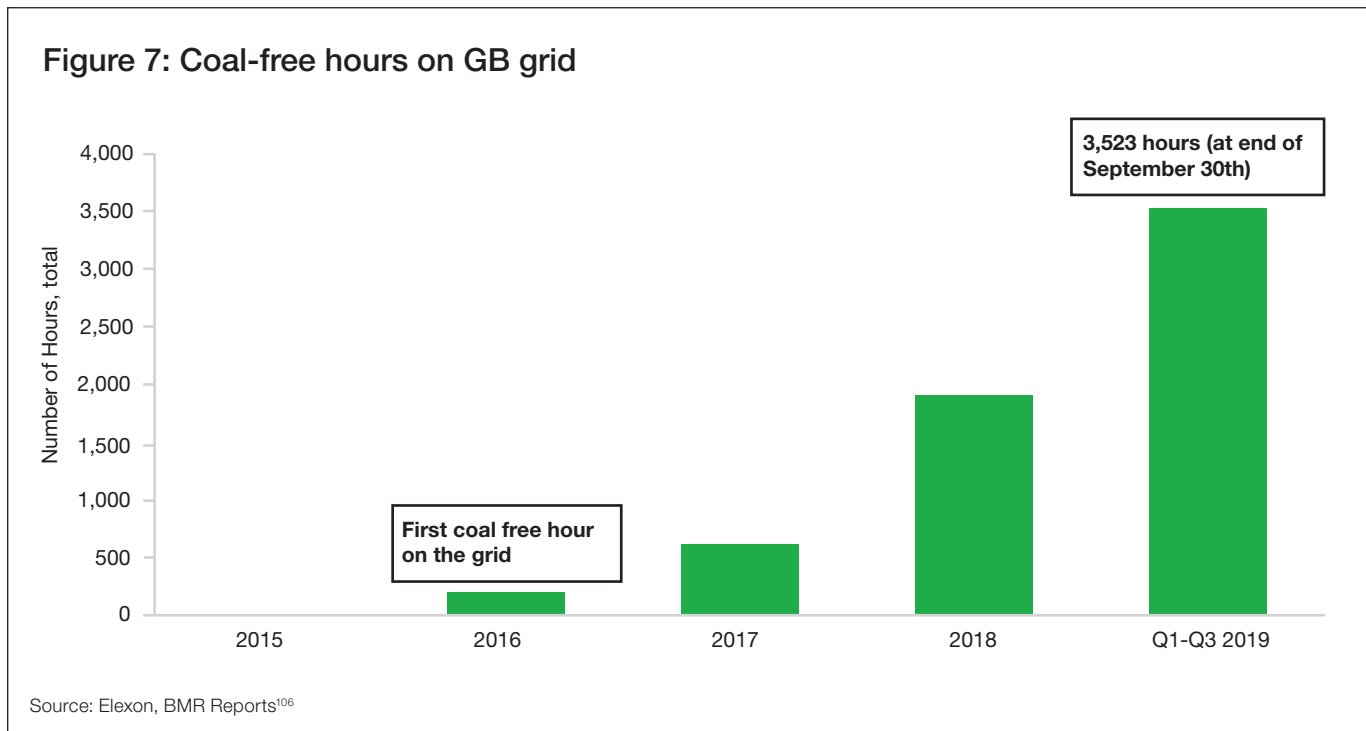
Our sustained support for clean energy has led to dramatic falls in the costs of some renewable electricity generation technologies. For example, government investment in offshore wind has helped to deliver clearing prices around 30% lower than prices in 2017¹⁰⁰ and there are early signs of some renewable technologies deploying without government support.

The use of coal in our electricity mix has dropped from 34% in 2007 to just 5% in 2018 – an 88% decrease¹⁰¹. Meanwhile, low carbon electricity’s share of generation increased from 50% in 2017 to 52.6% in 2018¹⁰², and renewables’ share of electricity generation now stands at a record 33%¹⁰³.



In April 2017, the UK experienced its first coal free day since the industrial revolution and went on to go eighteen days without coal in May to June 2019¹⁰⁵. This is a huge achievement for

the energy sector and is testament to how our energy system is changing to reduce emissions in the UK.



The Contracts for Difference (CfD) scheme has had a remarkable impact on the renewable energy market, particularly in the offshore wind sector, in which we are the world leader with 9.2GW of installed, operational capacity (as of Q2 2019)¹⁰⁷. This is expected to rise to 10GW by 2020 and up to 30GW by 2030 in line with the Offshore Wind Sector Deal published in March¹⁰⁸.

Our energy system is also becoming more flexible, and better able to integrate intermittent renewables and new sources of demand from electric vehicles and heating. According to the Electricity System Operator, there is now around 4GW of storage and 1GW of Industrial and Commercial Demand Side Response (DSR) in Great Britain¹⁰⁹. A new 1GW interconnector to Belgium, Nemo Link, was commissioned in January 2019, bringing to 5GW the amount of interconnection capacity we have with other countries¹¹⁰. A further 4.8GW of interconnection is under construction¹¹¹.

Next Steps

Our legally binding commitment to reach net zero greenhouse gas emissions in 2050 will require deep decarbonisation in the power sector, building on the actions we have already taken, and the deployment of negative emissions technology to offset emissions from those sectors that cannot be completely decarbonised. It is likely that electricity demand will grow significantly by 2050 as other sectors of the economy such as transport and heat are electrified, potentially nearly doubling (or more) from today's levels¹¹².

In order to meet this challenge, our ambition is to grow low carbon sources, enable a smarter, more flexible system, and keep costs down for consumers by reducing wasted energy.

As the cost of renewable technologies continues to fall, it is becoming clear that they are likely to provide most of our low carbon generating capacity in 2050. However, we agree with the Committee that there will still be a crucial role for low-carbon 'firm' (i.e. always available) power in 2050 to meet net zero while maintaining security of supply and keeping costs low.

For renewable technologies, this means continued deployment under the CfD scheme whilst considering how the mechanism will need to evolve over time to reflect wider systems costs. The latest CfD auction awarded contracts to 12 new renewable projects totalling around 5.8GW, which is 2.4GW more than was awarded in the 2017 allocation round¹¹³.

The completion on schedule of the concrete base for the reactor buildings at Hinkley Point C represents progress towards commissioning the first new nuclear power station since the 1990s, and the Nuclear Sector Deal¹¹⁴ focuses on the industry's work to lower the cost of new nuclear projects. We are also developing a new National Policy Statement for nuclear and recently consulted on our view that a Regulated Asset Base (RAB) funding model has the potential to reduce the cost of raising private finance for new nuclear projects¹¹⁵.

As part of our commitment to invest in innovative technologies, we are investing £222 million in a visionary fusion reactor design programme. A world first, the UK will aim to design, develop and build a commercially viable fusion power plant ready to provide energy to the grid by 2040.¹¹⁶

Carbon Capture, Usage and Storage (CCUS) can play a critical role across the UK economy – helping to decarbonise industry, generate low carbon power, and enable the production of low carbon hydrogen at scale, which can in turn enable decarbonisation across the energy system. Furthermore, CCUS can provide a pathway towards the development of bioenergy with carbon capture and storage (BECCS) and direct air carbon capture and storage (DACCS), potentially key technologies in the delivery of greenhouse gas removals. To enable

deployment, it is important that we develop a sustainable and investable commercial model in the UK, which supports public-private partnerships and private sector investment, and is underpinned by appropriate risk sharing arrangements between government and the private sector. We have consulted on potential business models for CCUS¹¹⁷, including for power CCUS, with the intention to outline our preferred delivery and investment framework at the end of 2019.

In order to integrate large volumes of low carbon generation, transport and heat, our energy system needs to be more agile, flexible, and data driven. We are removing barriers and creating markets for smart technologies such as energy storage, demand side response and vehicle-to-grid, by delivering 22 of the 38 actions in the Smart Systems and Flexibility Plan¹¹⁸ – with the remainder to be delivered by 2022.

On top of existing interconnectors and new links under construction, there is a further 8.5GW in the wider pipeline, often supported by Ofgem's Cap and Floor regime that incentivises private investment while maintaining a market-led approach.

Ofgem's forthcoming RIIO-2 price controls will set out the framework and funding for investment in our energy networks through the mid-2020s, and will take into account system needs for meeting net zero. We will also deliver fundamental reforms to how the system is governed, including reforms of data, codes and engineering standards. These reforms will prepare the system for the significant changes that will be required to meet our decarbonisation ambitions.

Figure 8: Low carbon generation – Key milestones

2015

- The government committed to phase out all unabated coal-fired electricity generation by 2025

2018

- The world's largest offshore wind farm inaugurated in the UK (Walney Extension)
- The Nuclear Sector Deal between the government and industry is published
- A record 53% of electricity was generated from low carbon sources, with 33% from renewables and just 5% from coal

2017

- The second Contracts for Difference auction saw clearing prices for offshore wind halve compared to the first auction in 2015
- The government confirmed that up to £557 million would be made available for future Contracts for Difference
- The world's first floating offshore wind farm inaugurated in the UK (Hywind Scotland)
- Great Britain achieved its first day without coal-fired electricity generation since the Industrial Revolution

2019

- Government and industry published the Offshore Wind Sector Deal
- Great Britain achieved a record 18 days and 6 hours of coal-free generation
- The third Contracts for Difference auction was held, delivering around 5.8GW of new low-carbon generating capacity and further cost reduction of offshore wind

2025

- Target to phase out unabated coal-fired electricity generation

Response to the CCC's Recommendations

Recommendation 1:

Completion of 2019 Contracts for Difference auction

We welcome the CCC's recognition of the Contracts for Difference (CfD) scheme's contribution to delivering low-cost emissions reductions whilst maintaining security of supply. The third CfD allocation (AR3) round opened to applications in May with less established ('Pot 2') technologies that will start generating in delivery years 2023/24 and 2024/25 eligible to apply. The budget for AR3 was £65 million (in 2011/2012 prices) with a capacity cap of 6GW¹¹⁹.

The results of AR3 were published on 20 September 2019. 12 new renewable energy projects won CfDs, including Offshore Wind, Advanced Conversion Technologies and Remote Island Wind. The auction has delivered around 5.8GW of new clean energy to be added to the grid by 2025 – which is 2.4GW more than was secured in the second allocation round (2017) and enough to power around 7.2 million homes¹²⁰. The costs of offshore wind have come down by around 30% since AR2, and this is the first time that renewables are expected to come online below market prices.

In 2017, the government confirmed that up to £557 million would be made available for future CfDs¹²¹. The timetable for future CfD auctions was announced in July 2018 which confirmed that, following on from AR3, the government's intention would be to hold CfD auctions every two years. This could allow up to 1GW to 2GW of new offshore wind every year in the 2020s (subject to prices)¹²², giving long term vision and clarity to the offshore wind sector.

As set out in the Offshore Wind Sector Deal, we could see up to 30GW of offshore wind installed by 2030 depending on prices¹²³. This will set a firm foundation for offshore wind's contribution to helping the UK to meet its net zero target. AR3 and the Offshore Wind Sector Deal provides the certainty the supply chain needs to invest and grow to achieve the industry's target of 60% UK lifetime content (up from 50%), a fivefold increase in exports to £2.5 billion per annum and around 27,000 jobs by 2030¹²⁴.

The results of AR3 will help to inform future CfD policy, in particular allocation round 4 (AR4). We plan to consult ahead of AR4, and we will be carefully considering all of the parameters in light of the results of AR3 and our wider and more ambitious climate and energy goals. This will allow continued delivery of cost-effective renewable electricity into the future to ensure that we continue to decarbonise the UK's electricity supply cost-effectively, whilst supporting our economy.

Case Study: Offshore Wind Sector Deal

The UK has the largest offshore wind capacity in the world, accounting for around 34% of the global total¹²⁵. The Offshore Wind Sector Deal builds on this global leadership position – setting out a pathway to up 30GW of generating capacity by 2030 whilst generating thousands of high-quality jobs, a strong supply chain and a fivefold increase in exports. This is our modern Industrial Strategy in action.

Through the sector deal, government and the sector will work to:

- Raise productivity, competitiveness and capacity in the UK supply chain through a new £250 million Offshore Wind Growth Partnership, ensuring that the UK leads internationally in the next generation of offshore wind innovations in areas such as robotics, advanced manufacturing, floating wind and larger turbines.
- Boost global exports fivefold to £2.6 billion per year by 2030.
- Deliver infrastructure investment of over £40 billion to 2030 (based on the sector's estimates).
- Support up to 27,000 jobs in the sector by 2030 (up from 7,200)
- Increase the representation of women in the offshore wind workforce to at least a third by 2030 (up from 16% in 2018), with a desire to reach a more stretching ambition of 40%.
- Set a stretching target for increasing BAME representation across the sector by 2030.
- Increase UK content in homegrown offshore wind projects to 60% (up from 50%).
- Develop industry-led regional clusters to coordinate activities between business, local government and academia to increase regional GVA.



Pacific Orca installation vessel (Image: JBray)

Recommendation 2:

Develop contingency plans that allow for additional low-carbon generation to be brought forward in the event of delay or cancellation of planned projects, or imports of electricity below projected levels.

In the event of a delay or cancellation to a planned low-carbon generation project, there already exist market mechanisms, such as the Capacity Market (CM), to bring forward new capacity.

The CM is a proven and efficient mechanism for bringing forward new generation and other capacity as and when it is needed. A series of auctions held since late 2014 have seen a wide variety of “new-build” technologies come through, including innovative resources such as DSR and battery storage. Changes made during 2019 mean that further types of renewables – wind and solar – are now eligible to compete alongside all other technologies, providing they are not otherwise in receipt of subsidies. The main CM targets are set annually, four years ahead, meaning that the amount of capacity winning support in the CM auctions can be varied in line with our best assessment of whether other, non-CM, projects will be ready in time.

Additionally, the CfD scheme is the government’s main mechanism for supporting new large-scale renewable electricity generation. The parameters for each auction, including the available budget and any capacity constraints, are finalised before each round commences. The government retains the flexibility to alter auction parameters or increase the budget of any given CfD auction, within the confines of the £557 million total allocation, to accelerate the deployment of low carbon generation at relatively short notice. The CfD scheme, together with the bespoke CfD contracts signed in the early days of the scheme¹²⁶, have so far awarded contracts for around 16GW of new renewable electricity capacity across all technologies. This includes around 13GW of offshore wind¹²⁷. The CfD scheme employs a non-delivery disincentive to help ensure delivery of contracted projects.

The UK’s new build nuclear power plant, Hinkley Point C, remains on track. Earlier this year Hinkley Point C achieved its biggest milestone yet, J-zero, which is the completion of the common raft for the Unit 1 nuclear island. Good progress is also being made to increase levels of interconnection. NEMO Link, a 1GW interconnector between the UK and Belgium, commissioned in January 2019 taking the UK to 5GW of interconnector capacity, a 25% increase from 2018¹²⁸. NEMO Link is the first interconnector to connect to mainland Europe since 2012 and is the pilot project for the cap and floor mechanism operated by Ofgem. In addition, there is 4.8GW of new capacity under construction, with an additional 8.1GW in the pipeline at an earlier stage of development¹²⁹. The UK could therefore have around 18GW of interconnector capacity by the mid-2020s.

To ensure that the UK has a credible plan to deliver future low-carbon capacity, the government recently published a number of consultations on new approaches to financing firm low-carbon generation projects. The government has consulted on proposals to potentially bring forward new nuclear through a Regulated Asset Base (RAB) model¹³⁰, which could allow nuclear projects to continue to be financed and delivered by the private sector at a low cost to consumers. Additionally, we have consulted on the development of appropriate, cost efficient CCUS business models for industry, power, and carbon dioxide transport and storage, as well as a framework to support hydrogen production with CCUS¹³¹.

Recommendation 3:

Develop and deliver a plan, in coordination with Ofgem, to upgrade networks in the 2020s to accommodate new electricity demands (e.g. from electric vehicles), and future-proof them in order to limit costs.

Ofgem’s RIIO-2 price controls will set the framework for investment in our energy networks through to the mid-2020s, and will take into account system needs for meeting

the net zero target. The government does not play a direct role in network planning and delivery as it is a matter for the electricity system operator and network companies overseen by the independent regulator. However, the government is following progress closely and engaging with Ofgem given the importance of ensuring a RIIO-2 settlement that can help to facilitate the government's net zero and clean growth ambitions, whilst also being fair to investors and consumers.

In May 2019, Ofgem published its sector-specific methodology decisions for the 2021-26 Electricity Transmission, Gas Transmission, Gas Distribution and the Electricity System Operator RIIO-2 price controls¹³². Ofgem outlined its intention to strengthen existing mechanisms and introduce new arrangements to ensure that networks can facilitate decarbonisation, the decentralisation of the energy system and new sources of electricity demand. In August 2019, Ofgem confirmed its approach to the funding model for the Electricity System Operator and consulted on its methodology¹³³.

In August 2019, Ofgem also published a consultation on its proposed approach to the 2023-28 RIIO-ED2 (price control for electricity distribution networks)¹³⁴. This included proposals to link network company revenue to the achievement of outcomes that support decarbonisation; proposals to drive further innovation; and greater consideration of anticipatory investment, including for the electrification of heat and transport. Ofgem has subsequently published an Open Letter asking network companies to clearly propose and evidence how their RIIO-2 business plans are able to flex to support delivery of the net zero target. Ofgem expects network companies to engage closely with local partners and stakeholders when considering investment needs to support the transition to net zero. However, it also recognises that this will need strong coordination between a range of parties, and Ofgem is examining options on how best to achieve this.

The government and Ofgem have set out clear expectations that Distribution Network Operators (DNOs) should make use of new technologies to more efficiently manage their networks. In response to the actions set out in the Smart Systems and Flexibility Plan¹³⁵ (see Recommendation 5), DNOs now tender for flexibility services as potential alternatives to network reinforcement, negating or deferring the need for network upgrades. These tenders are enabling new flexibility markets and thus incentivising the shifting of load, such as the charging of electric vehicles, away from peak demand. The government and Ofgem expect to see network companies develop these processes, as well as more effective co-ordination mechanisms across transmission and distribution. BEIS and Ofgem's joint letter to the Energy Networks Association¹³⁶, published in July 2019, set out a series of clear actions for network companies and the electricity system operator.

Ofgem also published a position paper on Distribution System Operation¹³⁷, alongside the RIIO-ED2 open letter¹³⁸ in August, setting out the programme of work Ofgem will undertake in this area to progress tangible change prior to 2023 and support the delivery of RIIO-ED2.

As part of preparing our energy system for net zero, the government and Ofgem have commissioned an independent review of the standards to which the network is built, which will be chaired by Simon Harrison. By using the network we already have more efficiently, we can connect new sources of demand to the system reliably at least cost to consumers. The government has also consulted on introducing regulations to require that private electric vehicle chargepoints are smart and therefore capable of shifting load, to further facilitate efficient use of current networks.

The government and Ofgem are working together to consider the implications of government policy for networks, including in relation to electric vehicles and the electrification of heat. Network companies also publish future

network plans, including the Electricity Ten Year Statement¹³⁹ based on Future Energy Scenarios¹⁴⁰ to accommodate possible future generation and demand requirements. We are engaging with the Energy Networks Association on its work to identify electricity network constraints and potential solutions to ensure that increasing demand from heat pumps and electric vehicles can be accommodated on the network. This will feed into network company investment plans. We are also consulting on reforming the governance of the energy industry codes, the detailed rules that facilitate the gas and electricity markets, and intend to publish a position paper on wider system governance in 2020.

Recommendation 4:

Outline in the forthcoming Energy White Paper a level of ambition compatible with achieving net zero emissions. This should include the outline of a subsidy-free route to market for the cheapest low-carbon generation from 2020.

The government recognises that our legally binding net zero target will require deep decarbonisation in the power sector. We agree with the CCC that the majority of low carbon generating capacity in 2050 is likely to be provided by renewable technologies but that there will still be a key role for low-carbon ‘firm’ (i.e. always available) power, such as nuclear and gas CCUS, to decarbonise while maintaining security of supply and keeping costs low.

In line with the 2015 Conservative Manifesto, new planning criteria were introduced to the planning system to ensure local communities in England had the final say on onshore wind projects in their areas. Projects can attain planning permission if they meet these planning criteria.

The prospects of subsidy-free solar PV and onshore wind are becoming increasingly realistic for developers; several onshore wind and solar PV sites have already deployed. To enable this at scale, we will need to examine the steps needed

to ensure a level playing field for renewables that are deployable without government support.

In June 2019, the government legislated for the Smart Export Guarantee (SEG) – a subsidy-free route to market for small-scale low-carbon electricity generators¹⁴¹. From 1 January 2020, the SEG gives these generators the right to be paid for the renewable electricity they export to the grid. This reflects our continued commitment to ensuring that low-carbon electricity is central to the transition to the smart and flexible energy systems of the future.

Recommendation 5:

Continue to improve system flexibility through the implementation of all actions in the Smart Systems and Flexibility Plan.

The energy system will need significant levels of flexibility in order to integrate large volumes of low carbon power, heat and transport. Technologies such as energy storage, demand side response and electric vehicles can provide this flexibility and reduce the costs of the system. The government, together with Ofgem and industry, has continued to make good progress on implementing the Smart Systems and Flexibility Plan. To date, we have implemented 22 of the combined 38 actions in the original 2017 Plan and the 2018 Progress Update¹⁴². We are on track to deliver the Plan in full by 2022.

Some of the key priorities for the next year include: enacting reforms to the way energy system data is created, stored and accessed, following the report of the Energy Data Taskforce; considering the recommendations of the Electric Vehicle Energy Taskforce, which is expected to propose solutions to challenges brought to the energy system by the uptake of electric vehicles later in the autumn; regulating to mandate that private electric vehicle chargepoints must be smart; Ofgem’s reforms of electricity network access and forward looking charging; and Ofgem’s decision on market-wide half-hourly settlement. The government will also take powers to regulate smart appliances and

to define storage in primary legislation, when parliamentary time allows.

Delivering the Smart Systems and Flexibility Plan

The Smart Systems and Flexibility Plan, published in July 2017, set out 29 actions that the government, Ofgem and industry will deliver to support the transition to a smarter and more flexible energy system; a further 9 actions were added in the October 2018 Progress Update.

The actions in the Plan focus on:

- Removing barriers to smart technologies, in particular energy storage;
- Enabling smart homes and businesses, giving consumers more control over their energy use; and
- Reforming our energy markets so that flexibility is fairly rewarded for the value it provides to the system.

Since October 2018, we have continued to make good progress on implementing these actions.

- Ofgem published **modifications to the generation licence for storage**¹⁴³. This will enable storage licence holders to avoid overpayment of policy levies.
- The government consulted on the **treatment of electricity storage facilities within the planning system**, to ensure that storage is assessed fairly without facing inappropriate barriers to deployment. Our response to this consultation has been published alongside this report¹⁴⁴.
- Industry has raised modifications to reform **transmission, distribution and balancing charges** for storage, so that storage doesn't overpay for use of the system. These are progressing through industry governance, with some already with Ofgem for approval.
- The **Smart Export Guarantee** was enacted, placing a legal obligation on energy suppliers with over 150,000 customers – covering more than 90% of the retail market – to introduce export tariffs for small-scale low-carbon generators (such as households installing solar panels) from 1 January 2020¹⁴⁵.
- The government launched a consultation on regulations under the Automated and Electric Vehicles Act to mandate that new **private EV chargepoints are smart enabled**¹⁴⁶. The government also confirmed it would take powers to **regulate smart appliances**. In parallel, we have been working with the British Standards Institute to develop technical standards for smart appliances and electric vehicle chargepoints.
- There are now nearly 15 million **smart and advanced meters** operating in homes and businesses across Great Britain¹⁴⁷. Building on the functionality provided by smart meters, Ofgem is consulting on moving to **market-wide half hourly settlement** and has published an outline business case with a final decision expected in Q3 2020¹⁴⁸.

- In this report, the government is endorsing the five key recommendations from the **Energy Data Taskforce** and we are working with Ofgem, Innovate UK and industry to implement them. We agree that data is a fundamental enabler of smart and flexible solutions for decarbonising our energy system and we are committed to unlocking its potential. As part of this, Innovate UK will launch a c.£2 million competition to create a ‘common data architecture’, which aims to greatly reduce barriers to exchanging digital energy information between organisations. Innovate UK will also fund development of best practice guidance for industry to enable it to adhere to the principle of ‘presumed open’ (subject to data privacy and cyber security considerations). This will support industry with the data resources they need to develop innovative products and services.
- All six distribution network operators are **now tendering for flexibility services as potential alternatives to network reinforcement**. The Open Networks project identified new system operation activities as part of the “Future Worlds” work. BEIS and Ofgem published a joint letter to the Energy Networks Association¹⁴⁹ setting out roles, responsibilities and clear actions for progressing this work.
- The government launched two new **innovation competitions** – the first to demonstrate **large scale energy storage** and another to support the development and demonstration of **innovative solutions to value and trade flexibility**.

Chapter 2: Progress on Reducing Emissions from Buildings



10 Key Achievements on Buildings

Since last year, we have:

1. Committed to introducing a **Future Homes Standard** which will see new build homes future-proofed with low carbon heating and the highest standards of energy efficiency by 2025¹⁵⁰. We are currently consulting on our plans to implement this standard, including an initial uplift to energy standards in new homes in 2020.
2. Announced that we will consult on a mechanism to **increase the proportion of green gas in the gas grid** to reduce our dependence on burning natural gas to heat our homes¹⁵¹.
3. Strengthened the domestic **Private Rented Sector regulations**¹⁵² to require landlords to contribute up to £3,500 towards improving their property to an energy efficiency rating of EPC Band E¹⁵³.
4. Launched a number of innovation projects which will help to drive improvements in home energy efficiency, including: the £5 million **Green Home Finance Innovation Fund** to encourage green mortgage innovation¹⁵⁴; the £9.4 million **Whole House Retrofit** cost reduction trajectory competition¹⁵⁵; and **six local supply chain demonstration projects** which will focus on reducing the cost for retrofit, building supply chain capacity, and addressing non-financial barriers to deeper retrofit¹⁵⁶.
5. Reached the milestone of upgrading over 2 million homes since the start of the **Energy Company Obligation (ECO)**, and continued to deliver energy efficiency measures to low income and vulnerable households under the reformed scheme whilst enabling the delivery of innovative measures and methods¹⁵⁷.
6. Implemented key recommendations from the **Each Home Counts** review¹⁵⁸, **published new technical standards for domestic retrofit**¹⁵⁹, and consulted on incorporating these standards and the new **TrustMark government endorsed quality scheme** into ECO¹⁶⁰. This will raise standards now and prepare the market to deliver net zero, including through a more ambitious successor to ECO.
7. Published a call for evidence on a new **Small Business Energy Efficiency Scheme**¹⁶¹ and launched the £6 million **Boosting Access for SMEs to Energy Efficiency** competition to support innovation and encourage uptake of energy efficiency by SMEs at scale¹⁶². Alongside this, we introduced a new **Streamlined Energy and Carbon Reporting** framework for larger businesses¹⁶³.
8. Published a review of the evidence on the **options for the long-term decarbonisation of heat** ahead of publishing our heat roadmap in summer 2020¹⁶⁴. We also responded to the call for evidence on options for **phasing out fossil fuel heating in buildings off the gas grid**¹⁶⁵.
9. Launched the main scheme of the **Heat Networks Investment Project**¹⁶⁶; made further changes to enable a pipeline of new, large, renewable heat plants to the **Renewable Heat Incentive (RHI)**¹⁶⁷; and launched the £16.5 million **electrification of heat demonstration project**¹⁶⁸, which will help demonstrate the feasibility of a possible large-scale transition to heat pumps and innovative solutions that work for a wide range of homes and businesses.
10. Continued to reduce central government emissions in line with the **Greening Government Commitment**¹⁶⁹, reducing emissions by 39% in 2017/18 against the 2009/10 baseline.

Summary of Progress

Reducing emissions from the UK's homes, businesses and public buildings is at the heart

of our ambition to achieve a net zero economy by 2050. We have seen substantial progress over time, as well as demonstrating that lower emissions can sit alongside economic growth.

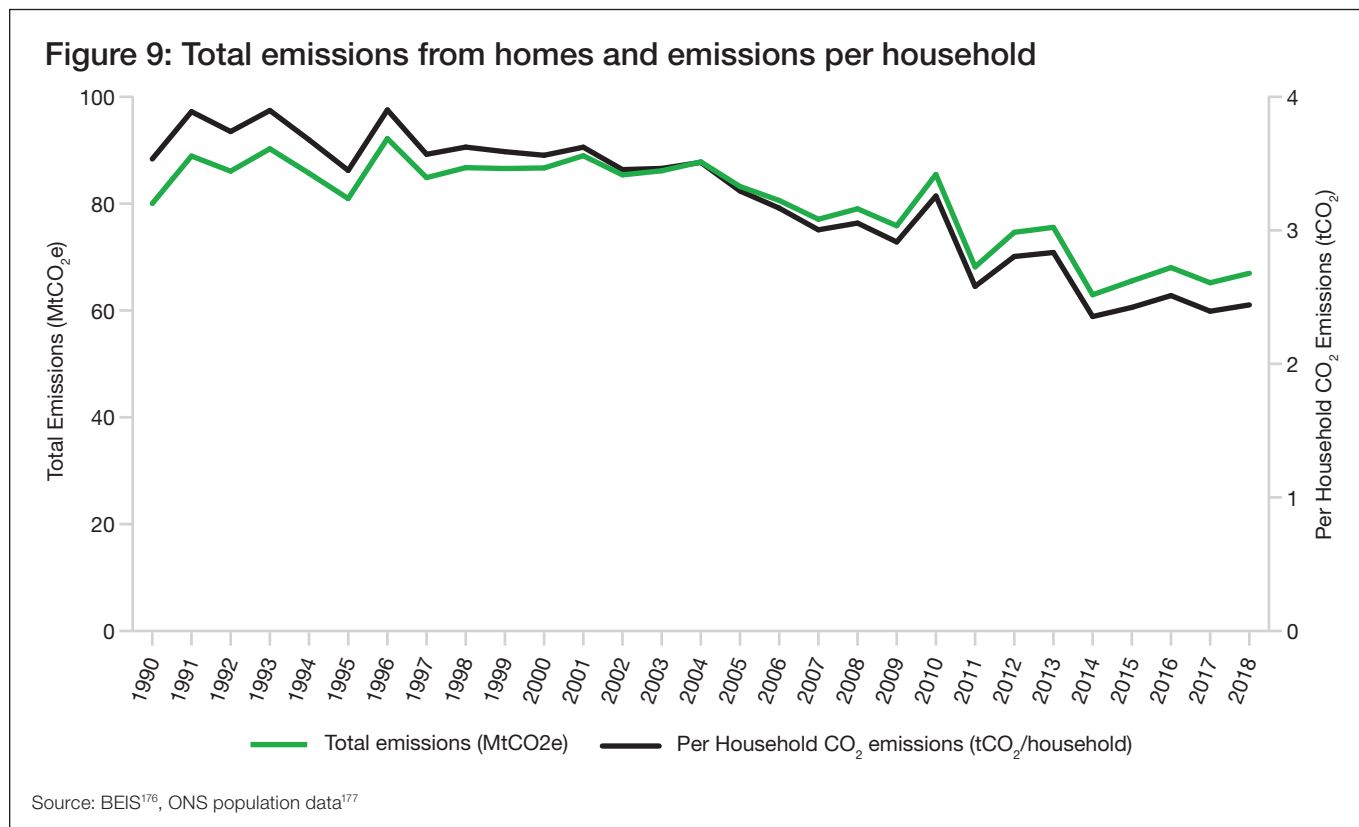
In 2017 emissions from homes were down 19% since 1990¹⁷⁰ despite nearly 5 million new homes having been built¹⁷¹, while emissions from industrial and commercial buildings have fallen by 23% over the same period¹⁷².

The drivers of these emission savings have also contributed to keeping bills down – the latest data shows that average household energy bills have fallen by 16.7% in real terms between 2013 and 2018¹⁷³. Emissions from central government also fell by 39% between 2009/10 and 2017/18, delivering savings to the taxpayer of an estimated £112 million in 2017/18 by reducing energy costs¹⁷⁴.

Achieving net zero will mean going further, virtually eliminating emissions from the UK’s

building stock. Over the past year, we have taken steps to build on the progress we have made and prepare for the transition to come, as we continue to roll out energy efficiency and move towards large-scale deployment of low carbon heat in both domestic and non-domestic buildings.

For new homes, the government announced this year that we will introduce a Future Homes Standard, so that by 2025 new homes are constructed with the highest energy efficiency standards and are future-proofed with low carbon heating. We are consulting on our plans to implement the standard, including an initial uplift to energy standards in new homes in 2020, through our consultation on Part L of the Building Regulations¹⁷⁵.



The Energy Company Obligation, now entirely focused on poorer and vulnerable households, has delivered 2.5 million energy efficiency measures in over 2 million properties since

2013¹⁷⁸. The government has delivered reforms to the scheme to support deployment of more innovative measures, and to increase the role of trusted local actors in identifying those households most in need. We have also launched a consultation on incorporating

the newly reformed TrustMark government endorsed quality mark into the Energy Company Obligation, delivering on the promise of the independent Each Home Counts review of quality and standards in home energy efficiency.

We have strengthened our energy efficiency standards for rented homes, introducing a requirement for landlords to contribute up to £3,500 towards the cost of improvement measures¹⁷⁹. We are also continuing the Smart Metering Implementation Programme, with nearly 15 million smart meters now operating across the country¹⁸⁰. Energy suppliers are on track to offer every small business and household in Great Britain a smart meter by the end of 2020. We have published a consultation on a post-2020 policy framework to further drive investment so that momentum continues to deliver a market-wide roll out and all consumer and system benefits as soon as practicable.¹⁸¹

Through the new Green Finance Strategy, we are engaging the financial sector to find new approaches to delivering energy performance improvements – for instance, through the launch of our £5 million Green Home Finance Innovation Fund¹⁸², and a commitment to consult later this year on requirements for lenders to support homeowners to improve the energy efficiency of the homes they lend to. The government is investing further in innovation through the £9.4 million Whole House Retrofit cost reduction trajectory competition¹⁸³, and the launch of six demonstrator projects focused on supporting and building local retrofit supply chains¹⁸⁴.

For businesses, we introduced new Streamlined Energy and Carbon Reporting requirements in April this year, improving both simplicity and transparency of reporting on energy use and emissions. We are investing in innovative approaches, such as through the £6 million Boosting Access for SMEs to Energy Efficiency competition¹⁸⁵ and the Industrial Heat Recovery Scheme¹⁸⁶, and we have published a call for evidence on a new energy efficiency scheme for SMEs¹⁸⁷.

The government has continued to deliver a significant number of low carbon heating installations under the Renewable Heat Incentive (RHI), which is expected to save approximately 123 MtCO₂e of greenhouse gas emissions over the lifetime of installations supported by the scheme¹⁸⁸. We have made further changes to the RHI to enable a pipeline of new, large, renewable heat plants and improve value for money for the taxpayer. In addition, the main scheme of the Heat Networks Investment Project was launched this year. This scheme provides £320 million of government funding, which will accelerate the growth of the UK heat networks market¹⁸⁹.

Next Steps

Looking ahead, the government recognises that we must go further on energy efficiency as well as preparing for the large-scale decarbonisation of heating.

In December 2018, we published a paper which sets out three priorities for the future market framework for heat networks: ensuring consumers receive sufficient protections; building investment in the sector; and maximising the potential decarbonisation benefits of heat networks¹⁹⁰. We aim to consult on policy options for the framework later in 2019.

Building on last year's call for evidence on options for phasing out fossil fuel heating in buildings off the gas grid, we are seeking to develop a comprehensive policy package to support this transition and will be consulting further on this in early 2020. We are committed to accelerating the decarbonisation of gas supplied by increasing the proportion of green gas in the grid, and will consult on the appropriate mechanism to deliver this later this year.

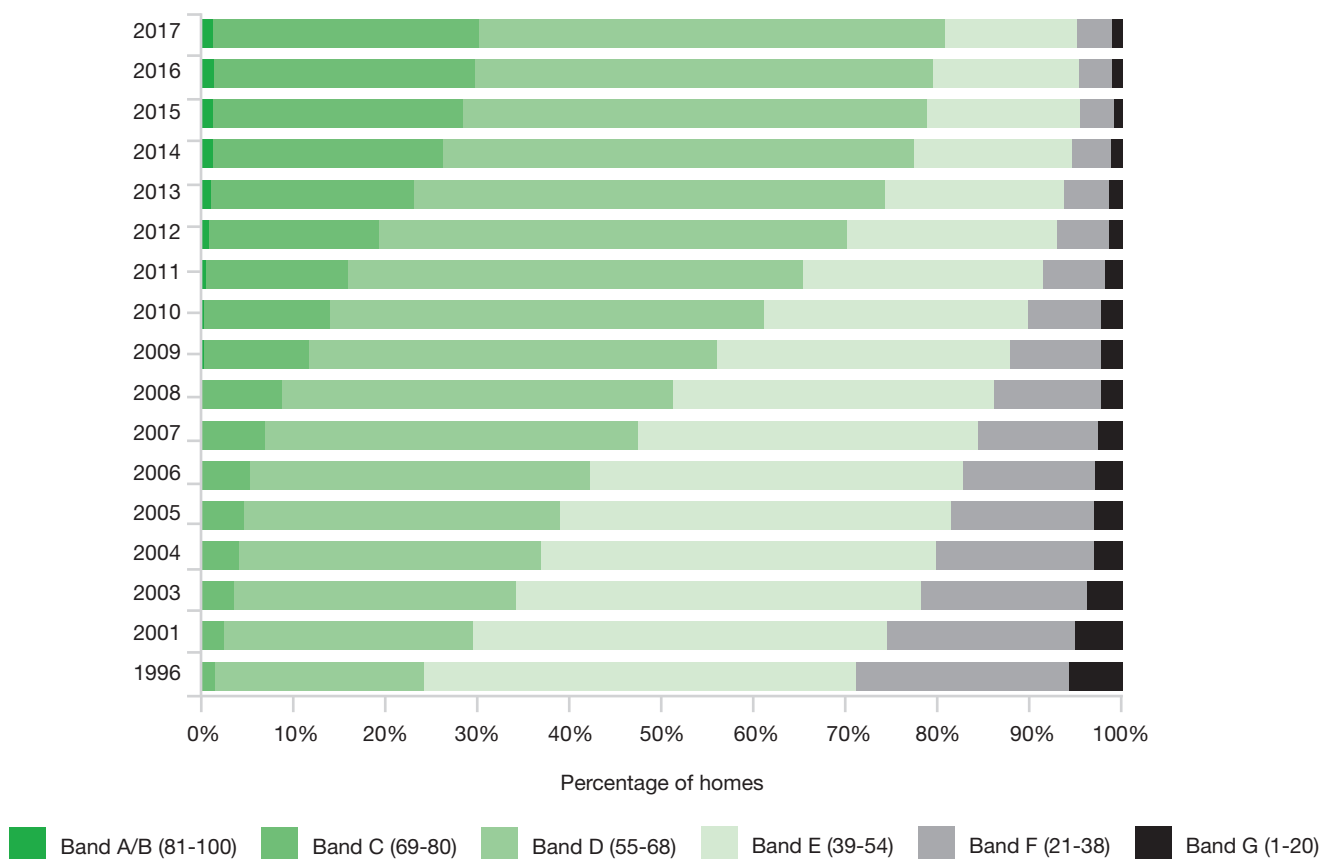
In December 2018, we published a review of evidence on options for decarbonising heat by 2050¹⁹¹. We are rapidly scaling up our ambition and action, and we will be publishing a 'heat policy roadmap' in summer 2020. We are continuing to test the different options for decarbonising

heat, to enable decisions in the first part of the 2020s on the best long-term pathway.

The government will continue to increase its efforts on energy efficiency. Alongside this report, we have published a consultation on raising standards for non-domestic rented buildings – which could save businesses

£1 billion a year in energy costs by 2030. We plan to consult on a trajectory to raise standards over time for domestic rented buildings later in the year. Following our Call for Evidence on Energy Performance Certificates in Buildings¹⁹², we will also set out a summary of responses and action plan to enhance and strengthen the current EPC framework.

Figure 10: Energy efficiency rating bands (England)



The Energy Performance Certificate (EPC) ratings of homes in England have been improving, largely due to tighter building and product standards, and obligations on energy suppliers to improve energy efficiency.
 Source: English Housing Survey¹⁹³

In the public sector, we will increase the capital pot for energy efficiency loans from £262 million to £385 million by 2020/21, as well as publishing a roadmap on our strategic approach to decarbonisation.

Additionally, at the UN Climate Action Summit in September, we signed up to the “Zero Carbon Buildings for All” initiative. This commits the UK to engage in a policy roadmapping process

focused on determining the nation’s best pathways towards zero carbon new buildings by 2030 and existing buildings by 2050.

It is clear that further efforts will be needed. We have set out ambitious policies and proposals to meet carbon budgets and set our building stock on the path to net zero. However, there remains a very long way to go, as we seek to increase the rate of deployment of energy efficiency

across the entire building stock, and to build on the steps we have taken to lay the groundwork for mass deployment of low carbon heat.

Response to the CCC's Recommendations

Recommendation 1:

Develop a fully-fledged strategy for decarbonised heat. This must be designed to fully decarbonise buildings across the UK in line with the net zero goal. HM Treasury must commit to working with BEIS, undertake a review of where the costs of the transition should fall, and allocate sufficient funding to deliver over the full period from now to 2050.

The government has committed to publishing a heat decarbonisation policy roadmap in 2020. This will set out the programme of work required to enable key strategic decisions in the mid-2020s on how we achieve the mass transition to low-carbon heat. We will work closely with stakeholders from industry, green and consumer groups, and academia to develop the roadmap, ensuring that we build in a wide range of views and expertise.

The roadmap will build on the government's review of the evidence on options to decarbonise heat in 'Clean Growth: Transforming Heating', published in December 2018¹⁹⁴. The review found that while there are a number of technologies that have the potential to offer low carbon heating, there is no consensus at present about which can do so economically and at scale, and not yet a clear basis for determining which approaches will be most cost effective overall. Due to the diversity of heat demand, the review also suggested that no single solution can provide the best option for all, meaning that a variety of technologies and options will need to be available.

Of the approaches we considered, we found that electrification and hydrogen both have the potential to deliver very deep reductions in emissions, although further work is needed

to determine the role that hydrogen can play in the transition to net zero. The review also found that biogas has the potential to make a substantial contribution, but that its scale is limited by the availability and prioritisation of sustainable biomass.

The report sets out priority areas we believe require further development across industry, academia and the public sector over the next 2-5 years, which include:

- Hydrogen – testing the safety, costs, practical delivery challenges and public perception and experience of hydrogen technologies and the conversion process;
- Electrification – improving understanding of potential future requirements for electricity generation and network reinforcement under different circumstances, and how these might be met most cost-effectively and practicably;
- Biogas – improving understanding of the potential for expanding biomass feedstocks in ways which are sustainable and affordable, whilst considering the prioritisation of limited biomass resource in the future.

The government is undertaking work to develop the evidence base for each of these options, which will feed into our roadmap and inform our understanding of the key strategic decisions that need to be taken before the mid-2020s about the long-term future of heat.

Following the announcement in the Spring Statement 2019¹⁹⁵, we are also developing proposals to increase the proportion of green gas in the UK gas grid, and will consult on the appropriate mechanism to deliver this commitment.

HM Treasury, BEIS and other government departments work closely together in the policy development process and will continue to do so. As the government announced in June, HM Treasury will also be taking forward a review into the costs and benefits of a net zero economy. The review will explore how we

can achieve the net zero transition in a way that works for households, businesses and public finances. The full scope and terms of reference will be set out in due course.

Recommendation 2:

Publish detailed plans to phase out the installation of fossil fuel heating in off-gas properties in the 2020s, ensuring there is no policy hiatus in 2021.

The Clean Growth Strategy set out the government's ambition to phase out fossil fuel heating such as oil, LPG and coal in homes and businesses off the gas grid during the 2020s, starting with new build.

In March 2018, we published a call for evidence to seek views on how industry, government and consumers could work together to deliver on this ambition¹⁹⁶. The responses we received from across the industry were clear that the government should set a long-term framework, ideally through regulations, that would enable industry to play their part in the decarbonisation of off gas grid areas. There was a clear view that this would allow industry to align their strategy and investment plans, and to drive forward innovation in technologies and business models. However, the continued engagement and expertise of the heating industry, energy suppliers, energy network operators and consumer advice groups will be vital to developing an effective policy framework.

Based on the evidence received, we continue to consider that, in combination with making properties more efficient, electrification offers the greatest decarbonisation opportunity for most buildings off the gas grid.

We are seeking to develop a comprehensive policy framework to support the transition to low-carbon heating in properties off the gas grid. It will aim to take forward the gains made by the Renewable Heat Incentive (RHI) and continue to build the market, backed by standards. We plan to consult on a policy framework backed

by regulations to deliver the commitment in the CGS in due course.

In the meantime, we are continuing to deliver carbon savings through the RHI and working to deliver a self-sustaining heat networks market – one which is attractive to investors, where costs continue to be driven down, consumers are properly protected and benefit from reliable and affordable heating, and which supports the decarbonisation of heat. As of August 2019, the RHI has supported over 91,000 business, public bodies, charities and households in transitioning to low-carbon heating: 19,584, through the non-domestic scheme and 72,403 through the domestic scheme.¹⁹⁷

There are currently around half a million individual customers on a heat network in the UK, and we are supporting the development of the market through our £320 million capital grants and loans programme (the Heat Networks Investment Project), as well as providing a further £20 million support to local authorities through the Heat Networks Delivery Unit¹⁹⁸. In December 2018, we published a policy paper which considers how to establish a market framework for heat networks. We aim to consult on policy options for the framework later in 2019.

Recommendation 3:

Strengthen new-build standards to ensure that all new homes built from 2025 at the latest are designed for a changing climate, are ultra-energy efficient and use low-carbon heat. No new homes built from 2025 should be connected to the gas grid. Ambitious standards for non-residential buildings must also be set.

As stated in the Clean Growth Strategy, the government is committed to strengthening new build standards to ensure our new homes are low carbon and fit for the future. The Future Homes Standard, announced in the 2019 Spring Statement, will set a standard by 2025 for all new homes to be future-proofed with low carbon heating and the highest standards of energy efficiency, to create healthy homes that

are fit for the future, have low energy bills, and are better for the environment. We have laid out our plans to implement the Future Homes Standard in our consultation on Part L of the Building Regulations.

Alongside housing, non-domestic buildings have an important role to play in decarbonising our building stock. The second part of the Part L consultation, which will cover non-domestic buildings, will be published later this year.

We expect that in future all new premises will have smart meters, and the government has implemented measures to normalise smart metering as the default meter offer in Great Britain. This will give households the ability to shift their consumption of energy so that they are able to use energy when prices are lower and avoid times of day when prices are higher. This will benefit the energy system by helping to balance supply and demand – reducing reliance on high carbon forms of generation.

Recommendation 4:

Set clear trajectories of standards across the building stock and firm policies to drive delivery. This includes introducing concrete policies for able-to-pay homeowners, addressing the major delivery risks which remain around the Private Rented Sector (PRS) regulations and setting out a trajectory, a delivery mechanism for the social housing minimum standards, and concrete policies to deliver the ambition for non-residential buildings.

(a) ‘Able-to-pay’ households

The government is committed to ensuring that policy is in place to enable able-to-pay households to take up energy efficiency measures. This is essential if we are to meet the aspiration set out in the Clean Growth Strategy that as many homes as possible should reach EPC Band C by 2035¹⁹⁹. There is no silver bullet that will achieve this, so we are focusing on building a vibrant and sustainable market for energy efficiency, as set out in our Call for Evidence on Building a Market

for Energy Efficiency in 2017. We published a summary of responses to this call for evidence in July 2019 and are considering these as we develop future policy²⁰⁰.

Over the last year, we have launched a number of initiatives which aim to promote home energy efficiency improvements and uptake of retrofit.

In the Green Finance Strategy, we announced the launch of the £5 million Green Home Finance Innovation Fund which will support the development and piloting of innovative green mortgages and other green home finance products²⁰¹. We also plan to consult later this year on requirements for lenders to support homeowners to improve the energy efficiency of the homes they lend to.

In support of the Buildings Mission objective to drive down the cost of retrofitting an existing building to modern energy standards, we launched a Whole House Retrofit cost reduction innovation competition in June 2019. This competition makes available approximately £9.4 million for a limited number of innovative projects that will work to demonstrate cost reduction potential for whole house retrofit²⁰².

Since January 2019, we have been funding six Local Supply Chain Demonstration projects to test different approaches for addressing the supply side barriers to energy efficiency²⁰³. The aim of the demonstration projects is to increase the uptake of retrofit work by providing support for local supply chain integration and project coordination, and by targeting able-to-pay owner occupiers with attractive and more affordable opportunities for retrofit work. A number of these pilots are utilising the newly published retrofit standard (PAS 2035).

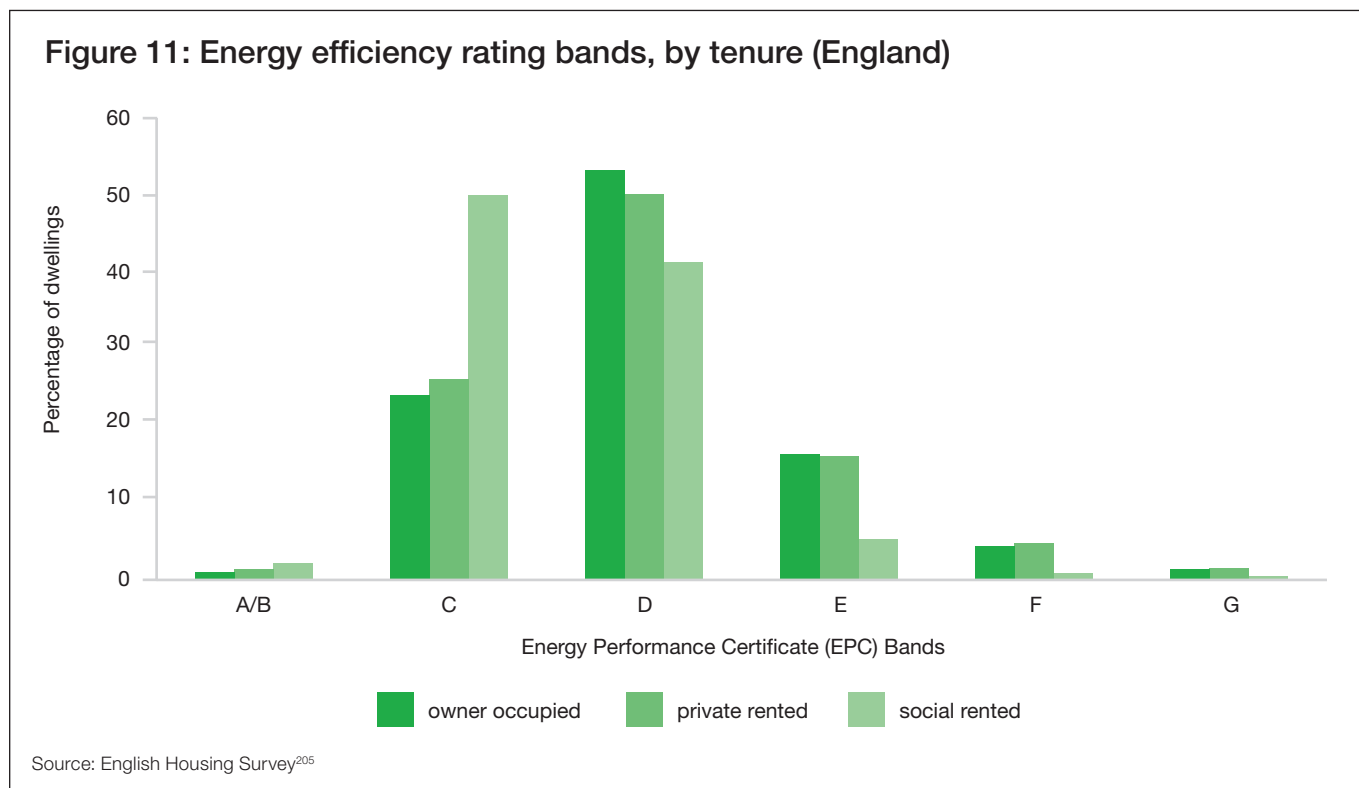
Local Authorities (LAs) from different regions in England are producing a series of feasibility and design studies to test means of encouraging homeowners to improve the energy efficiency of their properties through retrofit measures. With grant funding from the government, the five Local Energy Hubs have each allocated £200,000 to LAs in their regions. In total, around

ten LAs are participating in these studies which are due to be completed by summer 2020.

The Smart Energy Savings (SENS) Competition was launched in February 2019. It is providing successful applicants with a share of £6.25 million in funding to support the development and trialling of products and services that use smart meter data to provide energy feedback and advice²⁰⁴. This may include recommendations on how to reduce consumption based on households' actual usage (and data analytics), or personalised recommendations for energy efficiency measures. The competition includes a programme of research to assess the impact

of supported products on household energy use and concludes in March 2021.

The Energy Company Obligation (ECO) was reformed at the end of 2018. While previous schemes have focused on both able to pay and fuel poverty, the current scheme solely focuses support on low income and vulnerable households. Beyond the ECO scheme, the government has committed to extend support to home energy efficiency improvements to at least the current level of funding (£640 million annually) through to 2028, with a plan to consult on the successor scheme in 2020.



(b) Domestic Private Rented Sector

In April 2019, amendments to the Energy Efficiency (Private Rented Property) Regulations 2015 came into force. Landlords of EPC Band F and Band G rated homes are now required to invest, or co-invest, up to £3,500 in improving the energy efficiency of these properties to at least an EPC Band E²⁰⁶.

Of the different landlord spending cap options consulted on, the government considered that the £3,500 cap offers the best non-traded emissions savings, on the basis that landlords optimise costs. It also balances improvements in properties reaching EPC Band E, improving those properties unable to reach Band E, and concerns around imposing too high a financial commitment on landlords. The £3,500 cap enables 48% of EPC Band F and Band G properties to be improved to Band E, with the

remaining 52% able to make some level of improvement²⁰⁷. The regulations also represent an important contribution towards the first fuel poverty milestone, which is based on the key principle of prioritising support on the worst levels of fuel poverty.

Local Authorities (LAs) are responsible for enforcement of the minimum energy efficiency standard Regulations. The government is currently funding a year-long pilot study involving a representative sample of seven LAs to help build our understanding of enforcement of the Regulations. We will use the learnings to develop an enforcement best practice ‘toolkit’ to be shared with LAs across England and Wales. We are also considering whether changes to the legislation are required to support better enforcement.

The Clean Growth Strategy set out the government’s intention to look at a long term trajectory for energy performance standards across the private rented sector, with the aim of as many private rented homes as possible being upgraded to EPC Band C by 2030 where practical, cost-effective and affordable. The government is considering policy options to deliver this, which could include further strengthening of the Regulations. We have held a series of stakeholder workshops across England and Wales to inform policy options²⁰⁸, and plan to consult on a trajectory this winter.

(c) Social housing

The government is exploring how the energy performance standards of social housing can be upgraded where practical, cost-effective and affordable. The Social Housing Green Paper²⁰⁹ (published in August 2018) asked whether there were any changes to what constitutes a Decent Home that we should consider, including whether the energy performance of social homes should be upgraded to Energy Performance Certificate Band C by 2030 where practical, cost effective and affordable. The government is currently considering the responses to the consultation and will publish our action plan for implementing social housing reform in due course.

(d) Low Income and Vulnerable Households

In England, the Fuel Poverty Target commits to improving the energy efficiency of as many fuel poor homes as reasonably practicable to a rating of Band C by the end of 2030²¹⁰. The Fuel Poverty Strategy for England sets interim milestones of Band E by 2020 and Band D by 2025. The government recognises that specific policies may be required to support lower income and vulnerable households to improve the energy performance of their homes and switch to low carbon heating, to ensure that these households are not left behind in the energy transition.

The Energy Company Obligation (ECO), which is a requirement on larger energy suppliers to deliver energy efficiency measures to domestic consumers in England, Scotland and Wales, has delivered over 2.5 million measures since it was introduced in 2013²¹¹. In 2018, the scheme was reformed so that support is entirely focused on low income and vulnerable consumers. The scheme provides support worth up to £640 million per year and will run to 2022²¹². A new innovation element was introduced under the current ECO, enabling manufacturers of products and energy suppliers to develop partnerships and to introduce new, better and more efficiently delivered measures to homes.

In July 2019, the government published a consultation on proposals to update the Fuel Poverty Strategy for England, which seeks views on policies to improve energy efficiency for households in fuel poverty²¹³. The consultation also proposed a ‘sustainability principle’ which is intended to ensure that policies are designed to benefit fuel poor households in the long term, whilst seeking to ensure action taken is complementary to other government priorities such as delivering the Clean Growth Strategy and our target of reaching net zero emissions by 2050. Following that consultation, we intend to publish an updated Fuel Poverty Strategy for England.

(e) Non-residential buildings

There are 1.8 million non-domestic buildings in England and Wales, of which approximately 1.1 million (60%) are privately rented.²¹⁴ Since 1 April 2018, minimum energy efficiency standards have been in place for non-domestic rented properties. Designed to improve the worst performing buildings, the regulations mean that landlords cannot grant, extend or renew a tenancy unless their property has obtained an energy efficiency rating of at least EPC Band E.

The government has published a consultation alongside this response on a future trajectory for the non-domestic PRS Regulations. Acknowledging the need to set a long-term regulatory target in the sector that can drive clean growth and reduce emissions in line with the government's renewed level of ambition, our preferred trajectory is that all non-domestic privately rented buildings achieve a minimum energy efficiency standard of EPC Band B by 1 April 2030.

The EPC B target will bring 85% of the existing PRS building stock within scope of regulations, driving significant action across the stock. Four of the pilot areas in the government-funded enforcement study (see part b) are looking at non-domestic enforcement of the minimum energy efficiency standards; and as part of developing a best practice 'toolkit', we will consider what changes can be made to support enforcement at scale.

As set out in response to Recommendation 3, we will publish the second part of the Part L consultation, which will cover non-domestic buildings, later this year.

The existing regulatory framework in England and Wales focuses primarily on building fabric and is effective at improving the quality of business buildings. However, it is also important to ensure that industrial and commercial buildings are operated in ways that maximise their energy performance. We therefore intend to consult in 2020 on introducing mandatory in-use energy

performance ratings for non-domestic buildings in the private sector. This will be a key step in helping businesses to understand and improve the actual energy performance of their buildings.

The government is developing a new 'Small Business Energy Efficiency Scheme' and published a Call for Evidence in March 2019 to explore options²¹⁵. This closed on 8 May and we will set out next steps in due course. The market failures and barriers to SME energy efficiency are well documented, and careful policy design will be needed to overcome these barriers.

To address some of these barriers, the government launched the Boosting Access for SMEs to Energy Efficiency (BASEE) innovation competition in March 2019. This offers up to £6 million to fund the development of new, innovative scalable business models or solutions that reduce costs, simplify processes and encourage the take up of energy efficiency by SMEs at scale²¹⁶. We have awarded 14 contracts for feasibility studies which will complete in late Autumn. Phase 2 of the competition, which will focus on developing prototypes and market testing solutions, will start in January 2020.

In addition, the government is funding solutions which use smart meter data to support SMEs to make operational improvements and reduce energy consumption. In March 2018, the government launched the Non-Domestic Smart Energy Management Innovation Competition (NDSEMIC)²¹⁷. This £8.8 million investment targets the development of solutions for smaller non-domestic sites in the schools, retail and hospitality sectors. These solutions aim to help SMEs manage their energy use better through the provision of data-driven tailored and contextual energy advice, tips and activities. Pilots to test solutions in real-world settings started in March 2019 and will conclude in January 2020.

(f) Public Sector

The government is taking a leading role in reducing greenhouse gas emissions through

the Greening Government Commitment to reduce central government emissions by 43% by the end of 2019/20 compared to 2009/10 – having met the original target of a 32% reduction three years early²¹⁸. Good progress is being made towards our 43% reduction target, with the latest Greening Government Commitment Annual Report showing that we have delivered a 39% reduction in emissions by 2017/18²¹⁹.

The government has also continued to fund public sector energy efficiency projects through our loan scheme, managed by Salix Finance. The capital pot for England stands at £262 million as of the end of 2018/19 and is planned to increase each year to a total of £385 million by 2020/21.

Recommendation 5:

Tackle performance and compliance issues to ensure that new buildings and measures retrofitted in existing buildings perform as they should. This includes consulting on strengthened compliance and enforcement measures which extend beyond fire safety to regulations more widely; funding building control adequately; and developing a nationwide training programme to upskill the existing workforce, alongside implementation of low-carbon accreditation.

On the issue of compliance and enforcement, the government launched the consultation ‘Building a safer future: proposals for reform of the building safety regulatory system’²²⁰ earlier this year. The consultation proposes establishing a single building safety regulator that would have responsibility, at a national level, for oversight of the building safety and wider building regulatory system. It proposes a set of responsibilities for the new building safety regulator, including oversight of work to drive increased competence of professions and trades working on buildings across the whole of the built environment. We are currently analysing feedback from industry and will publish a summary of the consultation responses, and the government’s view on the way forward, in due course.

Furthermore, the government is consulting, alongside uplifts to requirements under Part L of the Building Regulations, on measures to improve the accuracy of as-built energy calculations. We are seeking to reduce the performance gap through the provision of clear information about the as-built specifications of new buildings to Building Control Bodies and building occupiers.

We are also addressing building performance and manufacturing issues by working with industry to implement the Construction Sector Deal. Funded through the Transforming Construction Programme, the Construction Innovation Hub is developing digitally driven, standardised approaches that improve productivity and the whole-life performance of built assets. We recognise the need to ensure that the industry has the necessary skills to implement these approaches and to deliver the required improvements to the quality and performance of new builds and the existing building stock. Details of government action to deliver on this are discussed in Recommendation 7.

The government has implemented the majority of the Each Home Counts review recommendations on consumer advice, protection and standards. This includes launching the reformed TrustMark Government endorsed quality scheme in October 2018 and publishing new technical PAS standards for domestic retrofit in June 2019. We have consulted on incorporating the new quality scheme and standards into ECO through secondary legislation²²¹.

To strengthen compliance and enforcement more widely, the government recently consulted on ‘Redress for purchasers of new build homes and the new homes ombudsman’²²². The consultation sought views on whether a Code of Practice for developers building new homes should be underpinned in statute, including requirements for clear information on energy performance and the powers a New Homes Ombudsman could have where disputes arise. The consultation closed on 22 August 2019 and we are currently analysing the responses.

In addition, the government is procuring the British Standards Institute (BSI) to review and develop standards for the installation of energy efficiency measures that will improve the non-domestic retrofit standards framework. These standards will support the 'Small Business Energy Efficiency Scheme' which was announced at Budget 2018 and is currently under development.

Recommendation 6:

Reform monitoring metrics and certification to reflect real world performance, rather than modelled data (e.g. SAP). Accurate performance testing and reporting must be made widespread, committing developers to the standards they advertise.

In the forthcoming consultation on non-domestic requirements under Part L of the Building Regulations, the government will explore options for improving monitoring and reporting of building performance, informed by ongoing Government R&D schemes.

The government has launched the Smart Meter Enabled Thermal Efficiency Ratings (SMETER) scheme to invest up to £5 million to develop, test and demonstrate technologies that measure the thermal performance of homes using smart meter and other data²²³. We are also utilising the Building for 2050 project, led by AECOM and launched earlier this year, to test the in-use performance of low cost, low carbon build homes, monitoring both construction and operation to ensure build performance meets design. We will consider the future role of these approaches and technologies to verify as-built performance on site in the consultation on Part L due later this year, mindful that the Building Regulations do not currently impose ongoing requirements on buildings after completion.

In addition, the government has sought evidence on the performance of Energy Performance Certificates and the suitability of the current system of EPCs for their current and emerging uses²²⁴. The Call for Evidence on EPCs asked for views on how technologies such as SMETERs

might be integrated into the existing EPC system, as well as considering other ways in which the accuracy and reliability of EPCs could be improved. Responses to the Call for Evidence will inform future policy development in this area. We will set out a summary of responses to the Call for Evidence and an action plan later in the year.

Alongside the current consultation on Part L, the government has published an update to the Standard Assessment Procedure (SAP) in order to ensure that SAP continues to provide an accurate and up-to-date assessment of the energy performance of homes where possible. We are working closely with the SAP Industry Forum (SAPIF) to scope potential changes for the next major update, SAP 11, and are considering the long-term impact on the SAP of new monitoring technologies.

As set out in Recommendation 4, the government intends to consult next year on introducing mandatory in-use energy performance ratings for non-domestic buildings in the private sector.

Recommendation 7:

Review professional standards and skills across the building, heat and ventilation supply trades with a nationwide training programme to upskill the existing workforce.

As the CCC recognises, it will not be possible to deliver a transformation in the energy efficiency of the building stock and widespread deployment of decarbonised heating solutions without a skilled workforce. The government is taking action with industry to ensure that we have the skills needed to rise to this challenge.

Improving skills

As part of the National Retraining Scheme, we are investing £34 million to scale up innovative training models for construction skills across the country²²⁵. This includes the Construction Skills Fund, which supports the development of construction on-site training hubs. The Construction Industry Training Board (CITB) is contracted by the Department for Education to

enable the training and support of a minimum of 13,000 individuals by 2020, and collectively the successful hubs plan to support approximately 17,000 people who are either unemployed or looking to make a career change to be construction site ready²²⁶.

We have committed to improve the quality of our technical education. The construction sector has been working with the Institute for Apprenticeships and Technical Education to develop new, employer-owned apprenticeship standards, and 77 construction standards have now been approved²²⁷. Construction will be in the first wave of T-Levels due to be launched in 2020, and through the Construction Sector Deal, industry has pledged to provide 1,000 work placements for T-Level students²²⁸.

In line with the recommendations of the Each Home Counts Review, we have ensured that good training routes are in place alongside new quality standards: CITB have sponsored the establishment of a new retrofit coordinator course to ensure competence in delivering the PAS 2035 standards published in June 2019. We will continue to support industry to upskill to meet the new requirements.

Agility

It is important that our construction industry has the ability to respond as the market changes, which is why we have been working closely with CITB to implement a significant programme of reform in order to ensure that CITB is better able to respond to the emerging skills needs of the construction sector. This includes skills for sustainable construction and for improving energy efficiency in the existing housing stock.

Future skills support

The government is also considering specific standards and skills across heat and ventilation. For example, we are undertaking extensive stakeholder engagement with heating installers to understand the existing supply chain's ability to deliver low carbon heat installations. The outcomes of this engagement will determine

the crucial roles for government, installers and the wider supply chain in ensuring that supply is able to meet demand for heat installation. We will set out full details of the scale of the challenge and joint government/industry activity to address it.

Chapter 3: Progress on Reducing Emissions from Industry



10 Key Achievements on Industry

Since last year, we have:

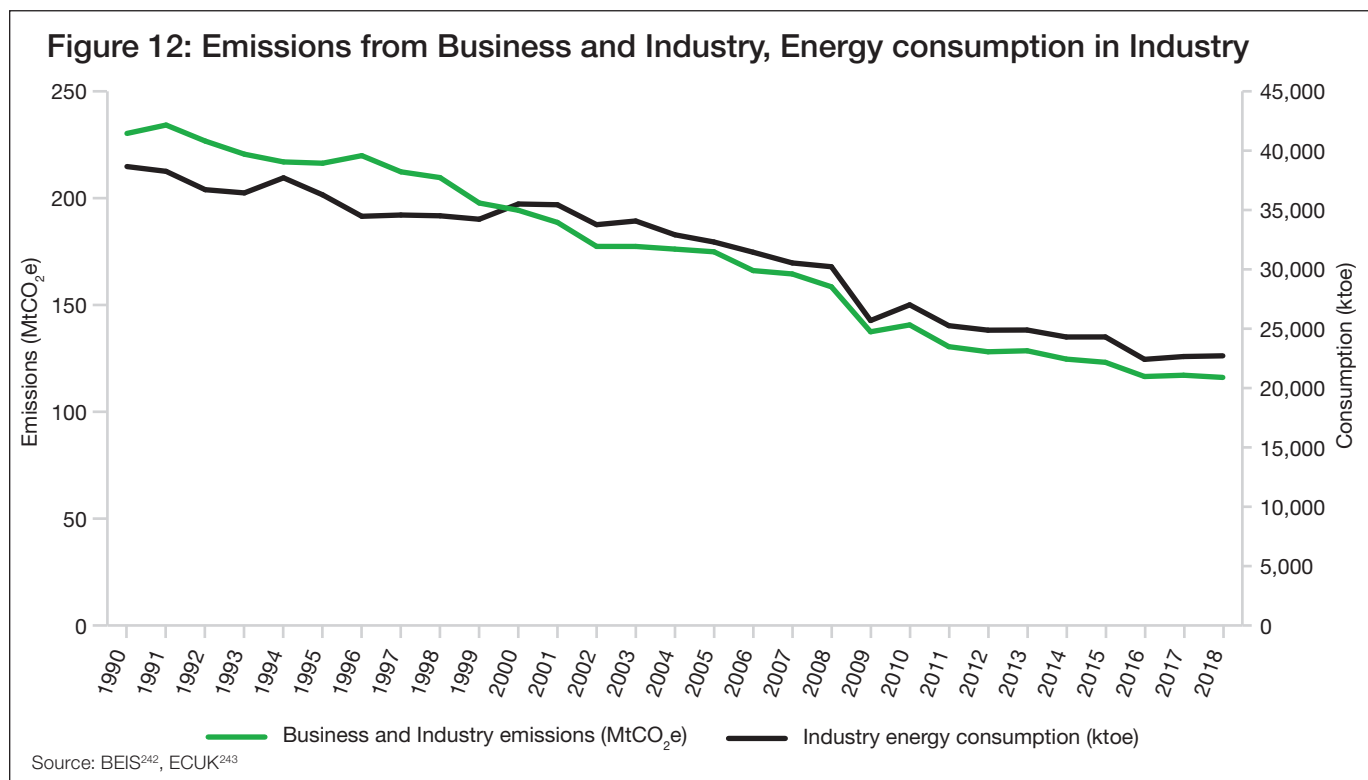
1. Launched the **Industrial Clusters Mission** under the Clean Growth Grand Challenge, aiming to establish in the UK the world's first net zero carbon industrial cluster by 2040 and at least one low-carbon cluster by 2030. To kickstart the mission, the government is investing up to **£170 million under the Industrial Strategy Challenge Fund**²²⁹.
2. Announced the £315 million **Industrial Energy Transformation Fund (IETF)** to support businesses with high energy use to transition to a low carbon future through investment in energy efficient processes and deep decarbonisation technologies. We have engaged extensively with stakeholders on the design of the scheme – including through an informal consultation and a market intelligence exercise to explore the types of energy-saving and carbon-saving projects that businesses would like to implement but have been unable to do so. A formal consultation on the proposed design of the scheme was launched in October.
3. Announced a £250 million **Clean Steel Fund** to support the UK steel sector to transition to lower carbon technologies and processes. A call for evidence was launched to better understand the needs of the steel sector and inform the future design of the fund²³⁰.
4. Announced a £100 million **Low Carbon Hydrogen Production Fund**, which aims to enable greater use of hydrogen as a decarbonisation option across the energy system and encourage future private sector investment in low carbon hydrogen²³¹. This builds on the £108 million we are investing in innovation programmes along the hydrogen value chain.
5. Published our **Carbon Capture, Usage and Storage (CCUS) Action Plan** – a key commitment in the Clean Growth Strategy²³². The Action Plan sets out the next steps that government and industry will take in partnership in order to achieve the government's ambition of having the option to deploy CCUS at scale during the 2030s, subject to costs coming down sufficiently.
6. Continued to invest in the development of CCUS technology, supporting **9 innovative schemes with £26 million of government funding**. This includes a Tata Chemicals project to construct a facility to capture and utilise 40,000 tonnes of carbon dioxide a year – the equivalent to emissions from 22,000 cars²³³.
7. Published **key consultations to help progress CCUS deployment** – on potential business models for CCUS (which also explored business models to support hydrogen production)²³⁴ and on the re-use of existing oil and gas infrastructure²³⁵.
8. **Responded to the Call for Evidence on 'Helping Businesses to Improve the way they use Energy'**, setting out our next steps towards our target in the Clean Growth Strategy to improve business energy efficiency by 20% by 2030²³⁶.
9. Published a consultation on **The Future of UK Carbon Pricing**, setting out the UK government and the Devolved Administrations' preferred approach to UK carbon pricing once we have left the European Union.²³⁷
10. Set out plans to promote resource efficiency and move towards a circular economy through the **Resources & Waste Strategy**²³⁸; committed to tackle industrial emissions of air pollutants in the **Clean Air Strategy**²³⁹; and launched the **UK Bioeconomy Strategy**, setting out the approach that government, industry and the research community will take to harness the power of bioscience and biotechnology to build a world-class bioeconomy, using renewable biological resources to replace fossil resources in products, processes and services²⁴⁰.

Summary of Progress

Reducing emissions whilst keeping energy bills down for business and industry is a priority for the government. We are focused on making progress towards our long-term net zero target by increasing the efficiency of buildings and industrial processes in line with the Clean Growth Grand Challenge, which aims to improve productivity and maximise the

advantages for UK industry from the adoption of low carbon technologies.

Emissions from business and industry have almost halved since 1990²⁴¹, mainly due to efficiency gains and a shift in manufacturing to cleaner fuels, as well as changes to the structure of the UK economy. The emissions intensity of industrial business energy use has also continued to fall and is now 18% lower than in 1990 (see Annex A).



The Clean Growth Strategy set out our ambition to improve business energy efficiency by at least 20% by 2030 (compared to 2015 levels)²⁴⁴, which will reduce energy bills by up to £6 billion by 2030 and contribute savings of around 22MtCO₂e in the fifth carbon budget period²⁴⁵. A number of policies and schemes are already in place to support businesses to cut their energy use – such as the Climate Change Agreements Scheme, the Energy Savings Opportunity Scheme, and the introduction in April 2019 of Streamlined Energy and Carbon Reporting by all UK large or quoted businesses. These policies, and new policies under development,

are designed to unlock the estimated additional £23 billion private investment needed to meet this ambition.

As set out in the Call for Evidence on “Helping Businesses to Improve the way they use Energy”²⁴⁶, published in July 2018, much of the abatement potential across the industrial and commercial sectors to 2030 can be met through building fabric improvements, better instrumentation and control, low carbon heating and improved energy management systems. To encourage and support investment in heat recovery technologies, we have this

year extended the £18 million Industrial Heat Recovery Support (IHRS) programme to March 2022 and awarded the first grant offers under the programme.

In the Clean Growth Strategy, the government committed to developing a framework to support the decarbonisation of industry over the course of the parliament. Over the last year we have continued to bring forward new policies and initiatives that will form a key part of that framework. The Industrial Clusters Mission, announced in December 2018 as part of the Clean Growth Grand Challenge, has set an ambition to establish the world's first net zero carbon industrial cluster by 2040 and at least one low-carbon industrial cluster by 2030. We have also announced four significant decarbonisation funds:

- The £315 million **Industrial Energy Transformation Fund** (IETF) to support businesses with high energy use to cut their energy bills and reduce carbon emissions²⁴⁷. In October, we published a formal consultation on the detailed scheme design. We propose that the first phase of the Fund will support a small number of energy efficiency projects and feasibility and FEED studies worth up to £30 million in total. The second phase will deliver the full scheme from 2021 to 2024 and will be worth around £285 million. In this phase, we propose that the IETF will be open to applications for deep decarbonisation projects beyond the research and innovation stage, including industrial carbon capture and fuel-switching.
- The **Industrial Decarbonisation Challenge**, a UK Research and Innovation (UKRI) programme which aims to accelerate the cost-effective decarbonisation of industry by developing and deploying low-carbon technologies. This will support delivery of the Industrial Clusters Mission and is funded by up to £170 million from the Industrial Strategy Challenge Fund, which is expected to be matched by up to £261 million from industry²⁴⁸.
- The £250 million **Clean Steel Fund**, which aims to support the UK steel sector to transition to lower carbon iron and steel and maximise longevity and resilience²⁴⁹. A call for evidence was launched in August 2019 to develop the design of the fund.
- A £100 million **Low Carbon Hydrogen Production Fund**, to support the deployment of low carbon hydrogen production at scale²⁵⁰. Availability of low carbon hydrogen could enable a pathway to lower carbon steel production and support broader efforts to decarbonise industry.

On Carbon Capture, Usage and Storage (CCUS), our CCUS Action Plan, published in November 2018, confirms that we will shift our focus to initial deployment, with an aim to deploy the UK's first CCUS facility from the mid-2020s. This is a critical milestone to achieving our ambition for the UK to have the option to deploy CCUS at scale in the 2030s, subject to the costs coming down sufficiently. To progress this, we published two consultations on potential business models for CCUS and on the re-use of existing oil and gas infrastructure, which has the potential to reduce the costs of the technology.

We are investing over £50 million in innovation support for CCUS to March 2021 to support cost reduction and the development of the technology²⁵¹. As part of this, we announced £26 million to support 9 innovative projects in June 2019, helping to unlock private sector investment²⁵². We have also continued the UK's international leadership on CCUS through the Global CCUS Summit, co-hosted with the International Energy Agency in November 2018; leadership of the CCUS initiatives under Mission Innovation and the Clean Energy Ministerial; and our Memorandum of Understanding on collaboration on CCUS with Norway.

Next Steps

The UK's net zero target will be at the heart of our approach as we develop future policies and build on our existing ambitious action to decarbonise

business, including industrial sectors. This will require further investment and greater collaboration between government, industry and consumers to drive forward progress.

To help to deliver on our 20% business energy efficiency target, we have launched a consultation on a long-term trajectory to tighten minimum energy efficiency standards for non-residential buildings. We will look to strengthen the Energy Savings Opportunity Scheme and any future Climate Change Agreements Scheme, and introduce a new scheme to help small businesses reduce their energy use. We will also take action to help build a market for energy efficiency following our recent Call for Evidence, and to reduce the use of fossil fuels for heating in non-residential buildings off the gas grid.

On CCUS, the government will continue to deliver the commitments set out in the CCUS Action Plan. This includes publishing responses to the consultations on business models and the potential re-use of oil and gas existing assets for CCUS by the end of 2019, as well as publishing an action plan in collaboration with Mexico and Saudi Arabia to advance the Mission Innovation CCUS Challenge.

We will continue to work closely with UK Research and Innovation on the design and development of the £170 million Industrial Decarbonisation Challenge to support the Industrial Clusters Mission, and expect this to be launched by the end of the year²⁵³.

We are committed to ongoing dialogue with stakeholders as we review responses to the call for evidence on the Clean Steel Fund, which is open until 21 November 2019, and will consult formally on the fund in due course.

The government will publish its response to the consultation on the IETF next year. We expect to launch the first phase of the Fund with guidance for applications in spring 2020, and to open for applications in the summer. The second phase will commence in 2021. We are aiming to encourage companies to start developing

projects that can apply when the first application window opens.

In addition, we intend to consult on the shape of the Low Carbon Hydrogen Fund during 2020 with a view to launching the Fund for bids in 2021. Engagement with stakeholders and industry during this period will guide how the Fund should be spent, whilst maximising value for money to taxpayers.

Response to the CCC's Recommendations

Recommendation 1:

Deliver near-term capital support for industrial decarbonisation, through the IETF and ISCF. Where necessary this should be accompanied by bespoke support for operational expenditure for these projects.

We have allocated up to £170 million from the Industrial Strategy Challenge Fund (ISCF) to kick-start delivery of the Industrial Clusters Mission. Although the ISCF is a UK Research and Innovation (UKRI) programme, the government is working closely with them on the design and development of the Industrial Decarbonisation Challenge (IDC), which will focus on supporting the deployment of decarbonisation technologies in one or more industrial cluster. The IDC will run from 2019/20 to 2023/24.

The Industrial Energy Transformation Fund is aimed at supporting businesses with high energy use to cut their energy bills and emissions, primarily through investing in low carbon technologies. The government has been engaging with stakeholders from across industry and academia, as well as with the CCC, to help inform the design of the fund. We are currently consulting on our preferred scope and criteria, which will remain open until November. The IETF has a budget of £315 million over five years from 2019/20 to 2023/24²⁵⁴. We propose that the fund will be delivered in two phases: a first phase to support a small number of energy efficiency projects and feasibility and FEED

studies (worth up to £30 million), and a second phase that will be open to applications for deep decarbonisation projects including industrial carbon capture and fuel-switching (worth £285 million from 2021 to 2024).

As we develop the IDC and the IETF – and other related policies, for example on CCUS – we will consider a range of issues, including questions around funding for projects which give rise to ongoing additional costs that outweigh returns.

Recommendation 2:

Make explicit how current and future policies will achieve a 20% reduction in energy use for businesses by 2030.

The government is making good progress towards helping businesses to meet our ambition, set out in the Clean Growth Strategy, to improve their energy efficiency by at least 20% by 2030 (against a 2015 baseline)²⁵⁵. Achieving this target will save businesses up to £6 billion in 2030 and reduce carbon emissions by 22 MtCO₂e over the fifth carbon budget period (2028-32)²⁵⁶.

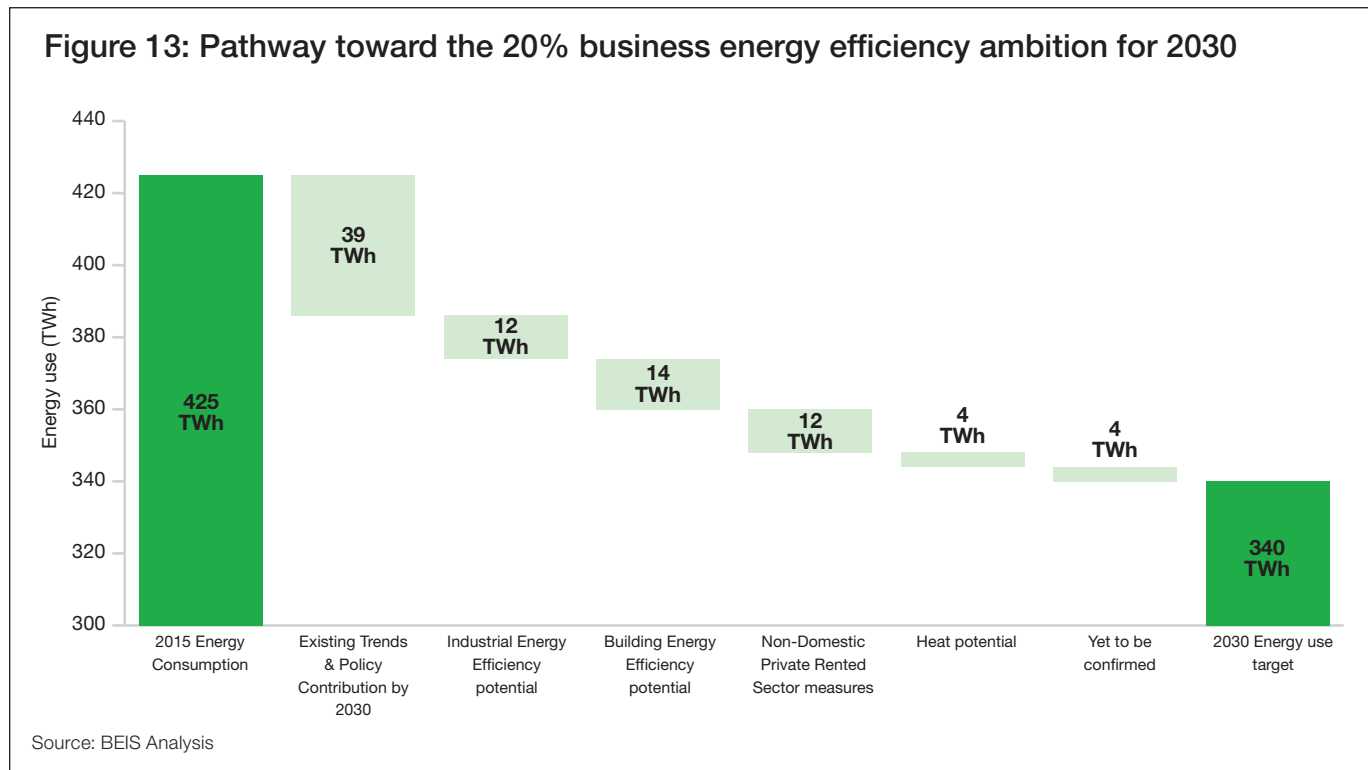
Our progress so far

- In July 2018, we published a Call for Evidence on “Helping Businesses to Improve the way they use Energy”. The Government Response was published in March 2019, summarising responses and views and setting out our next steps.
- In March 2019, we issued a call for evidence on introducing a new Business Energy Efficiency Scheme for SMEs²⁵⁷ which will reduce energy bills for small businesses and associated carbon emissions. The Boosting Access for SMEs to Energy Efficiency (BASEE) competition²⁵⁸ was also launched to fund the development of new products and business models to encourage take up of energy efficiency projects by SMEs and in July 2019 we awarded 14 contracts for feasibility studies.

- The £18 million Industrial Heat Recovery Support (IHRS) programme²⁵⁹ was introduced in July 2018 to encourage and support investment in heat recovery technologies. We have already awarded 16 grant offers under the programme totalling around £1 million²⁶⁰. This year, we extended the programme by a year to March 2022²⁶¹.
- Large or quoted UK businesses are required to disclose their annual energy and carbon emissions in annual reports under the Streamlined Energy and Carbon Reporting (SECR) framework, which came into force in April 2019. This aims to simplify reporting requirements while increasing corporate transparency, further incentivising energy efficiency and reducing emissions.
- Alongside this report, the government has launched a consultation on tightening the minimum energy efficiency standards for the non-domestic private rented sector (with a proposed trajectory of EPC Band B by 2030). We have also committed to consulting in 2020 on mandatory in-use energy performance ratings for business buildings.

How the 2030 ambition will be achieved

Figure 13 sets out how we will enable businesses to meet this ambition by reducing their energy use by 85TWh in 2030 through more efficient use of energy in the way in which buildings are constructed, refurbished and operated, and through more energy efficient manufacturing processes²⁶². Our modelling indicates that existing policies and processes will deliver around half of this energy saving, and we are committed to taking the further action needed to meet our 2030 target.



Our analysis suggests that policies to improve industrial energy efficiency could contribute 12TWh to the 2030 ambition²⁶³. We are developing our proposals to unlock investment to deliver this, including the Industrial Energy Transformation Fund (IETF) and a future reformed Climate Change Agreements (CCA) scheme. As stated in the Clean Growth Strategy, we remain committed to carbon pricing as an emissions reduction tool. Policies that deliver on this commitment include Carbon Pricing Support rates. In parallel, the Climate Change Levy will continue to incentivise efficient energy use by businesses. This, alongside incentives such as Climate Change Agreements, the IHRS, support for good quality combined heat and power (CHP), and our product labelling and standards will drive reductions in energy use and encourage investment in the most energy efficient technologies.

Improving the energy performance of commercial and industrial buildings will also be a priority, with the potential to contribute 26TWh by 2030. We aim to deliver this through a range of measures such as our Small Business Energy

Efficiency Scheme and action to strengthen the minimum energy efficiency standards for non-domestic buildings, including by setting a long-term trajectory for standards in the non-domestic private rented sector (PRS).

Alongside SECR, the Energy Savings Opportunity Scheme (ESOS) requires large businesses to carry out regular audits of their energy use in buildings, processes and transport and receive recommendations on energy efficiency improvement actions they can take. We will shortly publish the evaluation and post implementation review of ESOS and expect to publish a consultation early next year which sets out proposals for strengthening future phases of the scheme.

To deliver on our commitment in the Clean Growth Strategy, the government is also developing its approach to phase out the use of fossil fuels for heating in commercial and industrial buildings off the gas grid (see Chapter 2).

Taken together, our current approach reinforced by new policies will deliver the step change in energy efficiency that is needed to meet the

2030 ambition. We estimate that delivering this level of ambition will require around £23 billion in additional investment and will require substantial investment from private sector, which is why we are also taking steps to build the market for energy efficiency. An evaluation of the Electricity Demand Reduction (EDR) pilot was published in July 2019, which concluded that energy efficiency projects are not yet ready to enter the GB Capacity Market as currently designed. We have subsequently been seeking views, through a call for evidence that closed on 25 September 2019, on market barriers to energy efficiency in the UK and how we can create new markets for energy efficiency, securing its role in the wider energy market, contributing to flexibility and becoming a reliable alternative to increased generation and network reinforcement²⁶⁴.

Recommendation 3:

Publish the results of the evaluation of Climate Change Agreements to inform any successor scheme for 2023.

The current Climate Change Agreement (CCA) scheme, which began in 2013, covers 53 sectors, with over 3,400 facilities participating in the scheme²⁶⁵. It provides an annual reduction to their Climate Change Levy (CCL) of £200-300 million, and participants meeting their obligations under the scheme will continue to receive this discount through to March 2023²⁶⁶. Participants have reported a reduction to December 2018 of 17.2 MtCO₂e since the scheme began²⁶⁷. The current scheme is now in its final target period (January 2019 to December 2020).

The evaluation of the current scheme is underway, with the results of this due to be published in Q1 2020. This will assess the twin objectives of improving the efficiency of energy-intensive processes in industry using energy and carbon targets, whilst maintaining competitiveness of those industries through discounted CCL rates. Industry stakeholders have been extensively consulted as part of the evaluation, including workshops and interviews, and econometric analysis will provide further evidence of the level

of energy savings attributable to the scheme, as well as the impact to competitiveness of the participating industries.

The findings of this evaluation will form a critical evidence base for the design of any successor scheme to ensure that it provides maximum value.

Recommendation 4:

Set out a plan to enable multiple CCS facilities to be operational by the mid-2020s.

There is consensus that carbon capture, usage and storage (CCUS) will play a critical role in successfully decarbonising our economy by 2050, particularly through tackling emissions in the industries such as steel and cement, which lack alternative options for achieving deep decarbonisation. In addition, the government recognises the opportunity for the UK to become a global leader in CCUS, with the potential to create significant new opportunities for UK businesses.

As set out in our ambitious CCUS Action Plan, we are shifting our focus to initial deployment, with an ambition to deliver the UK's first CCUS facility in the mid-2020s and to have the option to deploy at scale during the 2030s.

In July, we published a consultation on potential business models for deployment of CCUS²⁶⁸ – this represents a major milestone to helping us achieve this ambition, given that commercial barriers have been identified as the key challenge facing CCUS deployment. A sustainable commercial framework will be vital to unlocking private sector investment, supporting a cost reduction trajectory and providing certainty to developers and investors.

The consultation included industrial carbon capture and hydrogen production – options which can support industry to move to a decarbonisation pathway. Within the consultation, we also considered how to address risks that have been associated with early CCUS projects, as well as possible delivery and

coordination challenges of deploying at scale. The government has separately consulted on the re-use of existing oil and gas infrastructure²⁶⁹ that has the potential to reduce the costs of the technology and facilitate CCUS deployment.

We are currently reviewing responses to these consultations, which will build the evidence base and help to inform our policies to progress CCUS deployment in line with the ambitions and commitments in our Action Plan. We will publish the government response to the consultations by the end of the year.

In parallel, we are investing over £50 million in innovation to support the technology²⁷⁰. In June 2019, we announced that nine CCUS schemes secured £26 million of government funding to advance the rollout of CCUS in the UK²⁷¹. This includes awarding £4.2 million to Tata Chemicals toward the construction of a facility to capture and utilise 40,000 tonnes of carbon dioxide a year – equivalent to emissions from 22,000 cars²⁷².

Recommendation 5:

Set out preferred mechanism for CO₂ transport and storage infrastructure.

The development of infrastructure to transport and permanently store CO₂ will be central to meeting our ambitions for CCUS. In line with the commitment in our Action Plan, we are continuing to work closely with industry to progress our review of CCUS delivery and investment frameworks. This includes examining the right business model for the transport and storage element of the CCUS chain, unlocking investment, mitigating CCUS risks such as long-term CO₂ storage liability and supporting a sustainable commercial model for CCUS in the UK. We will publish our response to the consultation on CCUS business models, which will include our preferred models for CO₂ transport and storage infrastructure, by the end of the year.

Recommendation 6:

Consult on mechanisms to incentivise widespread industrial fuel switching and CCS. Alongside this, BEIS should identify when those industrial sites that will require CCS and/or fuel switching would need to install them in order to fit with their refurbishment cycles. Secure (e.g. taxpayer or consumer) funding for the mechanism.

The Clean Growth Strategy highlighted the need for industry to begin to switch from fossil fuel use to low carbon fuels such as biomass, hydrogen and clean electricity. It is clear that fuel switching will need to substantially increase in scale, coupled with industrial carbon capture and storage, to support delivery of the UK's net zero target. The CCC's net zero analysis suggests that fuel switching could have the potential to reduce emissions from industry by up to a quarter by 2050²⁷³.

The Industrial Fuel Switching competition has made available up to £20 million to stimulate early investment in fuel switching processes and technologies, so that a range of technologies are available to the diverse industry sectors by 2030 and beyond²⁷⁴. This aims to support the development, commercialisation and cost reduction of innovative processes and technologies to enable low carbon fuel switching to be a viable option to support industry to decarbonise.

The competition has been split into three phases: market engagement and assessment; feasibility studies; and demonstration projects. The final report from the Phase 1 market engagement study, which aimed to understand the potential for industries to switch to biomass, hydrogen and electrification and the key barriers to realising this, was published by Element Energy and Jacobs in December 2018. The evidence underlined the considerable potential of fuel switching to support decarbonisation of industry. It suggested that 30% of current fossil fuel demand in industry can be switched to a low carbon fuel by 2040, with potential for

further reduction from fossil fuel use in CHPs and offsite steam production.²⁷⁵

Phase 3 of the competition will make up to £17.8 million available for demonstration projects and opened to applications on August 27 2019. We expect to announce the winners by the end of the year.

In parallel, the government is investing in the £20 million Hydrogen Supply programme, which aims to accelerate the development of low carbon bulk hydrogen solutions²⁷⁶. Lot 1 in the programme covers novel low carbon production processes which includes CCUS. Feasibility studies are underway, and the programme will include a demonstration phase later in the year. Beyond innovation, we have announced our intention to establish a Low Carbon Hydrogen Production Fund to support deployment.

As set out in Recommendation 4, the government has recently consulted on potential business models for deployment of CCUS and we have begun to explore, with industry, a framework for future evaluation of business models to support hydrogen production. Our response to the consultation will be published by the end of the year. In our ongoing consultation, we have also proposed that the Industrial Energy Transformation Fund should be open to applications for deep decarbonisation projects including fuel switching.

Through the Industrial Clusters Mission, we are working in partnership with industry to understand their refurbishment plans for sites and plants. This will inform policy development across the industrial decarbonisation landscape.

Recommendation 7:

Develop a strategy for developing low-carbon hydrogen use, production and infrastructure. Large-scale hydrogen trials to begin.

The government welcomes the CCC's advice that hydrogen use, production and infrastructure need to be developed in parallel, and we are

committed to exploring the option of hydrogen as a flexible and strategic decarbonised energy carrier for the UK, alongside electricity and other decarbonised gases.

Our strategic approach to date has focused on innovation and we are investing up to £108 million in programmes along the hydrogen value chain. This includes:

- a £20 million Hydrogen Supply programme to reduce the costs of bulk low carbon hydrogen production²⁷⁷;
- a £20 million Fuel Switching Competition to support the switch to lower carbon fuels in industry, including hydrogen²⁷⁸;
- a £20 million Storage at Scale competition to demonstrate large scale energy storage, including power-to-gas²⁷⁹;
- a £23 million Hydrogen for Transport programme to support deployment of hydrogen vehicles and growth of refuelling infrastructure²⁸⁰; and
- a £25 million Hy4Heat programme to ensure the safe use of 100% hydrogen for heating in buildings²⁸¹.

These programmes will help to provide evidence and assurances that the costs of producing and using low carbon hydrogen can be reduced to enable larger scale deployment in the future.

We recognise that innovation is most effective when accompanied by a policy framework that can stimulate private investment, which is why we sought stakeholder views on a framework for future evaluation of business models to support hydrogen production with CCUS (as set out in Recommendation 4).

Building on the above innovation programmes, we have also announced that the IETF will support deep decarbonisation technologies, such as low carbon hydrogen, and our intention to establish a £100 million Low Carbon Hydrogen Production Fund which will seek to deploy low carbon hydrogen production capacity and encourage future private sector investment²⁸².

We intend to consult on the shape of the Fund next year, with a view to launching the Fund for bids in 2021.

Potential users of hydrogen can only consider it as a decarbonisation option if it is readily available, at a competitive price and with assurance that it is low or zero carbon. This would give greater confidence to potential high-volume users in industry, power, transport and heat in buildings. Other industrial decarbonisation funds could help to match up hydrogen demand with supply. The Clean Steel Fund, for example, could support a switch to hydrogen use in the sector.

Recommendation 8:

Develop plans for resource efficiency to help reduce demand for carbon-intensive products.

The Resources and Waste Strategy²⁸³, published in December 2018, set out the government's plans to minimise waste, promote resource efficiency, and create a more circular, sustainable economy. This included plans to drive a shift in the market towards more durable, repairable and recyclable products. The strategy contained specific commitments to:

- Set regulatory requirements as to resource efficient design for products, through a similar mechanism to the EU Ecodesign system;
- Provide consumers with better information around the sustainability of the products they buy; and
- Seek to design 'Extended Producer Responsibility' (EPR) schemes so that producers pay the full net costs of managing packaging waste, incentivising them to ensure that product design enables reuse, repair and recycling at end of life. By the end of 2020 we will have consulted on changing the producer responsibility schemes for waste electrical and electronic equipment and batteries. By 2025 we will have reviewed and consulted on EPR for five new waste streams, two of which we plan to consult on by 2022.

In the Strategy, we also committed to developing models to support clusters of businesses to share information and pool resources to help implement resource efficiency measures. We will take account of the findings from a recent government-funded study carried out by WRAP²⁸⁴ on resource efficiency activity in five small scale clusters as we develop our plans to take this further in line with the Resources and Waste Strategy. We will also seek to support information availability to enable businesses to obtain secondary materials more easily for input to their business processes, helping to reduce emissions²⁸⁵.

The construction sector is a user of highly carbon intensive materials like cement and steel. However, developments such as digitalisation, off-site manufacturing, and new innovative construction materials and techniques offer huge potential for increasing resource efficiency. The Construction Sector Deal, launched in July 2018, will deliver investment of up to £420 million between industry and government to accelerate this transformation²⁸⁶.

As part of the Resources and Waste Strategy, the government has committed to build on the Sector Deal by working with industry, through the Green Construction Board, to develop a definition of zero avoidable waste and an ambitious roadmap for how and when this can be achieved. By shifting to a zero avoidable waste way of working – which may involve greater repurposing of buildings, design for disassembly of buildings and reuse of components – it is expected that we will also be able to reduce emissions in the sector.

We are also seeking to capitalise on the UK's world-class expertise in industrial biotechnology and synthetic biology – the platform technologies that underpin the bioeconomy. The bioeconomy represents the economic potential of harnessing the power of bioscience, producing innovative products, processes and services that rely on renewable biological resources instead of fossil-based alternatives.

In December 2018, the first joint government-industry UK Bioeconomy Strategy was published, with the aim of doubling the size of the UK bioeconomy to £440 billion by 2030²⁸⁷. The government is now working with industry and the research community to deliver the actions set out in the strategy, which will increase the use of bio-based products and processes in place of traditional, more carbon intensive alternatives.

Recommendation 9:

Establish policies to develop near-zero GHG emission technologies for off-road mobile machinery.

Non road mobile machinery (NRMM) covers a wide range of machinery across different sectors including construction, industry, agriculture and aviation. NRMM accounted for around 2.5% of total greenhouse gas emissions in 2017²⁸⁸, and we recognise the importance of innovation to reduce emissions from this type of machinery.

We have committed £274 million to the Faraday Battery Challenge to support research, innovation and scale-up of future low carbon battery technologies. This investment supports the government's ambition on electric vehicles, with a focus on automotive applications. The Challenge has also been sponsoring the development of advanced batteries for vehicles including off-road machinery, while promoting cross-sector knowledge development and technology transfer. The Challenge is currently working to understand the requirements and markets for non-automotive sectors, how recent developments in automotive battery technology may be translated, and where more focused efforts are needed to meet the performance requirements of other applications.

The Advanced Propulsion Centre has also committed £72 million in grant funding to projects dedicated to reducing emissions in the off-road/heavy duty sector. These projects cover a range of innovation including electric motors, battery packs, light weighting technology, novel battery management systems, fuel cells (hydrogen

and others) along with a disrupter technology in the form of a cryogenic engine fuelled by liquid nitrogen. For instance, Caterpillar UK has received funding for a project that will design and develop a battery electric Compact Wheel Loader. They will develop technology such as electric motors, power electronics, on-board chargers and High Voltage battery packs, and the resulting machine will be used in various construction applications.

In 2018, the government offered funding for the development of low emission construction NRMM and transport refrigeration as part of the £19.6 million UKRI 'Clean Air: Analysis and Solutions' research programme²⁸⁹. We have also started to scope options to encourage the use of lower emission NRMM in the course of our wider work to decarbonise the economy and improve air quality. For example:

- We announced a commitment to explore the use of environmental permitting to address emissions from significant NRMM sources in the Clean Air Strategy²⁹⁰, published in January 2019.
- The Aviation 2050 green paper²⁹¹ set out a range of policy measures currently under consideration that are expected to be viable within approximately the next 10 to 15 years. While it would be for the industry to determine which measures to adopt, within the overall policy framework established by the government, this includes increased uptake of measures such as e-taxiing and electric airside vehicles. We will consider these policies further in the forthcoming Aviation Strategy.
- We have this year started to develop a new emissions reduction plan for agriculture in order to create a more productive, low-carbon farming sector. As part of this, we will consider the potential for substitution of fossil fuels used on farms with low carbon alternatives. Alongside this we are also developing new ambitious R&D proposals to

support innovation in agriculture that could help to deliver new technologies that improve productivity and emissions reduction.

Recommendation 10:

Establish policies to reduce methane leakage and venting.

The offshore oil and gas industry is focused on the continued management and reduction of its operational emissions. Within upstream oil and gas operations, methane emissions account for 8% of the total greenhouse gases emitted by the industry²⁹². Just over half (55%) of the methane emissions were the result of venting²⁹³.

All atmospheric emissions are considered as part of the environmental impact assessment process and must be reported to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) through the Environmental Emissions Monitoring System (EEMS). Under the OPRED regime, operators must consider other preferable options such as gas recovery where this is practicable and consult key stakeholders on the potential effect of releases of GHGs.

In addition, flare and vent emissions are controlled under consents issued by the Oil and Gas Authority (OGA). The OGA requires that flaring and venting should be kept to a technically and economically justified minimum. Where appropriate, the OGA will request operational and technical documents from operators to include plans for reduction of vent levels. Furthermore, when undertaking its functions, the OGA will have regard to minimising carbon emissions from the UK offshore oil and gas sector.

On methane leakage from within the UK gas network, the ongoing Iron Mains Risk Reduction Programme (IMRP) aims to replace old iron pipes that are prone to fracture and leakage with polyethylene pipes. Through this and previous programmes, the proportion of iron pipes has fallen from 80% of the distribution network in the mid-1970s to 20% today²⁹⁴. This is forecast

to fall to around 10% by the end of the next RIIO price control period (2026)²⁹⁵.

Although improving safety is the primary driver of the Programme, there will also be a reduction in methane leakage by up to 75%²⁹⁶. The Programme is also resulting in far more accurate mapping of gas pipes and is laying the groundwork for the use of the network to potentially carry decarbonised gases such as hydrogen in the future.

GB gas network companies are currently developing their new Business Plans for the next RIIO price control which will be in place from 2021-2026. Ofgem is looking for the network companies to go beyond just reducing leakage through pipe replacement under the IMPR and is:

- refining the existing financial incentive on network companies to reduce gas lost during transportation by focusing it on areas within their control, such as the management of pressure on their network;
- encouraging network companies to work with their stakeholders to put forward ambitious deliverables and targets to reduce their greenhouse gas emissions;
- ensuring that the environmental costs of venting gas at compressor stations are captured, with penalties incurred if venting is not economically efficient.

Gas network companies will also be required, on an annual basis, to report publicly on their levels of gas lost and the activities they are undertaking to address this. This reputational incentive will encourage gas network companies to demonstrate strong, and ongoing, reduction efforts in this area.

Recommendation 11:

Initial deployment of engineered greenhouse gas removals in the second half of the 2020s, driven by incentives and enabled by CO₂ infrastructure development.

The government's priority is to tackle the root cause of climate change by reducing emissions of greenhouse gases from human activities as far as possible. For those sectors where emissions are difficult-to-cut, however, we agree with the CCC that greenhouse gas removal (GGR) technologies are likely to have an important role to play in meeting the net zero target by offsetting residual emissions in these sectors. This could include bioenergy with carbon capture and storage (BECCS) and direct air carbon capture and storage (DACCS).

We are taking active steps to strengthen our understanding of these technologies and, where appropriate, move forward with deployment. For example:

- Following our commitment in the Clean Growth Strategy to consider the scientific views of the Royal Society on GGRs, the Royal Society and Royal Academy of Engineering published a report reviewing a broad range of GGRs in September 2018²⁹⁷.
- In September 2019, the government published a report which assesses the different policies that could be used to encourage the take up of greenhouse gas

removal (GGR) technologies, fulfilling a commitment in the Clean Growth Strategy. The report reviews current policies, both in the UK and abroad, and recommends the most promising areas of policy development.²⁹⁸

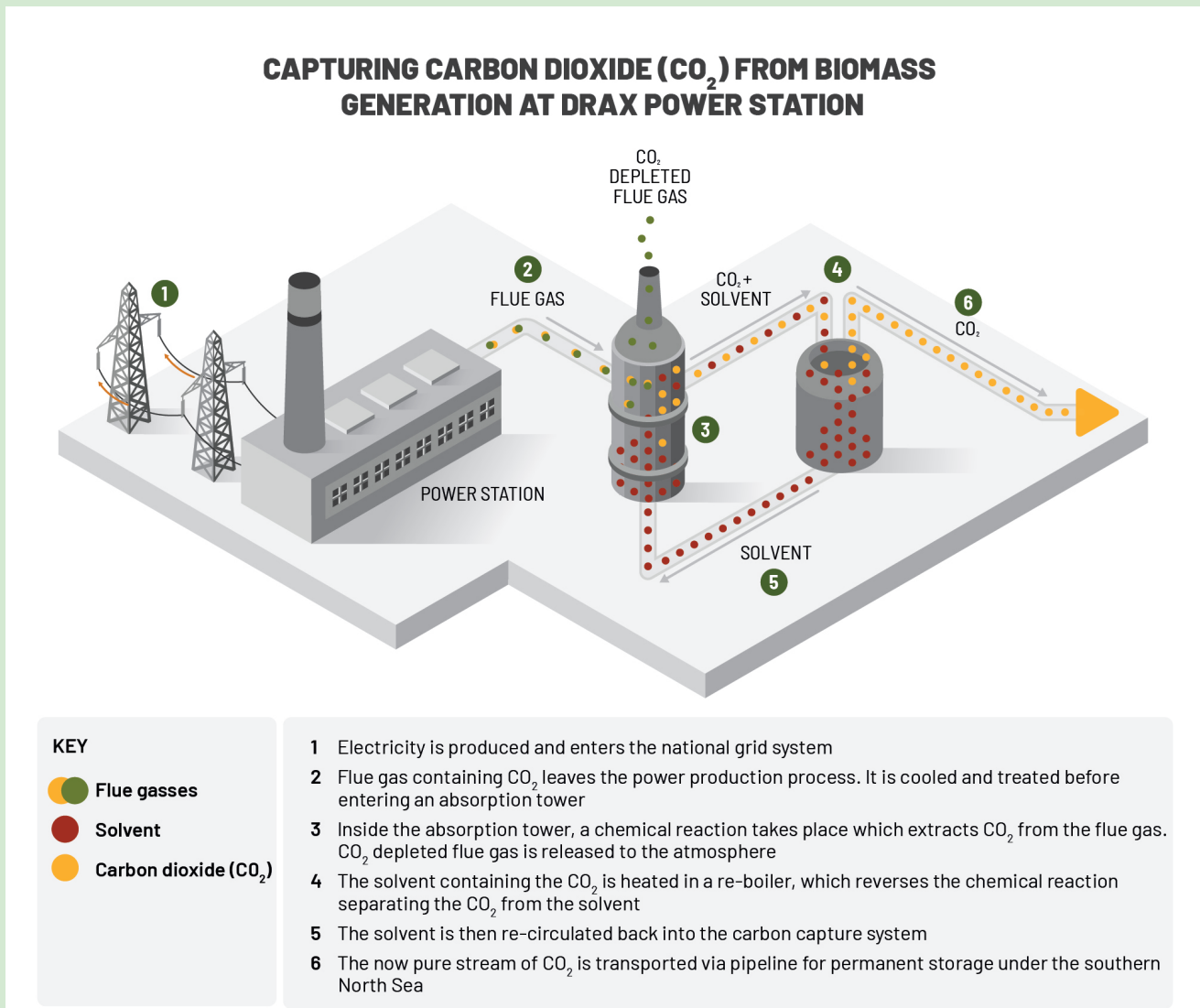
- The Research Councils, with government co-funding, launched an £8.6 million research programme looking at a number of GGR technologies in April 2017. The programme will conclude in 2021 and will help to inform the government's strategic approach to GGRs.²⁹⁹
- The government has announced a new £31.5 million programme which will support a series of GGR demonstrator projects.³⁰⁰
- We are making progress on implementing the CCUS Action Plan such as our review of CCUS business models, including possible business models for CO₂ infrastructure (see Recommendations 4 and 5).

Proposals for developing our strategic approach to GGRs, including the scope for removing barriers and strengthening incentives to support deployment, will be considered in light of this work.

Case Study: C-Capture at Drax

C-Capture is a Leeds University spin-out technology company developing chemical-based systems to remove carbon dioxide from power plants, steel works, and cement factories. Earlier this year, C-Capture partnered with Drax Power Station in North Yorkshire on a bioenergy carbon capture and storage (BECCS) pilot plant, which will remove carbon dioxide from emissions produced by generating electricity from sustainable biomass. The pilot is currently capturing one tonne of CO₂ per day. The project is supported by £4.9 million funding from the UK government.

If the pilot project is successful, it would move Drax one step closer to becoming one of the world’s first negative emissions power stations – meaning the electricity it produces would help reduce the amount of carbon dioxide in the atmosphere. The project is the first of its kind in Europe.



Source: Drax

Chapter 4: Progress on Reducing Emissions from Natural Resources



Image: Agri-EPI Centre

10 Key Achievements on Natural Resources

Since last year, we have:

1. Published the **Resources and Waste Strategy** to help minimise waste, promote resource efficiency and move towards a circular economy³⁰¹. In line with key commitments in the strategy, a suite of **consultations was launched to overhaul the waste system** and cut plastic pollution, which focused on reforming packaging waste regulations, introducing a deposit-return scheme for drinks containers, simplifying the recycling system (including separate food waste collections) and introducing a plastic packaging tax.
2. Announced £60 million of government investment, alongside £149 million investment from the private sector, to develop **new forms of packaging and plastics** as part of the Clean Growth Grand Challenge³⁰².
3. Committed to consulting on a **new Tree Strategy for England**, which will consider changes to our tree planting ambitions in light of the UK's net zero emissions target.
4. Announced £10 million to plant new trees in our towns and cities through the **Urban Trees Challenge Fund**³⁰³, launched in May 2019. We also plan to launch the **Woodland Carbon Guarantee** later this year, which will provide £50 million of guaranteed payments for up to 35 years for landowners who sequester carbon through the planting of new woodlands.
5. Commissioned an independent review to develop a series of recommendations that will help to develop a **National Food Strategy**. The Strategy will help to ensure that our food system delivers healthy and affordable food for all people, and is built upon a resilient and sustainable agriculture sector which considers its climate impact³⁰⁴.
6. Announced the creation of a Lowland Agricultural Peat Taskforce which will deliver recommendations for a **new more sustainable future for agriculture on lowland peatlands in England**, with a particular focus on reducing emissions from agricultural peatlands. The Taskforce will commence later this year.
7. Launched five peat pilots to test our approach for **moving all peatlands in England onto a path of restoration or sustainable management**, to support the forthcoming England Peat Strategy.
8. Published a scoping study report on viable options for **reducing the impact of England's landfill sites**, and started a project on direct measurement of emissions from landfill.
9. Continued to **cut F-gas consumption, reducing levels by over 37% since 2015**³⁰⁵, and contributed approximately £9.25 million to help developing countries cut their use of F-gases³⁰⁶.
10. Published the **Clean Air Strategy** to tackle all sources of air pollution, making our air healthier to breathe, protecting nature and boosting the economy³⁰⁷.

Summary of Progress and Next Steps

The natural resources sector comprises emissions reductions from agriculture, waste management, land use, forestry and F-gases. From 1990 to 2017, waste emissions have fallen by 69% while emissions from agriculture have reduced by 16%.³⁰⁸ We continue to plant trees to sequester carbon in line with commitments made during this Parliament, and we are restoring degraded peatland and phasing down consumption of F-gases. However, the government recognises the need for further action to reduce emissions across the sector.

Agriculture

Whilst agriculture creates greenhouse gas emissions through traditional farming processes and the natural digestive systems of livestock, farming and agricultural land have significant potential to ameliorate emissions and sequester carbon.

The government's approach to future farming will ensure that we support farmers to continue to produce good quality food, whilst protecting and enhancing the environment, for example through improved productivity, research and innovation. One of the public goods to be incentivised by the new Environmental Land Management (ELM) scheme will be mitigating and adapting to climate change, including outcomes on emission reduction and carbon sequestration.

We have commenced work this year on a Farm Emissions Reduction Plan, which will be informed by research and engagement with farming stakeholders to ensure proposed measures are effective and achievable.

As part of this, the government will implement a sustainable productivity package that will provide financial assistance to help farmers adopt new techniques and equipment in order to boost productivity and help to deliver environmental benefits, including emissions reductions.

Our ongoing agricultural R&D programmes work with industry to improve production efficiency and reduce emissions – for example, through our genetic improvement programmes that enhance the resource efficiency, sustainability and resilience of UK crop and livestock.

To support Innovation, we will introduce new schemes which build on the existing Agri-Tech Strategy and the Transforming Food Production initiative under the Industrial Strategy Challenge Fund. This will support industry to develop new technologies that could offer step changes in production efficiency and emissions reduction.

While food choices can have an impact on greenhouse gas emissions, well managed livestock also provide environmental benefits such as supporting biodiversity, protecting the character of the countryside and generating important income for rural communities.

The forthcoming Food Strategy will help ensure that our food system delivers healthy and affordable food for all people, and is built upon a resilient and sustainable agriculture sector which considers its climate impact. This will build on the work already underway in the Agriculture Bill, the Environment Bill, the Fisheries Bill, and the Childhood Obesity plan.

Waste and Resources

We welcome the Committee's finding that good progress was made in reducing waste emissions over the second carbon budget period. The latest confirmed data shows that waste management accounted for 4% of total UK emissions in 2017³⁰⁹, having achieved a 69% decrease in emissions compared to 1990 levels³¹⁰.

In December 2018, the government published the Resources and Waste Strategy, an ambitious document that sets out how we will preserve our stock of material resources by minimising waste, promoting resource efficiency and moving towards a more circular economy. This includes plans to reduce the amount of waste sent to landfill and emissions associated with

the breakdown of biodegradable waste, and to increase recycling, which typically results in lower carbon emissions in comparison to manufacturing products from virgin materials.

The Strategy proposed three major reforms to the waste system in England: the introduction of a deposit return scheme for drinks containers, extended producer responsibility for packaging, and consistency in household and business recycling collections. The consultation on the third of these included proposals for mandatory separate food waste collections, which will tackle emissions and leachate generation associated with breakdown of food waste in landfill. These measures are projected to deliver combined emissions savings of over 30 MtCO₂e between 2023 and 2035. Government responses, including next steps towards the launch of consultations on the final proposals, were published in July.

In addition to reforming the waste system, we are also taking action on waste prevention. This includes a consultation on mandatory annual reporting of food surplus and waste by large food businesses, a ban on certain single-use plastic such as plastics straws, cotton buds and drink stirrers entering into force early 2020, and encouraging resource efficient product design through setting minimum requirements through eco-design.

We have announced a new pilot scheme to reduce food waste, supported by a £15 million fund³¹¹, building on the £500,000 Food Waste Reduction Fund announced in December 2017³¹². The government is also investing £60 million through the Industrial Strategy Challenge Fund, alongside an investment of up to £149 million from the private sector, to establish the UK as a leading innovator in smart, sustainable plastic packaging³¹³. This could potentially fund the development of new recyclable materials, improved recycling technologies and new plastic innovations created from plants and food waste.

A key challenge in delivering the vision in the Resources and Waste Strategy will be to shift perceptions of waste from being a problem to

be managed to a resource to be valued. While we are putting policies in place to ensure that waste is managed more effectively when it does arise, our focus will be on preventing waste arising in the first place through better resource management. An evaluation plan and indicator framework for the Strategy is being developed to track progress and revisit policies in this area, which we aim to publish later this year.

Forestry

Forests are a natural carbon sink and will play an important role in helping the UK to meet its long-term emissions target. We have a target to plant 11 million trees in this Parliament through the Countryside Stewardship and the Woodland Carbon Fund³¹⁴, and over the last year, the government has reappointed Sir William Worsley as Tree Champion so that he can continue his work to drive higher tree planting rates. We have also set up the first pilot Forestry Investment Zone in Cumbria, which will trial innovative new ways of directing finance to forestry.

In April 2019, a £10 million Urban Tree Challenge Fund was launched to plant 120,000 trees in and around our towns and cities³¹⁵ – this keeps the government on track to meet our target to plant one million urban trees by 2022. Later this year we plan to launch the Woodland Carbon Guarantee, with the first auction to be held in early 2020. This new scheme aims to further incentivise the planting of new woodlands and help develop the domestic market for woodland carbon by providing £50 million of guaranteed payments for up to 35 years for landowners who plant trees to sequester carbon. We have also provided £5.7 million to kickstart the new Northern Forest, which has a vision to plant 50 million trees over the next 25 years³¹⁶, and recently committed to support Northumberland Forestry Partnership in the creation of a new Northumberland Forest of up to a million trees.

We have made permanent changes to the Woodland Carbon Fund introduced last year to make public bodies eligible and to allow smaller proposals to come forward, as well as extending

the lifetime of the Woodland Carbon Fund (WCF), keeping the Fund open for applications up to 31 March 2021, for payment in 2021/22³¹⁷.

We are committed to reviewing our ambition and policies in light of the UK's new target of net zero emissions, and will be consulting on a new Tree Strategy for England in the coming months.

Land use

Better management of our peatlands can produce a range of benefits – including as a terrestrial carbon store helping to mitigate climate change, a haven for rare wildlife, and for water purification and regulation. For these reasons, the government has committed to publishing an England Peat Strategy, setting out our vision to reverse the decline in England's peatlands and restore them in line with our commitment to leave the natural environment in a better state than we found it.

F-gases

In November 2017, the UK became the thirteenth country in the world, and the first EU Member State, to ratify the Kigali Amendment to the Montreal Protocol. The Amendment requires developed countries to phase down their consumption of hydrofluorocarbons (HFCs), the main type of F-gas, by 85% between 2019 and 2036³¹⁸.

The UK has already cut HFC consumption by over 37% since 2015 under the F-Gas Regulation – one of the world's most ambitious phasedowns. Quotas are allocated to producers and importers, which limit sales and which are reduced every few years until a 79% phasedown is achieved by 2030³¹⁹. The Regulation started earlier and goes faster than required by the Montreal Protocol. It also extends the phasedown to HFCs inside pre-charged equipment and bans certain products containing F-gases.

All the requirements of the EU F-gas Regulation will be retained in UK law after EU exit,

maintaining at least the current level of ambition and certainty for businesses.

The UK also continues to deliver around £9.25 million a year to help developing countries reduce HFCs and ozone depleting substances, making an important contribution to tackling this challenge globally³²⁰.

Response to the CCC's Recommendations

Recommendation 1:

England's Farm Emissions Reduction Plan and Scotland's updated Climate Change Plan, both due out in 2020, should set out firm policies and an implementation plan to reduce GHG emissions in agriculture.

England

The Clean Growth Strategy and 25 Year Environment Plan set out the UK government's commitment to tackle emissions from the agriculture and land use sectors. Building on this, we are developing a Farm Emissions Reduction Plan (FERP) for the agriculture industry to become a more productive, low carbon farming sector. The Plan will be informed by research, modelling, stakeholder engagement and feasibility studies.

The Plan will focus on using targeted intervention measures that can be implemented within the farm boundary and, when taken together, will play a significant role in agriculture's contribution towards meeting the fourth and fifth carbon budgets. A broad range of cost-effective measures will be used to achieve these reductions, primarily through improvements in on-farm efficiency and land-use change. As the cornerstone of future agriculture policy, the new Environmental Land Management scheme will pay public money for the provision of environmental public goods such as mitigation of and adaption to climate change.

As agriculture is fully devolved, the Plan will be England focused in the first instance. However,

the UK government will continue discussions with the Devolved Administrations and consider whether specific intervention options require a national approach. If policy measures are introduced in England alone, these must be sensitive to the functioning of the UK internal market so as to not present illegitimate barriers to trade. We will continue to consider this issue throughout the policy development.

Scotland

In February 2018, the Scottish Government published the 'Climate Change Plan: third report on proposals and policies 2018-2032 (RPP3)', which contains a dedicated chapter on agriculture. This set out a range of policies, proposals and milestones developed to help the agricultural industry transition to a low carbon farming future. The Scottish Government is committed to working with our agricultural industry and our renowned scientific community as we move forward. We believe that it is through this collaborative approach that we will find solutions that are not only beneficial to our environment, but to Scotland's farmers and crofters and our wider food and drink industry.

Recommendation 2:

The Industrial Strategy's Transforming Food Production Challenge Fund: ensure the £20 million of funding already committed to under the first call made in 2018 and subsequent calls are allocated to projects that deliver supporting emissions reduction and clean growth in the food and agriculture sectors.

The government is committed to being a world leader in agri-food innovation and sustainability. The first projects to receive funding under the £90 million 'Transforming Food Production' (TFP) programme were announced in June 2019, with 31 projects receiving £22.4 million of government investment with a further £8.8 million of industry funding.³²¹

These projects, and future awards under this initiative, will help British farmers to harness 'precision' technology and approaches in

order to reduce emissions and improve sustainable productivity. Projects will focus on the development of data-driven technologies that reduce the use of pesticides, fertilisers, herbicides; improve animal feed efficiencies; and reduce on-farm fuel use for operations. In doing so, the programme aims to support the industry to reduce waste and to move towards net zero emissions.

Government and industry stakeholders have worked to ensure that future competition calls are focused on those areas that are 'transformative' and provide greatest impact. This includes strengthening the funding allocation criteria towards projects that will support the industry to meet its zero-carbon target.

The next wave of funding competitions under TFP includes:

- **Future Food Production Systems** (£20 million) – Projects will help transform food production systems, improve productivity and sustainability, and help the industry move towards achieving net zero emissions by 2040. The competition opened on 17 September 2019.
- **Science and Technology into Practice** (£15 million) – Projects will strengthen connections between researchers, innovative businesses and practitioners to accelerate the development and adoption of data-driven precision approaches to bridge the productivity gap. The competition is scheduled to open on 28 October 2019.
- **International research: China** (£5 million) – A programme to identify and accelerate shared international priorities and help build export opportunities for pioneering agricultural-technologies and innovations with partners overseas, while targeting net zero emissions. The competition opened on 14 October 2019.

Recommendation 3:

Innovation, investment in R&D, and testing and piloting of options to deliver sustainable agricultural productivity improvements in crops and livestock, low-carbon technologies, and options for low-carbon agricultural machinery (e.g. tractors and robotics) during the 2020s.

Embracing technology and innovation will help the UK to reap the benefits of a more productive, sustainable and profitable agri-tech sector while boosting rural growth and creating high-skilled jobs. We are supporting innovation to increase productivity and reduce environmental impacts from agriculture through the £90 million Transforming Food Production Fund³²² and the £160 million we have invested in the 2013 Agri-Tech Strategy³²³. This includes

the four Centres for Agriculture Innovation which have been focusing, for example, on the development and demonstration on-farm of productivity enhancing tools such as precision machinery, local and remote sensors, and earth observation techniques.

Moving forward, the government is developing new ambitious R&D proposals as part of our new policy for agriculture. This will boost sustainable innovation and build on the Agri-Tech Strategy and Transforming Food Production to develop new technologies that could offer step changes in production efficiency and emissions reduction. During the agricultural transition, we also intend to support farmers to invest in equipment, technology and infrastructure to help to improve their productivity and deliver environmental benefits.

Innovation in agriculture

The government has invested over £90 million in four **Centres for Agricultural Innovation** since 2015³²⁴. The Centres are focused on improving the productivity, efficiency and effectiveness of agricultural processes and the agri-food chain, and we are already seeing the results from their work.

- **The Agricultural Engineering Precision Innovation Centre (Agri-EPI)** is focused on the development and demonstration on-farm of productivity enhancing tools including precision machinery, local and remote sensors and earth observation techniques. Agri-EPI's demonstration farms are already experiencing the benefits of technology adoption. For example, one dairy farmer has observed a 20% uplift in output after engagement with Agri-EPI, reducing carbon cost of the milk produced.
- **Agrimetrics** utilises data science and modelling to build a more efficient agri-food system. Agrimetrics worked with Alltech (a global animal feed manufacturer) to combine their customers' dairy cattle, environmental sustainability and weather data within dashboards to recommend improvements to farmers. This is delivering improved feed conversion efficiency and reduced cattle methane emissions for the same yield.
- **Centre for Innovation Excellence in Livestock (CIEL)** is focused on driving new industry-led research and innovation to promote sustainability in the UK livestock sector. CIEL's GrasscheckGB initiative, involving 50 pilot farms, is monitoring the growth and quality of pasture to provide data to help all farmers across the UK to improve grassland productivity and pasture utilisation through better informed decisions on grassland management.
- **Crop Health and Protection (CHAP)** has a soil health facility at Cranfield University which is assessing which crop mixtures increase soil health and reduce erosion via their root systems. This is helping to provide information and data for improved agronomic practices in the UK to minimise carbon loss and reduce the need for fertilisers.

Recommendation 4:

Post-CAP framework: ensure the on-going design of the Environmental Land Management System, including the testing and trialling of options, will incentivise the take-up of low-carbon farming measures and changes in land use to increase carbon removals.

As the cornerstone of future agricultural policy, the Environmental Land Management scheme will pay public money for the provision of public goods. Adapting to and mitigating climate change has been identified as a key public good that the Environmental Land Management scheme will contribute towards, as part of the 25 Year Environment Plan and our net zero target.

We are undertaking a programme of tests and trials to support the development of the ELM scheme. The work is being facilitated by a range of stakeholders, including farmer groups, representative bodies and non-governmental organisations and will cover a range of locations and sectors.

These tests and trials provide us with a mechanism to co-design ELM with stakeholders including farmers and other land managers and understand how it works in a real life environment. We will not use tests and trials to test whether specific land management activities achieve particular environmental outcomes.

Although we will not be testing how to achieve specific environmental outcomes, we do need to ensure that the scheme design is compatible with the delivery of each of the six public goods ELM will contribute towards, including adapting to and mitigating climate change. We will seek to do this through the Testing and Trials Programme and the National Pilot, which will begin in 2021.

Recommendation 5:

Develop strategies for each part of the UK to increase overall annual afforestation rates to at least 30,000 hectares in the 2020s.

Tree planting is important in sequestering carbon and further planting is required to meet a net zero target. As forestry is a devolved area, this response will cover England, Scotland, Wales and Northern Ireland in turn.

England

Over the last year, the UK government reappointed Sir William Worsley as Tree Champion to continue to push for higher tree planting rates in England. We also launched the £10 million Urban Tree Challenge Fund, allocated £5.7 million to grow 50 million trees in the new Northern Forest over the next 25 years, and trialled a new finance model for forestry in the nation's first Forestry Investment Zone in Cumbria. The Woodland Carbon Guarantee will be launched to provide £50 million of assured payments over 35 years to landowners who plant trees. This winter, we will consult on an English Tree Strategy which will consider changes to ambition and policies in light of the UK's commitment to achieve net zero greenhouse gas emissions.

Scotland

The Scottish Government is committed to increasing tree planting. Published in February 2018, the Climate Change Plan sets out Scotland's ambition to increase forest and woodland cover from around 18% to 21% of the total area of Scotland by 2032³²⁵. This target equates to 10,000 hectares of new planting per year until 2020/2021, rising by steps to 15,000 hectares per year by 2024/2025³²⁶.

These ambitions were reaffirmed in Scotland's Forestry Strategy 2019-2029³²⁷, published earlier this year, which identified the expansion of forests and woodlands across Scotland as a priority for action. In 2018/2019, 11,210 hectares of new woodland was created in Scotland, exceeding the target of 10,000 hectares and making a critical contribution to tackling atmospheric greenhouse gases.

The Scottish Government's current Programme for Government³²⁸, published in September

2019, sets out our ambition to continue to accelerate progress towards the Climate Change Plan's woodland cover target, seeking to plant an additional 2,000 hectares of trees, over and above the Climate Change Plan target of 10,000 hectares of new planting in 2019/20.

Wales

The Welsh Government acknowledges that trees are not currently being planted in sufficient numbers and recognises that increasing forestry cover is vitally important to enabling a vibrant forestry industry, countering carbon emissions and mitigating the effects of climate change. Woodlands for Wales, the Welsh Government's strategy for woodlands and trees, was revised in 2018 and includes the aim of increasing woodland cover by at least 2,000 hectares per year from 2020.³²⁹ Tree cover in the wider environment, on farms and in the rural landscape, and in and around towns and cities should also increase.

The First Minister's manifesto commitment for a new national forest will help support the aims of Woodlands for Wales, as well as priorities relating to biodiversity, commercial forestry, construction, community cohesion and regeneration, and health and well-being.

Northern Ireland

In Northern Ireland, the Department of Agriculture, Environment and Rural Affairs (DAERA) Forest Service will work with the Agri-food and Bioscience Institute to develop land-use studies and economic models to create options supporting changes in land-use from agriculture to forestry. The research will enable the trade-offs in ecosystem services (including climate change mitigation) to be analysed on a spatial basis and assist in developing policy options clearly in support of changes in land-use to forestry. The output of this work will help inform post EU exit Agricultural and Environmental Policy development and associated delivery mechanisms in Northern Ireland.

Recommendation 6:

Targeted investment in R&D and innovation to deliver productivity improvements in trees and energy crops during the 2020s.

The government recognises the potential of bioenergy, when coupled with carbon capture and storage, in future energy systems and its role in helping to meet the net zero target. We have commissioned a study running to early 2020 which seeks to establish the opportunities for the UK to increase the availability of sustainable low carbon bioenergy feedstocks crops through investment in innovation. The scope of the project includes forestry residues, short rotation forestry, short rotation coppice and energy crops. The project will be used to inform the design of any future innovation competitions on this topic funded by the BEIS energy innovation programme.

The Forestry Commission's Science and Innovation Strategy for Forestry in Great Britain supports tree improvement for both conifer and broadleaf species, using conventional tree breeding approaches and modern molecular techniques. Current projects include the Conifer Breeding Programme, which includes both marker aided selection and multi-provenance breeding of Sitka spruce, with the objective of both increasing volume growth and improving timber properties. Forest Research contributes to collaborative research to progress the National Strategy for the Improvement of Broadleaved Trees in Britain and Ireland. Trials of short rotation forestry, aimed primarily at increasing bioenergy production, are funded through contracts.

Recommendation 7:

Publish England's Peat Strategy to deliver peat restoration, and sustainable management practices for lowland peat that remains in agricultural production.

In the 25 Year Environment Plan, the government reaffirmed its ambition to tackle the causes and effects of climate change. This includes specific action to restore vulnerable peat soils; and

where it is not appropriate to restore lowland peat, to develop new sustainable management measures to make sure that the topsoil is retained for as long as possible and greenhouse gas emissions are reduced.

Healthy functioning (wet) peatlands store and sequester carbon, as well as providing water that is much cheaper to treat for drinking. The Office for National Statistics recently estimated that the benefits in restoring UK peatland for carbon savings alone would outweigh the costs by 5 to 10 times³³⁰.

While peatlands are our largest terrestrial carbon store, the evidence also shows that England's degraded peatlands release approximately 11 million tonnes of carbon dioxide equivalents every year³³¹. The vast majority of this (86%)³³² is through lowland peat that is in agricultural use.

Given the particular challenges of lowland peat, we have committed to setting up a Lowland Peat Agricultural Taskforce. This will deliver recommendations for a more sustainable future for agriculture on lowland peatlands in England, with a particular focus on reducing emissions from agricultural peatlands. This is due to start later this year.

We have also committed to publishing an England Peat Strategy, which sets out our vision to reverse decline in England's peatlands and restore them. We have begun testing our approach for moving all peatlands in England onto a path of restoration or sustainable management in five pilot projects in Northumberland and Cumbria, Greater Manchester, North York Moors, East Anglian Fens and Dartmoor. These were launched in August 2019 and will present their first findings in March 2020.

Restoration work is already underway at four large-scale projects across England via our capital grant scheme, where we have allocated £10 million to restore 6,498 hectares of degraded peatlands³³³.

Recommendation 8:

In England, set out a commitment to ban the landfilling of most biodegradable waste streams including food by 2025 at the very latest. In the forthcoming consultation, set out proposals for the mandatory measurement and reporting of food waste in England by all large businesses in the food supply chain (e.g. food retail, caterers and hospitality).

In 2017, approximately 12 million tonnes of England's municipal waste was landfilled, around half of which was biodegradable³³⁴. The Resources and Waste Strategy committed to work towards eliminating all biodegradable waste to landfill by 2030, as well as to eliminate food waste to landfill by the same date. Given the time it takes for Local Authorities to implement policies and to change contracts and role services, it is unrealistic to ban all biodegradable waste streams to landfill by 2025. This would also allow insufficient time to ensure that necessary alternatives for biodegradable waste can be made available.

Growth in energy from waste and alternative residual waste treatment infrastructure will divert further waste from landfill and we expect existing government commitments (e.g. separate food waste collections and consistency in the recycling system) to remove a large proportion of biodegradable waste to landfill. Under current plans, those policies will come into effect from 2023. Once these have been implemented, we will conduct composition analysis to determine whether food and other biodegradable waste to landfill remains an issue and, if so, consult on banning biodegradable material being sent to landfill.

The UK was one of the first countries in the world to publish comprehensive data on food waste in line with international best practice. The need to report data is shown to spur companies into taking the necessary targeted action. To help food businesses to do this, the Waste and Resources Action Programme and Institute of Grocery Distribution, supported by

Defra, introduced the Food Waste Reduction Roadmap³³⁵ – a voluntary tool so far adopted by almost 130 organisations, over 100 of which are food businesses. The roadmap gives businesses directions on measuring and cutting food waste in their own operations, and on how they can replicate this with their suppliers. However, the voluntary approach alone will not achieve sufficient sign-up to enable the UK to achieve its targets and address the pressing and environmentally damaging issue of food waste. We will therefore consult in 2019 on introducing regulations to make reporting mandatory for food businesses of an appropriate size.

Recommendation 9:

In Wales, publish a new Waste Strategy including proposals to reduce food waste substantially and regulations requiring that all businesses and public bodies separate recyclable waste at source.

The Welsh Government will publish its new zero waste strategy for consultation later this year. Its aim is to move to a circular economy, where waste is avoided and resources are kept in use as long as possible. This is a key part of the action needed on climate change and also brings economic opportunities as a part of the transition to a low carbon economy. The strategy will contain actions on food waste.

Separately, the Welsh Government published a consultation in September 2019 on proposals for businesses and public sector bodies to

separate recyclable waste at source, which will support collection of high quality materials that can be recycled and reused.³³⁶

Recommendation 10:

Publish a plan to restrict the use of F-gases to the very limited uses where there are currently no viable alternatives.

Domestic legislation is already in place which has cut the production and use of HFCs by over 37% since 2015, with a 55% reduction scheduled by 2021 and 79% by 2030³³⁷. The UK is also a signatory to the UN Montreal Protocol, which requires a reduction of 85% by 2036³³⁸. We are already reducing use of F-gases much faster than many other developed countries, going significantly further than the minimum requirements of the Montreal Protocol. The 37% reduction achieved by the UK in 2018 will not be required under the Montreal Protocol until 2024³³⁹.

A thorough review of the F-Gas Regulation will be published by the end of 2022, assessing how F-gas use and emissions can be cut even further to achieve the government's net zero commitment by 2050.

In the meantime, the government continues to examine ways of going further to reduce F-gas use and emissions. For example, NHS England has this year committed to reduce the climate impact of medical inhalers – a recognised source of F-gas emissions – by 50% by 2030³⁴⁰.

Chapter 5: Progress on Reducing Emissions from Transport



10 Key Achievements in Transport

Since last year, we have:

1. Continued to support the **record uptake of electric vehicles through consumer incentives** and announced **highly favourable benefit in kind rates** for zero emission company cars. The new Go Ultra Low advertising campaign was launched to promote awareness of ultra-low emission vehicles.
2. Made strong progress to **support the UK's growing electric vehicle charging infrastructure**, including by: launching the £400 million Charging Infrastructure Investment Fund to catalyse and diversify investment in public chargepoint infrastructure³⁴¹; awarding funding for local authorities to help install electric vehicle chargepoints for ultra-low emission buses and taxis; increasing funding by £2.5 million for on-street residential chargepoints³⁴²; launching a project to develop a vision for a core network of rapid chargepoints along England's key roadways; consulting on smart charging and requirements for charging infrastructure in new and existing buildings; and announcing that all domestic chargepoints funded by the government's Electric Vehicle Homecharge Scheme must be smart from 1st July 2019³⁴³.
3. Committed **additional funding for public and sustainable transport** – including a £440 million extension of the Transforming Cities Fund and initiatives to encourage cycling and walking³⁴⁴ – and awarded £48 million to local authorities and bus operators through the Ultra-Low Emission Bus Scheme³⁴⁵.
4. Published a **response to the Cycling and Walking Investment Strategy (CWIS) Safety Review**³⁴⁶ containing 50 ambitious commitments to make roads safer for those who cycle and walk, introducing new measures and ideas on areas such as infrastructure design guidance, Highway Code changes, enforcement, education, risk reduction and planning policy.
5. Put the maritime sector on a pathway to zero emission by setting out our ambition to see **zero emission capable ships** in UK waters by 2025 in our **Clean Maritime Plan**³⁴⁷, the environmental route map of the **Maritime 2050**³⁴⁸ strategy published earlier this year.
6. Published the **Aviation 2050 Green Paper**³⁴⁹ which sets a clear approach to tackling greenhouse gas emissions from aviation, with an update to our position on aviation and climate change to be published in the coming months and a full Aviation strategy next year.
7. Announced the **Aerospace Sector Deal**³⁵⁰, alongside a package of measures that will put the UK at the forefront of the electrified air transport revolution by 2025 – such as the **Future Flight Challenge**³⁵¹, which provides £125 million of funding to develop future flight, including electric planes.
8. Made available up to £20 million of matched capital funding for innovation projects that will address barriers in progressing the **production of advanced fuels for aviation and heavy duty vehicles**, through the Future Fuels for Flight and Freight Competition (F4C)³⁵².
9. Launched a consultation on the UK's **long-term approach to carbon pricing** once we have left the European Union, which includes aviation, and a **call for evidence on carbon offsetting in transport**.
10. Engaged extensively with Network Rail and the Rail Safety and Standards Board (RSSB) to support **development and deployment of low carbon technologies on the railway** and establish the suitability of different low carbon technologies for use on different parts of the network, in line with the Rail Industry Decarbonisation Taskforce final report³⁵³. A **call for evidence on Light Rail** was launched, inviting views on how to better harness the opportunities for light rail and explore the need for other light rail and rapid transit systems in the UK³⁵⁴.

Summary of Progress

Transport has become the largest emitting sector in the UK in recent years, accounting for 27% of greenhouse gas emissions in 2017³⁵⁵. Emissions have remained at a similar level since 1990, due to a combination of factors including rising demand for car and van travel and increasing emissions from domestic aviation and shipping. As the CCC has noted, further action is needed to meet our future carbon budgets. Given the significant contribution of transport emissions to these carbon budgets, we acknowledge the CCC’s concerns around the need for a higher level of ambition on transport decarbonisation.

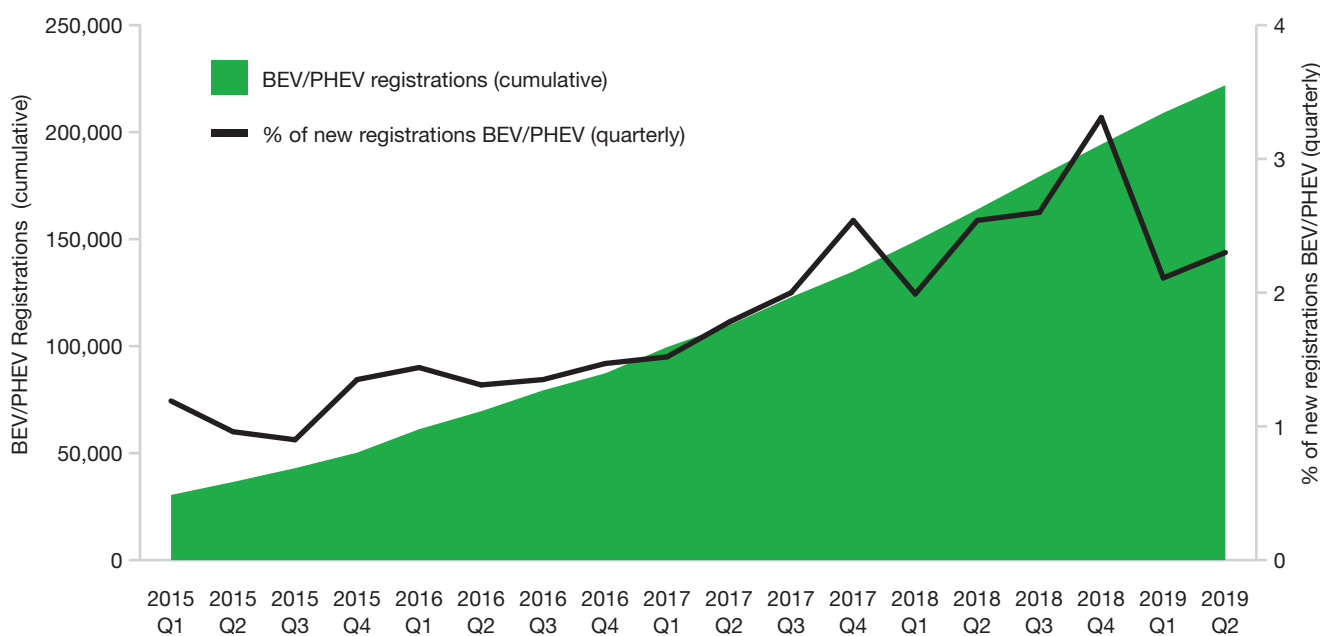
The government recognises the urgency of stepping up the pace of progress to ensure that the transport sector plays its part in supporting the delivery of the UK’s emissions reduction targets. We are working hard and quickly to

ensure that we put transport on a credible path to deliver its contribution to net zero.

We have now begun development of a new Transport Decarbonisation Plan that will review the entire system and put forward the policies and actions needed to help deliver our carbon budgets, whilst looking at the supply chain of each modal sector and adopting a place-based approach.

As road transport makes up over 90% of transport emissions, placing the UK at the forefront of the transition to electric vehicles (EVs) is central to our vision. The Road to Zero strategy, published in July 2018, set out our plans to drive the uptake of zero emission vehicles³⁵⁶. We are making progress – supported by our package of incentives, the UK was the second largest market for ultra-low emission vehicles (ULEVs) in the EU in 2018, with over 200,000 now registered. The market share of these vehicles in August 2019 was 4.4% of all new cars³⁵⁷.

Figure 14: Registrations of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) and new car market share



Source: Department for Transport³⁵⁸

The Road to Zero strategy stated the government's commitment to develop one of the best charging networks in the world to enable the successful roll-out of EVs. As of September 2019, there are over 21,000 publicly accessible chargepoints in the UK, up from 15,000 at the end of 2018, including more than 2,100 rapid devices – making it one of the largest networks in Europe³⁵⁹.

Along with lower emissions and cleaner air, the measures in the strategy aim to unlock the economic benefits of the global EV transition by developing UK leadership in their design and manufacture. In 2018, 1 in 5 battery electric cars sold in Europe were built in the UK³⁶⁰ with exports worth £2.7 billion³⁶¹.

The £1.5 billion we are already investing in incentives, R&D and infrastructure to 2021 make the Road to Zero one of the most comprehensive support packages in the world to encourage uptake of zero emission vehicles. Acknowledging the concerns of the CCC, industry and the public, we now want to explore how to support this transition even further and faster.

In October 2019, the government announced up to £1 billion additional funding to develop and embed the next generation of cutting-edge automotive technologies. This will be used to develop UK supply chains for the large-scale production of electric vehicles and will also be used for further research and development in our world leading research centres³⁶².

Over the past year, the government has continued to lay the groundwork for the action we will need to take in order to tackle emissions from aviation and shipping. The Aviation 2050 Green Paper was published in December 2018 and proposed accepting the CCC's long-standing planning assumption that for an economy-wide target of an 80% emissions reduction, aviation emissions in 2050 should be no higher than those in 2005 (i.e. 37.5 MtCO₂e). It also proposed a requirement that airports' planning applications for capacity growth must demonstrate that their emissions do not impact on our ability to meet

carbon reduction targets. Following the aviation advice we received from the CCC in September 2019³⁶³, we intend to consult on how we are going to achieve a sustainable growth of the aviation sector and update our position on aviation and climate change.

We have launched our Maritime 2050 strategy, setting out our ambition for the UK to become a world leader in the transition to clean maritime and enhance our position as a leading global maritime nation. In July 2019, we published the Clean Maritime Plan – the environment route map to a zero-emission shipping future, which includes a range of policies to reduce shipping emissions while encouraging clean growth and economic opportunities for the UK.

Alongside our domestic strategies, the UK has led international efforts on cost-effective emissions reductions and robust emissions inventory practices in the international aviation and shipping sectors, working through the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO).

Next Steps

Building on the robust plans in our Road to Zero strategy, Aviation Green Paper, Maritime 2050 strategy and the recent recommendations of the Rail Industry Decarbonisation Taskforce, our task now is to rapidly bring down transport emissions and get the sector onto a credible pathway to achieving net zero.

Our Transport Decarbonisation Plan, currently under development, will take for the first time a holistic and cross-modal approach to transport decarbonisation. The plan will not only think in terms of modes of transport, but also places – considering where and how transport contributes to greenhouse gas emissions, and ultimately looking to reduce their contribution across the whole of the UK.

To deliver this plan, we will work with a broad range of stakeholders, including the CCC, to lay out a pathway that maximises the co-benefits of innovative, low-carbon transport technologies

for the environment and the entire country. The plan will also look at ways to capitalise on technological progress to facilitate the mapping of transport emissions, so that people can more easily monitor the carbon footprint associated with their journeys and make more informed travel choices.

As a priority, the government aims to continue to support uptake of ULEVs, expand chargepoint infrastructure and develop a vision for a core network of rapid EV chargepoints along England's key road networks.

We want cycling and walking to be the natural choices for short journeys, and almost £2 billion of investment is projected for the Spending Review period to 2020/21 to encourage higher levels of cycling and walking³⁶⁴. While cycling and walking must remain the best options for short urban journeys, our Future of Mobility: Urban Strategy also identified public transport as a fundamental part to an efficient transport system. New mobility services must lead the transition to zero emissions, and we are taking significant measures to improve the decarbonisation of passenger transport, such as through the Ultra-Low Emission Bus Scheme.

We are planning for a greener freight transport, as trailed by the calls for evidence on last mile delivery and new light rail services. To help move people and freight over long distances in an efficient and sustainable way, we are investing a record £48 billion in the railway over the period 2019-2024³⁶⁵. Our Future Fuels for Flight and Freight Competition is also making up to £20 million of capital funding available to projects that will produce low carbon waste-based fuels to be used in aeroplanes and lorries³⁶⁶.

The government will continue its efforts to promote sustainability in aviation and shipping, and in the coming months we will be publishing the UK government and the Devolved Administrations' response to the recent consultation on the UK's future approach to carbon pricing, including in the aviation sector, and our response to the call for evidence on carbon offsetting in transport. We will shortly be updating the government's

position on aviation and climate change, with the final Aviation Strategy due to be published next year.

These actions are all part of a single concerted approach to dramatically reduce emissions from our road, rail, maritime and aviation networks as we move people and goods more sustainably. They will also enable the early adoption of innovative, low-carbon transport technologies which could put the UK at the forefront of the transport decarbonisation challenge and strengthen its international leadership even further.

Response to the CCC's Recommendations

Recommendation 1:

Bring forward the ban on new conventional vehicle sales to 2035 (or ideally earlier) and clarify that only battery electric (or other zero-carbon) vehicles will be permitted to be sold after this point.

The government recognises the significant contribution that petrol and diesel cars and vans make to our domestic greenhouse gas emissions, and wants to see new cars and vans delivering as many zero emission miles as possible, as soon as possible.

The 2040 date for the end of sales of new conventional petrol and diesel cars and vans was set in 2017 following extensive engagement with stakeholders across numerous sectors, including the automotive industry. At that time, the date was viewed as ambitious, but deliverable. The Road to Zero also included our ambition for as many as 70% of new car sales and up to 40% of new van sales being ultra-low emission by 2030.

Since then, the UK has recorded record sales of zero emission vehicles. Against a rapidly evolving domestic and international context, the government will consider what further interventions are required to ensure that the pace of change is sufficient, so that we can be more

confident of delivering our net zero commitments and maintain the UK's leadership position in the global transition to zero emission vehicles.

We will work closely with all stakeholders through various forums to ensure that future policy to accelerate the transition to zero emission vehicles will maximise benefits for both the economy and the environment, whilst supporting the automotive industry and consumers and delivering co-benefits for air quality and clean growth.

Recommendation 2:

Clarify the UK regulatory approach to the EU 2020/21 new car and van CO₂ targets and set stretching CO₂ targets for new cars and vans beyond 2020, requiring a high electric vehicle market share. A real-world testing regime must be used alongside standardised tests.

In 2018, the UK was one of the EU Member States that pushed for higher ambition during negotiations to agree future CO₂ emission reduction standards for new passenger cars and light commercial vehicles. We argued for, and supported, stretching new CO₂ reduction targets for 2025 and 2030 based on the 2021 Worldwide Harmonised Light Vehicle Test Procedure (WLTP) measurements. As a result of these negotiations, a new regulation was recently published by the EU and will come into force in January 2020. It includes real world emission testing and benchmarks for manufacturers to deliver zero and low emission vehicles, that we expect will deliver 30% ultra-low emission vans and 35% ultra-low emission cars across the EU market by 2030.³⁶⁷

As we leave the European Union, the UK government has made clear its commitment to maintaining a future approach that is at least as ambitious as the current arrangements for vehicle emission standards. The Road Vehicle Emission Performance Standards (Cars and Vans) (EU Exit) (Amendment) Regulations 2019 were made in March 2019 to ensure the existing ambition and targets out to 2024 still apply even

in the event of the UK leaving the EU without a deal in October 2019.

At Budget 2018, the government announced a review of vehicle taxes which are linked to carbon dioxide (CO₂) emissions³⁶⁸. The review sought evidence on the impact of the WLTP on reported CO₂e emissions, and views on whether changes are therefore required to Vehicle Excise Duty (VED) and company car tax. Following this review, the government announced in July 2019 that all zero emission models will pay no company car tax in 2020/21, 1% in 2021/22 before returning to the planned 2% rate in 2022/23, to accelerate the shift to zero emission vehicles³⁶⁹.

Recommendation 3:

Implement policies, including fiscal instruments, to strengthen incentives to purchase cleaner vehicles. Current purchasing trends are undermining new car and van emissions targets and must be reversed.

The government is committed to supporting cleaner new vehicles, and recognises the importance of accelerating the transition to zero emissions. That is why we are investing £1.5 billion between April 2015 and March 2021, providing grants for plug-in vehicles and chargepoint infrastructure in homes, workplaces and on residential streets³⁷⁰. This is one of the most comprehensive support packages in the world for the transition to zero emission vehicles.

Fiscal instruments

We expect the transition to zero emission vehicles to be industry and consumer led, supported by the measures set out in the Road to Zero strategy. Government grants for plug in cars, vans, taxis and motorcycles have helped to reduce the upfront cost of purchasing electric vehicles, and the UK was the second largest market for ultra low emission vehicles (ULEVs) in the EU last year. Since its introduction in 2011, the plug-in car grant has supported the sales of over 190,000 ULEVs³⁷¹. It is now focused

on fully zero emission vehicles and, as a result, registrations of battery electric vehicles were up over 122% in the first nine months of 2019 compared with the same period in 2018.³⁷² The Road to Zero stated that consumer incentives will continue to play a role in the transition to zero emission vehicles after 2020.

Purchasers of ULEVs receive other benefits in addition to grant funding for the purchase of vehicles and chargepoints, including lower tax rates. All zero emission models will pay no company car tax in 2020/21, 1% in 2021/22 before returning to the planned 2% rate in 2022/23 – a significant tax saving for employees and employers³⁷³. New legislation has been introduced which exempts zero emission capable taxis (electric taxis) from the premium rate of Vehicle Excise Duty (VED) – saving taxi drivers purchasing an eligible taxi £1,600 over a 5-year period³⁷⁴.

Public awareness

To encourage more people to embrace the benefits of ultra-low emission vehicles, we continue to increase consumers' awareness of EVs through our Go Ultra Low public education campaign, now running for the 5th year, and we will consult on green number plates to incentivise behaviour change. With uncertainty and poor advice identified as a key barrier to EV adoption, we have backed the 'Electric Vehicle Approved' scheme for car dealerships, aiming to create a trusted brand and increase the confidence of drivers looking to buy an electric vehicle. The eight cities funded through the £40 million Go Ultra Low Cities Scheme continue to deliver a range of pioneering local initiatives and charging infrastructure projects³⁷⁵.

EV charging network

We recognise that a key barrier for consumers to purchase plug-in battery electric vehicles is range anxiety. To make it easier for consumers to move towards EVs, our vision is to have one of the best charging infrastructure networks in the world. For this reason, there are a number of schemes in place to support workplace,

on-street residential and off-street domestic chargepoints. For example, 51 local authorities have successfully been awarded funding through the On-street Residential Chargepoint Scheme since 2017, which has allocated £8.5 million in grant funding towards the cost of installing on-street chargepoints through to 2020³⁷⁶. The current funding for 2019/20 is £5 million.

An affordable, efficient and reliable charging infrastructure network, that is easy for drivers to locate and use, needs to be in place. We adopted powers last year in the Automated and Electric Vehicle Act to allow us to regulate further in this area. In the last 12 months, we have taken further action to continue to strengthen the charging network.

- In a recent consultation, we have proposed that all chargepoints installed in the UK should be smart to encourage off-peak charging, keeping costs down for consumers and helping to prepare the energy system for the mass switch to EVs. Since 1 July 2019, all domestic chargepoints funded by our Electric Vehicle Homecharge Scheme – which provides grant funding of up to 75% of the cost of purchase and installation of a domestic chargepoint – must be smart³⁷⁷.
- To end the current wide variety of payment systems and associated frustration, we have announced that we want all new rapid and higher powered chargepoints to provide 'pay as you go' debit or credit card payment options by spring 2020³⁷⁸.

Case Study: Go Ultra Low Cities

The £40 million Go Ultra Low Cities scheme has awarded funding to 8 cities to deliver a range of pioneering local initiatives and charging infrastructure³⁷⁹. The funding is helping these cities to become international exemplars in supporting the uptake of ULEVs in their areas.

Sunderland 350kW Filling Station

The scheme has supported the first 350kW enabled electric vehicle charging station in the UK, which opened in Sunderland this year. The site has four 50 kW rapid charge points, plus two 175 kW points that are enabled for 350 kW charging. A 175 kW charge point can charge an electric vehicle to 80% capacity in around 15 minutes. All of the charge points are supplied with 100% renewable energy.

Appointed by the North East Combined Authority, the station was constructed and is to be operated by Fastned. It is located near to the factory where the Nissan Leaf (electric car) is produced.



Source: North East Combined Authority

Milton Keynes Rapid Charging Hub

Go Ultra Low Cities has also supported a rapid charging hub in Milton Keynes, which provides 9 rapid 50kW chargers at a strategic location within a minute's drive of the M1.

Ionity have subsequently installed an additional, High Power Charging Station at this site – which is the second of 45 such stations planned in the UK. Ionity's partnership with Octopus Energy means vehicles will be charged with 100% renewable energy.

Source: DfT, Milton Keynes Council

- We anticipate that the vast majority of drivers will choose to charge at home, where this is possible. In July 2019, we launched a consultation on amendments to the Building Regulations to require that every new home in England with a car parking space is fitted with an EV chargepoint, as well as minimum chargepoint provision in new and existing non-residential buildings³⁸⁰.
- We have awarded over £6 million across 17 local authorities to help install chargepoint infrastructure dedicated to ultra-low emission taxis³⁸¹. This takes the overall award to over £20 million across 27 local authorities to help deliver over 900 chargepoints³⁸². Delivering on a key commitment in the Road to Zero, the £400 million Charging Infrastructure Investment Fund³⁸³, managed by Zouk Capital, launched in September 2019. This will enable large scale private investment in the provision of charging infrastructure.
- We launched the EV Energy Taskforce in June 2018. Due to report in the autumn, this cross-sector industry taskforce will issue proposals for government and industry on how to prepare the electricity system for the mass take up of EVs.

The Office for Low Emission Vehicles is also undertaking a review to develop a vision for a core network of rapid chargepoints along England's key roadways. The project aims to direct and catalyse private investment to build out the infrastructure required to give consumers the confidence to use electric vehicles for longer journeys.

Vans

To accelerate the market share for ultra-low emission vans, which are currently a much smaller percentage of new sales than cars, the Plug-in Van Grant offers up to 20% of the price of a qualifying vehicle to a maximum grant amount of £8,000, or £20,000 for the first 200 large vans or trucks. The government has backed the Clean Van Commitment, which aims to increase the uptake of ultra low emission vans in fleets.

Next Steps

We will work closely with industry and consumers to assess whether and what additional policy and fiscal interventions, on top of those set out above, will be required to accelerate the development of the zero emission vehicles market even more effectively.

Recommendation 4:

Set stretching targets for CO₂ emissions reductions from new HGVs to address the rise in emissions and exploit opportunities to improve logistics and increase uptake of eco-driving. Develop plans for the roll-out of zero emission HGVs.

Heavy Duty Vehicles (HDVs) are a major source of emissions, accounting for 18% of UK greenhouse gas emissions from all road transport in 2017³⁸⁴, which is why the UK pushed for higher ambition during the EU negotiations on new CO₂ reduction targets. The new regulation sets binding CO₂ emission reduction targets for HDV manufacturers of 15% by 2025 and 30% by 2030 (based on 2019 emission levels)³⁸⁵. Those targets are binding, and manufacturers who do not comply face a financial penalty in the form of an excess emissions premium. The new Regulation was published in the Official Journal of the European Union on 25 July 2019 and is now in effect in the UK. Our Road to Zero strategy made it clear that as we leave the EU, we are committed to maintaining a future approach that is at least as ambitious as the current arrangements for vehicle emissions regulation.

We expect to see significant emission reductions from HDVs in the coming years. A key priority of government efforts is the voluntary, industry-supported commitment to reduce Heavy Goods Vehicles (HGV) greenhouse gas emissions by 15% by 2025, from 2015 levels³⁸⁶. Both the major trade bodies, the Freight Transport Association (FTA) and Road Haulage Association (RHA), have supported this target. To meet this ambition, we are working with the industry to promote best practice and effective

practical actions that operators can take to reduce their greenhouse gas emissions and improve efficiency.

A number of schemes and activities are already under way to encourage cleaner and more fuel-efficient trucks: for example, our £25 million Advanced Biofuels Demonstration Competition³⁸⁷, our ten-year trial of longer semi-trailers and the £11 million Low Carbon Truck Trial³⁸⁸. Through the Low Emission Freight Trial, we have also awarded £20m to collaborative R&D projects which are trialling a range of low emission technologies for freight³⁸⁹. In 2020 real-world commercial trials of HGV platooning technology will take place on the UK strategic road network and the project will report on whether the technology can safely deliver fuel saving benefits to UK hauliers thereby informing their future investment decisions. We are also working with the Connected Places Catapult (CPC) to identify new ways of bringing novel transport decarbonisation technologies to market, including analysis of the potential impact of demonstrators for zero emission technology solutions for HGVs. Additionally, we have implemented a duty incentive for road fuel gases and we have increased rewards for gaseous fuels under the Renewable Transport Fuel Obligation.

Moving forward, we will be working with the Energy Saving Trust to develop, improve and promote their existing Freight Portal, supported by the Low Carbon Vehicle Partnership. This assists freight operators in the choice of vehicle and provides information and case studies on how fuel savings, cost and emission reductions can be achieved including adoption of new technologies, driver training and performance monitoring. We will make it more relevant to small and medium sized operators and focus on the practical actions that they can take to achieve significant emission reductions and realise the commercial benefits that come through improved fuel and logistical efficiency.

Through our Transport Decarbonisation Plan, we will also be looking at what more we can do to use R&D and procurement to support zero

emission fuels for the heavier haulage sector, including electrification, renewable biofuels and whole new energy fuel sources like hydrogen. We will engage with industry to develop an ultra-low emission standard for trucks.

In 2020 real-world commercial trials of HGV platooning technology will take place on the UK strategic road network and the project will report on whether the technology can safely deliver fuel saving benefits to UK hauliers thereby informing their future investment decisions.

The government is also committed to accelerating our activity to enable cost-effective options for shifting more freight from road to rail, including using low emission rail freight for deliveries into urban areas, with zero emission last mile deliveries. As part of the Transport Decarbonisation Plan, we are also investigating alternatives to diesel trains for rail freight.

Recommendation 5:

Set out policies to address the decline in bus usage and develop new schemes to increase levels of walking and cycling.

Public transport, walking and cycling have a key role in tackling carbon emissions, as well as delivering the co-benefits of decarbonisation such as cleaner air and a healthier society. In the Future of Mobility: Urban Strategy, published in March 2019, the government made clear that walking, cycling and active travel must remain the best options for short urban journeys and that new mobility services must lead the transition to zero emissions.

To improve productivity and spread prosperity through investment in public and sustainable transport, we have announced an extension of the Transforming Cities Fund. This will provide an extra £440 million of competitive funding for the previous and additional cities in England shortlisted. A further £240 million will be made available to six metro mayors with a devolved settlement.³⁹⁰

Further investment in cycling and walking will be considered as part of the forthcoming multi-year Spending Review, expected in 2020. This will consider the appropriate levels of funding required to double cycling and increase walking by 2025, as set out in the Cycling and Walking Investment Strategy, and to maximise health outcomes and achieve geographical equity.

To help decarbonise our cities, reduce congestion and improve air quality, we recognise the need for an efficient and sustainable public transport system and the necessity of promoting walking and cycling further. Our intention is to further explore the role of modal shift in driving down greenhouse gas emissions as part of our upcoming Transport Decarbonisation Plan.

Bus usage and transition to ultra-low emission buses

The government is committed to making public transport more efficient and sustainable, as set out in the Clean Growth Strategy.

In 2017, the government introduced the Bus Services Act³⁹¹, which aims at reversing the decline in bus use by giving local authorities new powers to bring passengers a richer and more informative experience of bus travel. Since then, we have met with over 30 local authorities to explain the powers available to them and we are working closely with four local authorities that are pursuing or actively considering those opportunities.

Central to our ambition is to improve the information available to bus passengers and ease their travel decisions based on complete, accurate and timely data. In response to the recent Bus Open Data consultation, the government announced in March 2019 that it will offer data hosting services to smaller Bus Operators with less technical capacity and will work with them to upskill the industry. Bus operators will be also required to provide Automatic Vehicle Location (AVL) data. These improvements aim to remove uncertainty in bus journeys, improve journey planning

and, ultimately, help passengers secure best value tickets.

To make bus journeys more sustainable and increase the take-up of ultra-low emission buses in the long-term, we have awarded £48 million to 19 local authorities and bus operators through our Ultra-Low Emission Bus Scheme. This funding will be used to support the purchase of 263 ultra-low emission buses and associated infrastructure. The Chancellor also announced £220 million funding in September 2019 to transform bus services and promote their decarbonisation. £50 million of this funding will be used to support the development of an all-electric bus town or city³⁹².

Cycling and Walking

In the statutory Cycling and Walking Investment Strategy (CWIS), published in April 2017, the government set out a range of aims and targets for increasing active travel, including to double cycling activity by 2025. Almost £2 billion of investment is projected over this Spending Review period to 2020/21 to increase cycling and walking, and spending on cycling in England has doubled from £3.50 per head to around £7 per head since the last Spending Review period. The government is committed to further investment over the next Spending Review period³⁹³.

The funding is largely focused on development of safe, efficient and direct cycling and walking infrastructure – including segregated and unsegregated cycle lanes, dedicated footways and bridges, road crossings and cycle racks. Funding is also provided for children’s cycle training (the Bikeability scheme), cycle hire and giveaway schemes, and local modeshift campaigns.

As announced in June 2019, an extra 2,300 cycle spaces will be built at 48 stations across England thanks to an additional £6.8 million for the Cycle Rail programme, which has now exceeded £40 million of investment since 2010³⁹⁴. Cyclists around the country will also benefit from more than 20 new and improved

cycling routes, announced in July 2019, thanks to a £20 million government investment for upgrading the National Cycle Network³⁹⁵.

Safety, and the perceptions of safety, are the biggest barriers to higher take-up of cycling. To address these concerns, the government's response to the CWIS Safety Review, published in November 2018, contained 50 commitments to make roads safer for those who cycle and walk³⁹⁶, including:

- Reviewing the guidance in the Highway Code to improve safety for cyclists and pedestrians;
- Encouraging local councils to invest around 15% of their local transport infrastructure funding over time on safe and efficient cycling and walking infrastructure;
- Enforcement against parking in mandatory cycle lanes.

We continue to engage with key cycling and walking organisations to develop a behaviour change campaign aligned with our CWIS Action Plan³⁹⁷. In early 2019, we announced £2 million specifically to support initiatives to encourage more people to cycle and walk. These include the Big Bike Revival and Living Streets Walk to School outreach programme, which encourages young people to make walking a key part of their journeys from an early age³⁹⁸. The scheme saw walking to school rates increase by 23% last year within schools supported by the scheme, a big step towards the government target of 55% of primary school children walking to school by 2025³⁹⁹.

Case Study: Cycle Cities Ambition Fund

The £191 million Cycle Cities Ambition fund is part of the Cycling and Walking Investment Strategy. This strategy sets out the government's commitment to make cycling safer and easier across the country to improve health, quality of life, the environment, and local economies.

Birmingham is one of eight cities, or groups of cities, that received funding through the programme – receiving a grant of £39.1 million.

This funding has helped Birmingham to resurface eight canal towpath cycle routes; create or improve over 25km of cycle routes across green space; sign 11 routes along quieter roads; implement 20mph zones across 41 square km of roads; and distribute 7,000 bikes in disadvantaged communities. Recently completed schemes include 6.9km of new segregated cycle track along two 'A' road corridors, with new cycle parking due to be installed along these routes shortly.

There has been a comprehensive upgrade of 52 km of canal towpaths; information totems were installed on 2km of route in the city centre, and access ramps were added at eight locations. Between 2012 and 2017, cycling volume on the canal towpaths increased by 157%, whereas city-wide cycling volume increased by 32% – suggesting the canal towpath improvements had a positive impact on cycling levels.

Source: Department for Transport⁴⁰⁰

Recommendation 6:

Formal inclusion of international aviation and shipping emissions in Climate Change Act targets. Strategies for aviation and shipping that reflect the net zero target.

Aviation and shipping emissions are global issues that require global solutions. The exclusion of international aviation and shipping emissions in the UK's carbon budgets and 2050 emissions target is consistent with the Paris Agreement, which looks to the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) to develop targets. No practice for allocating such emissions to individual states has yet been agreed internationally, and we will continue to account for international aviation and shipping emissions via "headroom" within our existing carbon budgets. However, we recognise the importance of a good international inventory and we are also minded to include these emissions in domestic legislation at a later date, subject to future progress in the IMO and ICAO.

The UK will continue to lead international efforts to agree robust emissions inventory practices and negotiate cost-effective emissions reductions. The UK is one of a number of states who are co-funding the IMO's fourth GHG Inventory exercise for shipping emissions and we were instrumental in agreeing the first worldwide measures to reduce emissions in a single sector in the form of the Carbon Offsetting and

Reduction Scheme for International Aviation (CORSIA).

The UK has also worked hard through ICAO to develop robust emissions criteria for aviation offsets, which were approved by the ICAO Council on 4 March 2019. This goes a long way to securing a scheme that is environmentally robust. We will also negotiate in ICAO for a long-term goal for international aviation that is consistent with the temperature goals of the Paris Agreement, ideally by ICAO's 41st Assembly in 2022.

The government also continues to take action at a domestic level. Over the last year, we have published our Maritime 2050 strategy, our Clean Maritime Plan and our Aviation 2050 Green Paper, and we will publish an ambitious Aviation Strategy next year. In developing these and future strategies, we have and will continue to consider the implications of our 2050 net zero target and we have set out a robust and comprehensive approach to tackling aviation and shipping emissions which will also consider the role of synthetic fuels.

While decarbonisation takes place, to gather information on how consumers can help reduce their emissions, the government has launched a call for evidence on carbon offsetting in transport. We have also published a consultation on the UK's future approach to carbon pricing, including in the aviation sector.

Chapter 6: Progress on Reducing Emissions in the Devolved Administrations



The Devolved Administrations have a crucial role to play in helping to deliver the UK's carbon budgets and the 2050 net zero target, through their emissions reduction policies in devolved areas such as agriculture, waste and local energy efficiency. At the same time, action taken by the UK government in reserved areas of policy is vital to achieving statutory targets in Scotland and Wales.

The UK government, Scottish Government, Welsh Government and Northern Ireland Civil Service (in the absence of devolved government) are committed to close and collaborative engagement in order to achieve our shared climate objectives and lead the world in delivering a net zero future.

Scotland

Summary of Progress

The Scottish Government is committed to doing what is needed to limit global temperature rises and will do that responsibly and in collaboration with the Scottish Parliament and citizens. In April 2019, Scotland's First Minister declared that there is a global climate emergency, and the Scottish Government is responding urgently through an ambitious approach that will support economic growth by reducing the cost to the Scottish economy of climate change, while maximising opportunities to export technology innovations and knowledge as other economies make their own transition.

In May 2018, the Scottish Government introduced a new Climate Change (Emissions Reduction Targets) Bill to the Scottish Parliament to raise the ambition of Scotland's domestic targets in line with the Paris Agreement. Following the declaration of a global climate emergency, and receipt of advice from the UK Committee on Climate Change in May 2019, the Bill was amended to set a target date for net zero emissions of 2045. In September 2019, the Bill passed Stage 3, confirming the net-zero emissions target date and setting a world-leading interim target for 2030 of a 75%

reduction in emissions. These targets will mean that Scotland's contribution to climate change will end, definitively, within a generation.

The Scottish Government's Climate Change Plan⁴⁰¹ was published in February 2018, setting out proposals and policies, across all sectors of the economy, for reducing greenhouse gas emissions in every year to 2032. We have committed to updating the current Plan within six months of our Bill receiving Royal Assent, to reflect the increased ambition of the new targets.

A central pillar of the Scottish Government's approach is constructive dialogue, and a Just Transition Commission has been established to provide Scottish Ministers with practical advice on how to maximise the economic and social benefits of decarbonising Scotland, and manage the risks and challenges. The Scottish National Investment Bank and Scotland's Infrastructure Commission will also support the transition to net zero. A Big Climate Conversation was held over summer 2019, engaging with individuals, the private and public sectors about the roles that everyone needs to play in ending Scotland's contribution to climate change.

The global climate emergency and a Green New Deal are at the heart of the First Minister's Programme for Government⁴⁰². This sets out new measures across all parts of the Scottish economy, with a few examples being: investing over £500 million in improved bus infrastructure, making the transition to net zero the primary mission of the Scottish National Investment Bank, aiming to decarbonise scheduled flights within Scotland by 2040, and a National Planning Framework and future public infrastructure programme to lay the foundations on which we will build low and zero carbon homes, communities and industries.

The CCC's May 2019 advice, which was provided jointly to the Scottish, Welsh and UK governments, made it clear that Scotland cannot achieve net zero emissions by 2045 through devolved policy alone and enhanced action from the UK government in reserved areas will also be needed.

The most recent statistics show continued year on year progress in reducing Scotland's greenhouse gas emissions, which were down 3.3% between 2016 and 2017 and down 46.8% since the 1990 baseline⁴⁰³. Scotland continues to lead the UK as a whole in delivering long term reductions. Amongst Western European EU-15 countries, Scotland continues to be placed second only to Sweden in progress to date⁴⁰⁴.

Next Steps

As set out above, the Scottish Government will update its current Climate Change Plan within six months of the Bill receiving Royal Assent. In the meanwhile, progress against the current Plan continues to be assessed through monitoring reports. The first, baseline, set of such reports was published in October 2018⁴⁰⁵. A second set of reports will be published later this autumn, which will then help to inform the Plan update process.

In addition to its UK reports, to which the present document responds, the CCC provides a stand-alone annual progress report on emissions reductions in Scotland. The Scottish Government will respond separately to the Committee's 2019 Scottish report, once this is published later in the year.

Response to the CCC's Recommendations

Recommendation: Scotland's updated Climate Change Plan, due out in 2020, should set out firm policies and an implementation plan to reduce GHG emissions in agriculture.

The Scottish Government's Climate Change Plan contained a dedicated chapter on agriculture,

setting out a range of policies, proposals and milestones developed to help the agricultural industry to transition to a low carbon farming future. The Scottish Government is committed to working with our agricultural industry and our renowned scientific community as we move forward. We believe that it is through this collaborative approach that we will find solutions that are not only beneficial to our environment, but to Scotland's farmers and crofters and our wider food and drink industry.

Recommendation: Develop strategies for each part of the UK to increase overall annual afforestation rates to at least 30,000 hectares in the 2020s.

The Scottish Government is committed to increasing tree planting. The Climate Change Plan sets out Scotland's ambition to increase forest and woodland cover from around 18% to 21% of the total area of Scotland by 2032. This target equates to 10,000 hectares of new planting per year until 2020/2021, rising by steps to 15,000 hectares per year by 2024/2025.

These ambitions were reaffirmed in Scotland's Forestry Strategy 2019-2029⁴⁰⁶, published earlier this year, which identified the expansion of forests and woodlands across Scotland as a priority for action. In 2018/2019, 11,210 hectares of new woodland was created in Scotland, exceeding the target of 10,000 hectares and making a critical contribution to tackling the climate emergency.

The Scottish Government's current Programme for Government⁴⁰⁷ sets out our ambition to continue to accelerate progress towards the Climate Change Plan's woodland cover target, seeking to plant an additional 2,000 hectares of trees, over and above the Climate Change Plan target of 10,000 hectares of new planting in 2019/20.

Wales

Summary of Progress

The Welsh Government welcomes the significant fall in Welsh emissions in 2017. The CCC's

2019 Annual Progress Report highlights the importance of continued reductions in power sector emissions if Wales is to achieve its first carbon budget (2016-20) and recognises that the Welsh Government does not have devolved control of this sector.

The Welsh Government published 'Prosperity for All: A Low Carbon Wales' in March 2019⁴⁰⁸. It contains 100 policies and proposals for meeting Wales's first carbon budget and 2020 target. The Welsh Government declared a climate emergency in April and the National Assembly for Wales subsequently became the first parliament in the world to do so. In June, the Welsh Government accepted the CCC's recommendation to increase Wales's 2050 target to 95% as its contribution to a net zero target for the UK. It also declared an ambition to bring forward a target for Wales to achieve net zero emissions no later than 2050, making it the only government seeking to go beyond the CCC advice.⁴⁰⁹

Since publishing the plan and declaring a climate emergency, the Welsh Government has established a permanent Cabinet Sub-Committee to provide impetus from the ministerial level. It has reached a number of policy milestones which represent major reviews of government policy, as reflected in 'Prosperity for All: A Low Carbon Wales':

- Publishing proposals for future financial support for agriculture after Brexit.⁴¹⁰
- Publishing proposals for future marine management after Brexit, including the implementation of sustainable management practices, focusing on improving the resilience of marine ecosystems.⁴¹¹
- Completing a consultation on environmental principles and governance after Brexit and creating a group of key stakeholders to take forward this work over the summer.⁴¹²
- Committing to bringing forward new restrictions on the sale of single use plastics, and to implementing the provisions of the

Environment (Wales) Act 2016 to require businesses to separate their waste to ensure all recyclable materials are not wasted.⁴¹³

- Publishing the recommendations from the Decarbonisation of Homes Wales Advisory Group, with a full government response due this autumn.⁴¹⁴
- Committing to driving further decarbonisation and energy efficiency through the rollout of the empty homes grant scheme across the Valleys taskforce area.
- Committing to prioritising the zero carbon economy in regional investment after Brexit, along with inequality, business competitiveness, and healthier and more sustainable communities.
- Publishing proposals on the new curriculum for Wales, which includes helping learners to become ethical and informed citizens of Wales and the world as one of the curriculum's four central purposes.⁴¹⁵

Additionally, since the climate emergency declaration the Welsh Government has announced more than £60 million to support a wide range of initiatives that deliver on the objectives of 'Prosperity for All: A Low Carbon Wales', with almost £20 million additional funding secured from the European Union. These include support for active travel, tackling biodiversity loss and wider ecosystem resilience, low carbon innovation in industry, the development of a world-leading marine energy sector and supporting community action on reducing waste and protecting local species and habitats.

Next Steps

The Welsh Government is focussed on delivering the policies and proposals in 'Prosperity for All: A Low Carbon Wales'. It has requested further advice from the CCC about how the new 95% target for 2050 affects Wales's interim targets for 2030 and 2040 as well as the first two carbon budgets that have been set in legislation.

It intends to ask the National Assembly for Wales to amend these targets and budgets in legislation next year. The Welsh Government will also work with the CCC and others to identify how Wales might go beyond 95%.

Response to the CCC's Recommendations

Recommendation: Publish a new Waste Strategy in 2020 including proposals to reduce food waste substantially and regulations requiring that all businesses and public bodies separate recyclable waste at source.

The Welsh Government will publish its new zero waste strategy for consultation later this year. Its aim is to move to a circular economy, where waste is avoided and resources are kept in use as long as possible. This is a key part of the action needed on climate change and also brings economic opportunities as a part of the transition to a low carbon economy. The strategy will contain actions on food waste.

Separately, the Welsh Government published a consultation in September 2019 on proposals for businesses and public sector bodies to separate recyclable waste at source, which will support collection of high quality materials that can be recycled and reused.⁴¹⁶

Recommendation: Develop strategies for each part of the UK to increase overall annual afforestation rates to at least 30,000 hectares in the 2020s.

The Welsh Government acknowledges that trees are not currently being planted in sufficient numbers and recognises that increasing forestry cover is vitally important to enabling a vibrant forestry industry, countering carbon emissions and mitigating the effects of climate change. Woodlands for Wales, the Welsh Government's strategy for woodlands and trees, was revised in 2018 and includes the aim of increasing woodland cover by at least 2,000 hectares per year from 2020.⁴¹⁷ Tree cover in

the wider environment, on farms and in the rural landscape, and in and around towns and cities should also increase. The strategy contains a number of principles, including:

- Giving priority to creating both new native and new mixed woodlands that can deliver multiple benefits, and to the use of planting and natural processes to do so.
- Making a strong presumption against the permanent removal of woodland except for the restoration of high priority open habitats and to meet the requirements of the Environment (Wales) Act 2016.
- Offsetting permanent removal of woodland when permitted for development by compensatory planting undertaken by the developer.
- Providing information to landowners and communities about Welsh Government priorities and financial support for woodland creation.

The First Minister's manifesto commitment for a new national forest will help support the aims of Woodlands for Wales, as well as priorities relating to biodiversity, commercial forestry, construction, community cohesion and regeneration, and health and well-being. The Welsh Government is considering how to maximise these economic and environmental benefits and will work in collaboration with the public sector and other partners to identify preferred sites for planting.

The Welsh Government is consulting on land management after Brexit. It is proposing to pursue an objective of Sustainable Land Management (SLM) and provide support targeted at SLM outcomes. Sustainable food production is the major part of SLM but it also includes sustainable forestry and other types of primary production.

Northern Ireland

Summary of Progress

In Northern Ireland, greenhouse gas emissions have reduced by 18% against the 1990 baseline to 20 MtCO₂e in 2017 – a decrease of 3% compared to 2016. The largest sectors in terms of emissions in 2017 were agriculture (27%), transport (23%) and energy supply (17%).⁴¹⁸

Most sectors showed a decreasing trend since the base year. The largest decreases, in terms of tonnes of carbon dioxide equivalent, were in the energy supply, waste management and residential sectors. These were driven by improvements in energy efficiency, fuel switching from coal to natural gas, which became available in the late 1990s, and the introduction of methane capture and oxidation systems in landfill management.

Waste

The Department of Agriculture, Environment and Rural Affairs (DAERA) has consulted on the reform of the producer responsibility system for packaging and the introduction of a deposit and return scheme for drinks containers. These policy proposals, alongside HMT's proposed introduction of a tax on single use plastics, will reduce the amount of packaging waste produced, improve recycling and recyclability, and tackle street and marine litter. A second round of consultations is planned alongside the rest of the UK next year.

DAERA has ensured environmental governance is maintained in the absence of a sitting Assembly by working with Defra to include appropriate enabling powers for forthcoming policy proposals in the Environment Bill.

A new waste prevention programme will issue for consultation later this year. The overall aim of the Waste Prevention Programme is to maintain the downward trend in waste arisings in Northern Ireland. This in turn will have a significant impact on meeting EU landfill diversion targets. It contains a series of actions centred around household and commercial activity and tackling

food waste along with a range of initiatives aimed at supporting both the public and third sectors.

In addition to considering the CCC's advice, DAERA has launched a £23 million programme to provide financial assistance to local government to improve recycling services and facilities in order to improve recycle quality and increase recycling rates to support the circular economy.

Energy

The Department for the Economy (DfE) is currently undertaking significant work on the development of a new Energy Strategy for Northern Ireland, engaging with key stakeholders and industry as well as establishing a NI Energy Strategy Government Stakeholder Group. A new NI energy strategy will provide joined-up, cross-departmental leadership and support for the wider energy related decarbonisation efforts across all Departments.

In the interim, ongoing extension of the natural gas network to 8 towns in the West and 13 towns and villages in East Down aims to connect some 68,000 consumers to gas, and in doing so, reduce greenhouse gas emissions through conversion from more polluting fuels.

Also, since 2010, the Utility Regulator's Northern Ireland Sustainability Energy Programme (NISEP) has made a significant contribution to energy efficiency in homes and premises across Northern Ireland, with 890,321 tonnes of carbon saved.

In 2010, the NI Executive set a target that 40% of electricity consumed in Northern Ireland would come from renewable sources by 2020. Statistics recently published by the Department for the Economy show that the proportion of electricity consumed from renewables for the 12 month period ending 30 June 2019 was 44.0%⁴¹⁹ demonstrating that the Executive target has been exceeded.

Transport

The Department for Infrastructure (Dfi) is completing local transport studies, integrated

with the Councils' Local Development Plan processes, focusing on future measures to deliver modal shift from private cars to public transport and active travel for all Council areas.

DfI is investing in a new fleet for Translink including ultra-low emission hybrid electric buses and three zero emission hydrogen electric buses which will, in future, be trialled in Metro routes. DfI is also investing in NI's infrastructure to increase the proportion of journeys made by walking, cycling and public transport.

Land use, land-use change, and forestry (LULUCF)

DAERA has commissioned a series of Conservation Management Plans for Northern Ireland's Special Areas of Conservation to improve the condition and resilience of these priority habitats to pressures associated with climate change. These sites include the best of NI's peatland resource and will have specific recommendations and costings for appropriate peatland management and restoration.

INTERREG Va funding is being used to define and implement peatland restoration for a number of key peatland sites to improve their biodiversity, water purification and carbon storage value.

Work has commenced on developing a Peatland Strategy for Northern Ireland which will highlight the importance of peatlands in relation to the climate change agenda. The strategy will focus on the need to put in place long term plans to protect and restore these vital ecosystems across a wide range of public bodies. The strategy will have implications across a number of sectors including agriculture, and will focus on the importance of future agri-environment policies to maintain and increase the ecology of our peatlands. It is intended that the strategy will be consulted on in mid-2020.

Northern Ireland has commenced a process to develop long-term plans to achieve emissions reduction through increased afforestation rates,

as set out below in response to the CCC's recommendation.

Next Steps

The CCC has advised that unlike Scotland and Wales, Northern Ireland has no legislated GHG reduction targets and has not laid out a long-term plan to achieve emission reductions. Despite promising trends in the power sector, Northern Ireland is at risk of falling behind the rest of the UK. Actions to address climate change must be taken as soon as possible across all sectors of the economy.

In the absence of Northern Ireland Ministers, any future policy decisions to be made in respect of Northern Ireland may be taken by a senior Departmental Officer in Northern Ireland, in accordance with the Northern Ireland (Executive Formation and Exercise of Functions) Act 2018 and the guidance published by the Secretary of State under section 3 of that Act.

Northern Ireland contributes towards the UK climate change targets and carbon budgets set out in the Climate Change Act 2008. In addition, the Northern Ireland Civil Service work programme includes the objective to 'live and work sustainably, protecting our environment' with greenhouse gas emissions reductions being used as one of the indicators to help monitor progress. The work programme sets out the priorities to be pursued in the current year, setting real-world objectives on how policies make a difference.

DAERA requested an independent overview from the CCC on what NI needs to do to reduce emissions going into the 2020s. In February 2019, the CCC published their report 'Reducing Emissions in Northern Ireland'⁴²⁰. This provided comprehensive recommendations on policy options and actions across all sectors that could deliver economy wide emission reductions.

In response to the CCC report, DAERA has established the Future Generations Working Group. This cross departmental group will look

at all NI sectors with a view to further reducing NI's emissions.

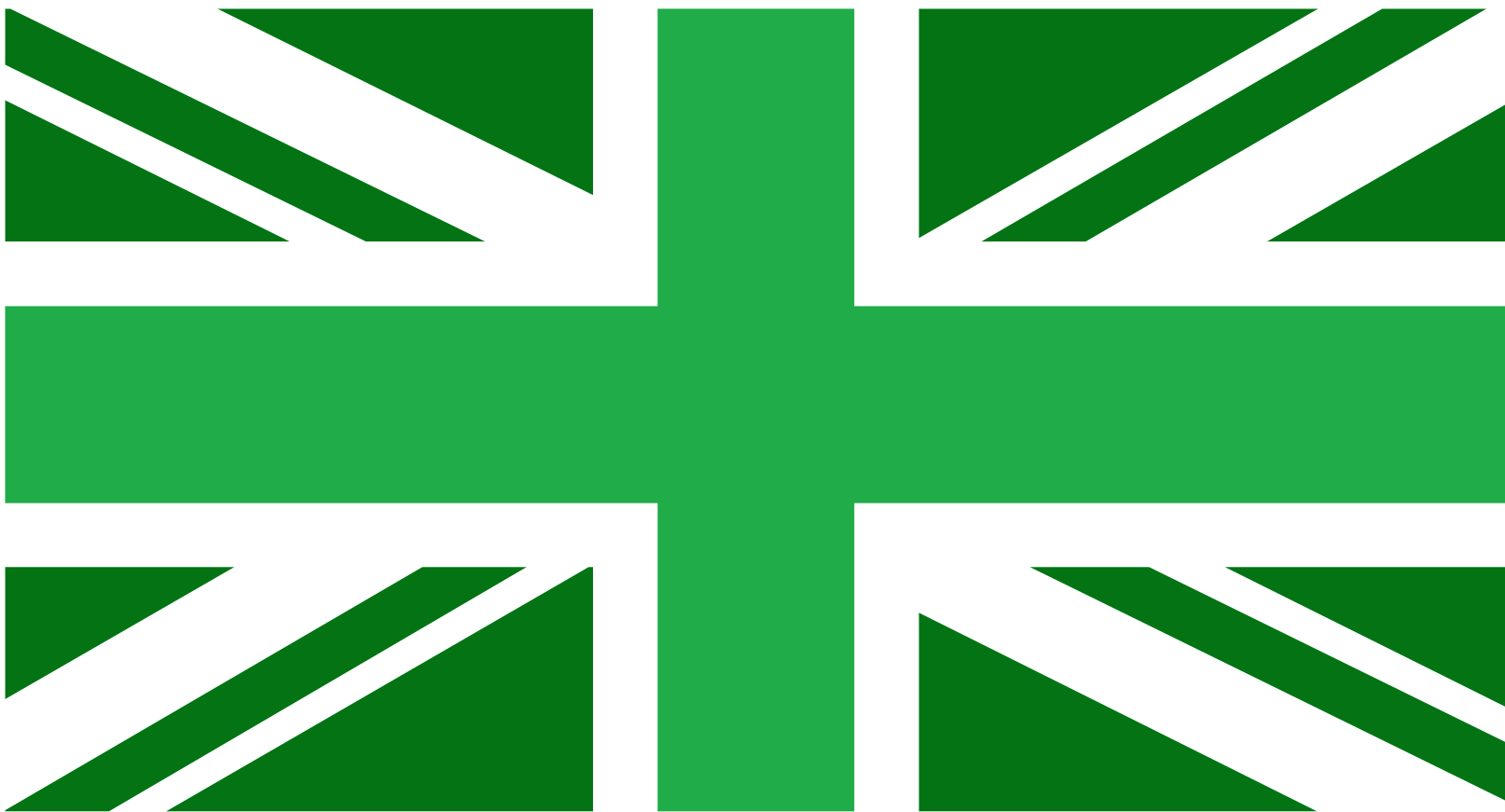
Northern Ireland departments will consider all recommendations set out in the recent CCC reports to identify what policies, strategies, measures and schemes may be possible to progress emissions reduction in Northern Ireland through the 2020s and contribute to the UK net zero target, for future Ministerial consideration.

Response to the CCC's Recommendations

Recommendation: Develop strategies for each part of the UK to increase overall annual afforestation rates to at least 30,000 hectares in the 2020s.

In 2019/2020, the DAERA Forest Service will focus its attention on developing the case for expanding forests within the context of post-EU exit Agricultural and Environmental Policy development, and establish an afforestation forum of senior officials and policy makers to gather perspectives and opinions on how planting rates can be increased. In addition, the Forest Service will continue to work with the Agri-food and Biosciences Institute in their development of land use studies and economic modelling that assist the Forest Service to communicate policy options clearly in support of changes in land use to forestry. The Department will support woodland expansion through the Environmental Farming Scheme and the Forest Expansion Scheme and, in addition, create new woodland on agricultural land acquired by the Department.

Annexes



Annex A: Metrics

In the Clean Growth Strategy, we set out a set of key economy-wide and sector-level metrics against which we will measure our progress. This second annual update to the metrics provides an indication of our progress toward meeting the ambitions set out in the Strategy. These have been updated to include the latest available data for 2017 and, where available, estimates for 2018. Statistical revisions to historic data have also been included.

		1990	2016	2017	2018 ¹	1990 – 2017
Overall	Emissions per capita (tCO ₂ e/person)	14	7	7	7*	-50%
	Emissions Intensity Ratio, EIR (tCO ₂ e/£ million of GDP)	712	250	239	230*	-66%
	Final energy consumption intensity of GDP (MWh/£ million)	1,535	870	853	851	-44%
Business and public sector	Non-industrial business and public energy use per £ million output (MWh/£ million)	303	168	163	162	-44%
	Emissions intensity of non-industrial business and public energy use (gCO ₂ e/kWh)	120	85	83	85*	-31%
	Industrial business energy use per £ million output (MWh/£ million)	1,680	909	881	879	-48%
	Emissions intensity of industrial business energy use (gCO ₂ e/kWh)	486	402	401	394*	-18%
Homes	Home energy use per household (MWh/household)	21	18	17	17	-19%
	Emissions intensity of home energy use (gCO ₂ e/kWh)	169	142	141	140*	-17%
	Share of Homes with EPC C or above (%)**		30%	30%		
Transport	Road transport energy use per 1,000 vehicle kilometres (kWh/km)	1,127	943	932	925	-17%
	Road transport emissions per vehicle kilometre (gCO ₂ e/km)	261	214	212	209*	-19%
	Road transport emissions per energy use (gCO ₂ e/kWh)	231	227	227	226*	-2%
Power	Emissions from generation (MtCO ₂ e)	204	83	73	66*	-64%
	Share of generation from clean sources (%)	21%	44%	49%	50%	28ppts
Natural Resources	Total conventional woodland area (thousand hectares)	2,778	3,159	3,164	3,173	14%
	Emissions intensity per £m agricultural output (tCO ₂ e/£ million)	5,404	4,116	4,034	4,021*	-25%
	Biodegradable waste sent to landfill (MtCO ₂ e)	36	8	7	Not available	-79%
	Emissions from landfill (MtCO ₂ e)	60	14	14	14*	-77%

¹Emissions estimates for 2018 are provisional.

** New metric. This is based on English housing stock, i.e. dwellings, not households; it covers England only (not UK)

¹ 2018 estimates are provided where available. A complete set for 2018 will not be available until 2020.

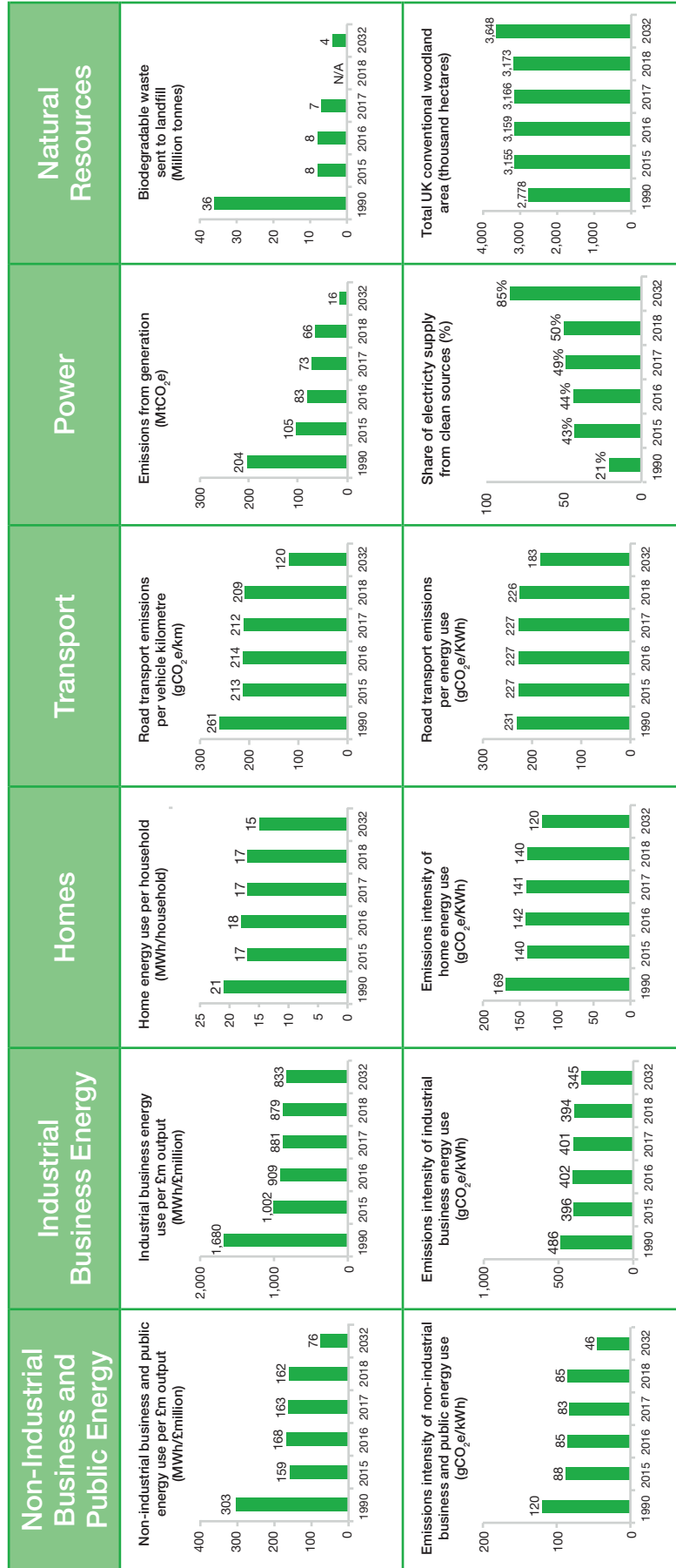
These metrics give helpful insight into the strength of progress. However, care should be taken when interpreting the figures: year-on-year results can be volatile as they depend on external factors such as weather, and may not reflect underlying trends. In addition, emissions estimates for 2018 are based on provisional data and are likely to change.

Since 1990, the UK's emissions per capita has fallen by 50%. The Emissions Intensity Ratio of the economy has fallen by over two thirds since 1990 and is provisionally estimated to have fallen again in 2018.

Sector level data demonstrates that:

- Businesses have continued to grow while also becoming cleaner, improving in both energy and carbon intensity. However, provisional estimates show an increase in emissions intensity for non-industrial businesses and the public sector. This is linked to growth in energy consumption and emissions in the first quarter of 2018 due to unusually cold weather (known as the beast from the east).
- Emissions from homes are highly dependent on the weather, making year-on-year comparisons difficult. Energy use per household and emissions intensity continued to fall in 2017 with energy use 19% below 1990 levels. A marginal increase in energy use per household is provisionally estimated for 2018, underpinned by increased energy use and emissions. Again, this is linked to cold weather in the first quarter.
- Road transport continues to account for around a quarter of UK emissions. While policy has driven vehicle emissions improvements, this has been offset by increased demand for road transport, with corresponding impacts on congestion. However, in 2017 vehicle demand grew faster than energy consumption and emissions. Provisional estimates show this trend continuing into 2018.
- Power sector emissions have fallen by more than 60% since 1990. The power sector continued to make strong progress, with emissions falling 12% in 2017 and provisional figures showing a 10% decrease in 2018. Provisional estimates for 2018 show half of all electricity generated was from clean sources.
- The coverage of woodland area continued to increase in both 2017 and 2018. However, progress in agriculture remains slow. While emissions from waste have been largely flat since 2015 the amount of biodegradable waste sent to landfill is nearly 80% lower than in 1990.

Emissions across the economy



The graphs above include projections for 2032 from the pathway analysis presented in the Clean Growth Strategy. The Technical Annex to the Strategy provides more information on this methodology available at <https://www.gov.uk/government/publications/clean-growth-strategy>.

Annex B: Progress Against Actions and Milestones

In Annex B of the Clean Growth Strategy, we set out a list of key actions and milestones for each sector, which was subsequently updated in the Government Response to the CCC's 2018 Progress Report in October 2018 (Delivering Clean Growth, Annex B).

In this section, we provide an update on progress against the actions and milestones we expected to have achieved by the end of 2019, demonstrating our progress towards meeting the ambitions set out in the Strategy. Actions and milestones marked as 'Complete' in last year's report have been omitted from the list.

Lead Department	Description	Timing	Progress
Green Finance			
BEIS	Respond to Green Finance Taskforce recommendations.	Spring 2019	Complete – Green Finance Strategy published in July ✓
Clean, Smart, Flexible Power			
BEIS	Provide an update on our approach for small scale low carbon generation beyond 2019.	End 2017	Complete – Smart Export Guarantee to be introduced from 1st January 2020 ✓
Ofgem	Introduce a modified generation licence for storage to improve regulatory clarity.	Summer 2018	Complete ✓
BEIS	Continue to work with nuclear developers on their new build proposals, including on financing plans.	2018	Ongoing. Consultation on Regulated Asset Base (RAB) funding model closed on 14 October
BEIS	Publish the government response to consultation on Feed-in Tariffs scheme.	End 2018	Complete ✓
BEIS	Response to Professor Dieter Helm's Review of the Cost of Energy.	End 2018	Former Secretary of State's speech on the future of the energy market in November 2018
Ofgem/BEIS	Ofgem to implement price cap on standard variable and default tariffs across the whole market.	End 2018	Complete ✓
Ofgem/ National Grid	Increase the independence of the electricity system operator within the National Grid group.	April 2019	Complete ✓
BEIS	Planned Pot 2 Contract for Difference allocation round.	By May 2019 and every two years thereafter	Complete (Allocation Round 3) ✓
BEIS	Nuclear Sector Deal Annual Review.	June 2019	Ongoing – Industry was updated at NNB2019 in June
BEIS	Publish a draft National Policy Statement for nuclear power with single reactor capacity over 1 gigawatt beyond 2025, including a draft list of sites, for consultation.	Summer 2019	Ongoing – a range of siting and planning options are being considered and future material for consultation will be published in due course

Lead Department	Description	Timing	Progress
BEIS	Set out next steps on alternatives to the EU ETS.	Summer 2019	Consultation published in May; UK government and Devolved Administrations' response due by end 2019
BEIS	Publish Electricity Market Reform review.	Summer 2019	Ongoing – will be published in due course
Improving Business and Industry Efficiency and Supporting Clean Growth			
BEIS	Organise first global CCUS summit with international partners.	2018	Complete ✓
BEIS	Develop and consult on a package of measures to support businesses to improve how productively they use energy.	From 2018	Ongoing – Government Response to Call for Evidence published in March, setting out next steps
BEIS	Undertake an evaluation of the Climate Change Agreements to inform any successor scheme from 2023.	Expected to commence in 2018	Ongoing – final report due early 2020
MHCLG	Consult on improving the energy efficiency of new and existing commercial buildings.	2018	Late 2019
BEIS	Launch innovation funding competition to pilot business models that scale up energy efficiency projects from SMEs.	Oct 2018	Complete (Boosting Access for SMEs to Energy Efficiency competition) ✓
BEIS	Explore voluntary building standards.	2018	Ongoing
BEIS	Publish CCUS Deployment Pathway Action Plan.	By end 2018	Complete ✓
BEIS/MHCLG	Consult on trajectory for non-domestic PRS energy efficiency standards.	Early 2019	Complete – Consultation published alongside this report ✓
BEIS	Secondary legislation for Streamlined Energy Carbon Reporting implementation comes into force.	April 2019	Complete ✓
BEIS	Consult on the delivery and investment frameworks for CCUS.	2019	Complete – Consultations launched July 2019 ✓
BEIS	Work with industrial clusters to identify the most appropriate way forward to test the potential for development of CCUS industrial decarbonisation clusters.	2018	Ongoing
BEIS	Next steps on industrial energy efficiency.	2019	Complete – Currently consulting on an Industrial Energy Transformation Fund ✓
BEIS/HMT	Ensure incentives for investment in energy efficiency are regularly reviewed, for instance the list of products that qualify for enhanced capital allowances tax relief.	Ongoing	Plans for Enhanced Capital Allowances were confirmed at Budget 2018

Lead Department	Description	Timing	Progress
Improving our Homes			
BEIS/HMT	Work with mortgage lenders to incorporate energy efficiency into their lending decisions, and look at incentives and other levers that could encourage home-owners to invest in energy efficiency improvements.	2017	Ongoing. Launched initiatives e.g. Green Home Finance Innovation Fund. Consultation on requirements for lenders to support energy efficiency due late 2019/2020.
BEIS	Continue to work with suppliers to ensure that people are provided with tailored advice when a smart meter is installed.	2017	Complete – introduced obligation in February 2018 for energy suppliers to offer tailored energy efficiency advice during smart meter installations. BEIS has also worked with energy suppliers, Citizens Advice and Ofgem to monitor industry performance and share good practice. ✓
BEIS	Replace the existing, telephone-only Energy Saving Advice Service with a digitally led-service working closely with the <i>Each Home Counts</i> implementation, offering tailored advice on improving the energy performance of people's homes.	Spring 2018	Complete ✓
MHCLG/BEIS	Publish the government response to consultation on amending domestic PRS regulations.	Autumn 2018	Complete – amended regulations came into force in April 2019 ✓
BEIS	Launch the quality mark scheme as part of the implementation of the <i>Each Home Counts</i> review.	Autumn 2018	Complete ✓
BEIS	Work with industry to implement the independent industry led <i>Each Home Counts</i> review to improve quality and standards for all retrofit energy efficiency and renewable energy installations.	2017	Ongoing. Consulted on incorporating the TrustMark government endorsed quality scheme into ECO3.
BEIS	Publish guidance on the new innovation element of the Energy Company Obligation.	Autumn 2018	Complete ✓
BEIS	Explore ways in which we could make it easier for innovative approaches or products to be installed under our consumer-facing schemes such as the Energy Company Obligation.	2017	Complete – Ofgem approved first 'innovation' measure under ECO in February ✓
BEIS	Launch PRS enforcement pilots with a number of local authorities to develop best practice and learn lessons.	Autumn 2018	Complete ✓
MHCLG	Consultation on a possible review of the Decent Homes Standard.	Autumn 2018	Considering responses to the Social Housing Green Paper
BEIS	Publish the government response to consultation on whether to set standards for smart appliances.	Autumn 2018	Complete ✓
BEIS/MHCLG	Stakeholder engagement on options around long-term trajectory for energy performance standards across the private rented sector.	Autumn 2018	Complete ✓
BEIS	Consult on longer term domestic trajectory for the Private Rented Sector.	2019	Consultation due winter 2019/2020
BEIS/MHCLG	Stakeholder engagement on options for energy performance standards across the social housing sector	2018	Considering responses to the Social Housing Green Paper

Lead Department	Description	Timing	Progress
BEIS	Publish action plan around building a market for energy efficiency, focused in particular amongst owner occupiers.	End 2018	Published a summary of responses to the Call for Evidence on Building a Market for Energy Efficiency – considering these as we develop future policy
BEIS	Publish the Government Response to Urban Biomass Consultation.	January 2019	Due late 2019
MHCLG	Consultation on Part L of the Building Regulations.	Spring 2019	Complete – Consultation on changes to Part L for new homes published October 2019 ✓
BEIS	Update 2015 Fuel Poverty Strategy for England	Summer 2019	Ongoing – published consultation in July 2019, with Strategy due in late 2019 / early 2020
BEIS	Consultation on options for the future heat networks market framework.	Summer 2019	Due late 2019
BEIS	Publish an evidence gathering report of bioenergy and electric heating options in off-gas-grid buildings.	2019	Complete ✓
BEIS/MHCLG	Explore innovative solutions to energy performance improvements not performing as well as predicted, including potential actions on compliance and enforcement of energy performance.	By 2019	Ongoing
BEIS	Continue smart meter roll out	Roll out complete by end of 2020	Ongoing. On track to offer smart meters to all households and small businesses by end of 2020; published consultation in September 2019 on a post-2020 policy framework.
BEIS	Funding allocated in the Spending Review 2015 to grow the UK's heat networks market.	By 2021	Ongoing (Heat Networks Investment Project)

Leading in the Public Sector			
BEIS	Continue to fund further improvements in the wider public sector with £295 million of funding allocated to the public sector energy efficiency loan scheme, across the UK, in the 2015 Spending Review.	Ongoing	Ongoing
BEIS	Review progress against the voluntary wider public and higher education sector emissions reduction target by 2020, with a view to moving to a more ambitious target during the 2020s (e.g. a 50% reduction in greenhouse gases by 2030, against a 2009/10 baseline). Once a reporting framework is in place, and there is clear evidence of the impact of voluntary action, a mandatory target could be considered.	2018 onwards	Ongoing
BEIS	Currently assessing how much the current 2020 greenhouse gas emission reduction target under the GGCs could be stretched to be more ambitious yet achievable. We also aim to set an appropriate level of ambition beyond 2020.	2018	More ambitious target has been set for 2020. Considering post-2020 target.
BEIS	Continue to support the expansion of Energy Performance Contracts in the public sector which can offer a new route for investment in energy efficiency alongside guaranteed savings.	We are providing continuing support in 2017/18	Ongoing

Lead Department	Description	Timing	Progress
BEIS	Support Local Leadership on decarbonisation via Local Energy Programme.	2018	Ongoing – Every LEP has now completed an Energy Strategy feeding into Local Industrial Strategies, and 5 Local Energy Hubs have been created to support the development of local decarbonisation projects.
BEIS	Publish a Roadmap for Public Sector.	2019	Due 2019/2020
BEIS	Review post-2020 targets for central Government and wider public sector.	By 2020	Ongoing

Enhancing the Benefits and Values of our Natural Resources			
BEIS	Set out approach to bring together biological industries, academia and innovators, linking up farmers and land managers with high tech industries to make the most of existing resources and develop advance feed stocks that are essential for the future low carbon economy.	By end of 2018	Complete ✓
BEIS	New Bioeconomy Strategy.	By end of 2018	Complete ✓
Defra/BEIS	Set up a stronger and more attractive domestic carbon offset market that will encourage more businesses to support cost-effective emissions reductions such as through planting trees. We will also explore how we could extend this market to include other land activities.	2017 onwards	Ongoing – launching in late 2019
Defra	Allocate funding to woodland planting to plant 11 million trees	Ongoing	Ongoing
Defra	Establish forestry investment zones.	2017 onwards	Ongoing – one established so far (Cumbria)
Defra	Publish a new Resources and Waste Strategy.	End 2018	Complete ✓
Defra	Publish a Clean Air Strategy.	2018	Complete ✓
Defra	Publish England Peat Strategy.	End 2018	Due 2019
Defra	£10 million capital grant scheme for peat restoration.	Funds available from April 2018 for 3 years	Ongoing – in second year of three
UKRI/Defra/BEIS	Apply the £90 million Industrial Strategy Challenge Fund on Transforming Food Production to deliver R&D to support increasing agricultural productivity, sustainability and resilience with improved environmental impacts (which includes GHG emissions reduction).	Autumn 2018	Complete – First £20 million awarded in June 2019 ✓
Defra	Continue working with the Organisation for Economic Co-operation and Development (OECD) on their project to improve the modelling of macroeconomic effects of the transition to a circular economy.	Project concludes end of 2018	Complete ✓
Defra	Publish consultations on a deposit return scheme or restrictions on single use plastics.	End 2018	Complete ✓
Defra	Scoping study on viable options for reducing the environmental impact of England's landfill sites.	End 2018	Complete ✓
Defra	Establish a Lowland Agricultural Peat Taskforce.	2019	On track – will commence by end 2019
Defra	Commit to make available up to £200 million to support rural communities over the next two years and set out agroforestry decisions.	By end of 2019	Ongoing – all £200 million has been made available ✓

Lead Department	Description	Timing	Progress
Accelerating the Shift to Low Carbon Transport			
DfT	Series of consultation papers setting out the government's strategic approach to aviation, including how to support growth whilst tackling environmental impacts.	2017-18	Ongoing – Green Paper published in December 2018; Aviation Strategy expected early 2020
DfT	Deployment of £80 million ULEV infrastructure funding announced in Autumn Statement 2016.	2017-2021	Ongoing
DfT	Regulation to improve EV charge point provision and consumer access under the Automated and Electric Vehicle Bill.	2017	Primary powers have been taken (Automated and Electric Vehicle Act 2018). Secondary legislation will follow.
DfT	EU HGV CO ₂ emission reporting and monitoring starts.	January 2019	Ongoing – regulation has been agreed, first reports September 2020
DfT	Publish Aviation Strategy	First half of 2019	Due early 2020
DfT	Publish Clean Maritime Plan	Spring 2019	Complete ✓
DfT	Clarify the UK regulatory approach to the EU 2020/21 new car and van CO ₂ targets.	Autumn 2019	Complete ✓
DfT	Report from Low Emission Freight and Logistics Trial.	2019	Due summer 2020
DfT	Decision on domestic regulatory regime for car/van CO ₂ regulations in context of EU exit.	2019	Complete ✓
DfT	Active participation in the IMO to address GHG emissions from shipping.	Ongoing	Ongoing
DfT	Set targets for EU CO ₂ emissions reductions from new HDVs.	Ongoing	Complete ✓
HMT/DfT	Additional funding, fiscal support/tax incentives for ULEVs.	Ongoing	Ongoing. New company car tax rates announced in July 2019, Charging Infrastructure Investment Fund launched in September 2019 ✓

Annex C: Future Actions and Milestones

In this section, we set out an updated list of key actions and milestones that we expect to achieve over the coming year and beyond, demonstrating continued policy momentum and the government's commitment to ambitious action to reduce emissions across the whole economy.

Lead Department	Description	Timing
Green Finance		
BEIS/HMT	Review progress on greening the UK's financial system, including implementation of the Task Force on Climate-related Financial Disclosures (TCFD) recommendations	End 2020
BEIS/HMT	Conduct a formal review of progress against the ambitions and plans across all three chapters of the Green Finance Strategy	2022
Clean, Smart, Flexible Power		
BEIS	Introduction of the Smart Export Guarantee (SEG) obligation	1 January 2020
BEIS	Publish consultation on Contracts for Difference Allocation Round 4	Early 2020
BEIS/Ofgem	Government response to consultation on reforming the energy industry codes	Early 2020
BEIS/Ofgem	Publish report following independent review of electrical engineering standards	Spring 2020
Ofgem	Publish consultation on RIIO-ED2 price control strategy	Summer 2020
Ofgem	RIIO-2 price control draft determinations on network company outputs and funding	Summer 2020
Ofgem	Final decision on implementation of market-wide half-hourly settlement	Q3 2020
BEIS	First Annual Review of the Offshore Wind Sector Deal	November 2020
BEIS	Continue to work with Ofgem and industry to implement all actions in the Smart Systems and Flexibility Plan	By 2022
Improving Business and Industry Efficiency and Supporting Clean Growth		
UKRI	Industrial Strategy Challenge Fund's Industrial Decarbonisation Challenge phase 1 opens	Autumn 2019
BEIS	Publish responses to the consultations on potential business models for CCUS and on the potential re-use of existing oil and gas assets for CCUS	Late 2019
BEIS	Publish the UK Government's and the Devolved Administrations' response to the consultation on The Future of UK Carbon Pricing	Late 2019
BEIS	Publish evaluation and Post Implementation Review of the Energy Savings Opportunity Scheme	Late 2019
BEIS	Publish response to consultation on sustainable business models for low carbon hydrogen and use this to inform future work	Late 2019
BEIS	Announce the winners of the demonstration phase of both the Hydrogen Supply and Industrial Fuel Switching competitions	Late 2019
BEIS	Publish feasibility studies for both the Hydrogen Supply and Industrial Fuel Switching competitions	Late 2019
BEIS	Publish an action plan in collaboration with Mexico and Saudi Arabia to advance the Mission Innovation CCUS Challenge	Late 2019
BEIS	Award the Phase 2 contracts for the Boosting access for SMEs to energy efficiency (BASEE) competition	January 2020
BEIS	Publish evaluation of the current Climate Change Agreements Scheme.	Early 2020
BEIS	Consultation on proposals for future reform of the Energy Savings Opportunity Scheme	Early 2020

Lead Department	Description	Timing
BEIS	Publish the Government Response to the formal consultation on the Industrial Energy Transformation Fund, alongside launch and guidance for Phase 1 of the scheme	Spring 2020
BEIS	Phase 1 of the Industrial Energy Transformation Fund opens to applications	Summer 2020
BEIS	Publish consultation on the Clean Steel Fund	2020
BEIS	Publish consultation on the Low Carbon Hydrogen Fund	2020
BEIS	Publish consultation on the proposed SME Energy Efficiency Scheme	2020
BEIS	Publish Government Response to consultation on tightening the minimum energy efficiency standards for non-domestic Private Rented Sector properties	2020
BEIS	Progress innovation programmes and generate learnings across the hydrogen value chain	Ongoing
BEIS	Work with partners to understand the elements required to test low carbon hydrogen production, enable the option of deployment and the role for government. This will include looking at the supply chain, skills requirements, and how best to coordinate our efforts.	Ongoing
BEIS	Beyond support through the RHI, ambition to phase out high fossil fuel heating in businesses off the gas grid during the 2020s. Businesses and industry will be involved in developing the new policy.	During the 2020s

Improving our Homes

BEIS	Publish consultation on the policy options for the heat networks future market framework	Late 2019
BEIS	Publish consultation on the appropriate mechanism to increase the proportion of green gas in the gas grid	Late 2019
MHCLG	Publish the second part of the consultation on Part L of the Building Regulations	Late 2019
BEIS	Publish the updated Fuel Poverty Strategy for England	Late 2019/2020
BEIS	Publish consultation on requirements for lenders to support homeowners improve the energy efficiency of the homes they lend to	Late 2019/2020
BEIS	Publish consultation on the trajectory for the domestic Private Rented Sector regulations	Late 2019/2020
BEIS	Publish consultation on the regulatory options for phasing out the installation of fossil fuel heating systems in properties off the gas grid	Early 2020
BEIS	Publish a Heat Policy Roadmap	2020
BEIS	Publish consultation on the successor to ECO3	2020
BEIS	Beyond support through the RHI, ambition to phase out high fossil fuel heating in homes off the gas grid during the 2020s. Consumers and industry will be involved in developing the new policy.	During the 2020s

Enhancing the Benefits and Values of our Natural Resources

Defra	Development of Farm Emissions Reduction Plan (FERP) to reduce emissions within the farm boundary	2019 onwards
Defra	Research projects on ruminant diets and microbiomes to support industry in strengthening farm biosecurity, reducing reliance on medicine and reducing emissions	2019 onwards
Defra	Launch consultation on English Tree Strategy	Winter 2019
Defra	Publish England Peat Strategy	Late 2019
Defra	Publish research on the current understanding of the practical, social, economic and environmental constraints on the large-scale adoption of paludiculture in the lowland peats of England and Wales	Late 2019
Defra	Publish a Resources and Waste Strategy evaluation plan and monitoring framework	Late 2019
Defra	Launch consultation on food waste reporting	Late 2019
Defra	Launch consultation for transposition of the Circular Economy Package	Late 2019
Defra	Publish the English Tree Strategy	Early 2020
Defra	Launch of consultations on the final proposals for a deposit-return scheme, consistency in household and business recycling and an extended producer responsibility scheme	Early 2020

Lead Department	Description	Timing
Defra	Ban on the supply of plastic straws, drinks stirrers and cotton buds entering into force	April 2020
Defra	Creation of a Fertiliser Expert Group to encourage industry to use low-emissions fertiliser	2020
Defra	Next F-gas quota reduction of 55% from baseline level	January 2021
Defra	Launch of Environmental Land Management scheme pilot	2021
Defra	Launch of Environmental Land Management scheme	2024

Accelerating the Shift to Low Carbon Transport		
DfT	Publish Aviation and Climate Change Position Paper	Autumn 2019
DfT	Commission research on financial and economic incentives that could possibly be adopted at a global scale to incentivise the switch to low/zero emission ships	Autumn 2019
OLEV	Work to set out a vision for a core network of rapid and high powered chargepoints along England's key road network	Late 2019
DfT	Open private and public beta phases of the project to build the Bus Open Data Digital Service to both bus operators and local authorities	Late 2019
OLEV	Analyse the report of the Electric Vehicle Energy Taskforce, commissioned by the government to propose solutions to challenges brought to the energy system by the uptake of electric vehicles	Late 2019
OLEV	Launch consultation on green number plates	Late 2019/2020
DfT	Publish Aviation Strategy	Early 2020
OLEV	Respond to the consultation on amending Building Regulations to include the provision of an electric vehicle chargepoint in new residential buildings.	2020
DfT	Decision on next steps in light of platooning and longer semi-trailer trials	2020 onwards
OLEV	Publish response to the consultation on electric vehicle smart charging and bring forward regulations	Late 2020
OLEV	Review progress made and consider what interventions are required to speed up the adoption of ultra-low emission vehicles if not enough progress is being made	By 2025

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