



Reducing emissions and preparing for climate change: 2017 Report to Parliament Summary and recommendations

Committee on Climate Change
June 2017



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Book 1 of 3

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Foreword

This is an important moment for action to tackle climate change.

During the election, all the major political parties re-affirmed their commitment to meeting the UK's international and domestic commitments on climate change. Those commitments have seen UK greenhouse gas emissions fall by 42% since 1990, alongside commitments to multi-year investment in flood defences, and a range of other important measures. We have managed to do this whilst growing GDP by over 65%. Since the passage of the Climate Change Act in 2008 we have reduced energy bills and delivered more than a three-fold increase in renewable electricity generation.

However, our progress is at risk of stalling just when UK businesses and households are poised to see a growing benefit from action. The global transition – driven by worldwide government and private sector action – presents opportunities for UK businesses. The wide range of benefits associated with addressing climate change – such as cleaner air and improved health – will be felt by households. Achieving these outcomes requires action from this new Parliament.

This joint report covers the measures required to reduce greenhouse gas emissions and those required to improve our resilience to the risks from climate change. In passing the Climate Change Act, with its clearly articulated timetable for new policy and new actions, Parliament deliberately chose to ensure action to tackle climate change was not a hostage to “events”. The “events” of the past year have been, by almost any measure, exceptional. However, it is now time for Government, and for Parliament, to act. Climate change is happening, not waiting. It is neither justifiable nor wise to delay further.

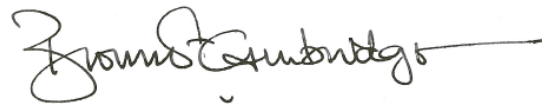
This comprehensive, joint mitigation and adaptation report was produced by two committees that included many new committee members. The new members of both the mitigation and adaptation committees have brought new insights and thinking. We would like to thank those who have joined. At the same time, this means valued members have left over the past year and others will be leaving in the coming months. Their contributions have helped to establish the Committee on Climate Change as the authoritative, independent voice on climate issues. Lord Krebs was Chairman of the Adaptation Sub-Committee since its inception. He guided it to the high regard in which it is rightly held. Professor Sam Fankhauser, uniquely, contributed economic insights to work on both adaptation and mitigation issues. We thank them for their efforts.

We would also like to recognise the Secretariat for their professionalism and commitment. In common with all areas of public service, they have taken on more and more tasks, harder and harder analysis with fewer and fewer resources. They continue to provide invaluable support to the committees and we extend our thanks to every member of the Secretariat for their integrity, and thoughtfulness, and sheer hard work.

The path to reducing emissions and adapting to the risks from climate change requires national leadership as well as international consensus. Climate science demonstrates the importance and urgency of the journey. Technological change, public awareness and business support means that path has never been more clear. However, it is also fragile. Over the past decade, under governments of all persuasions, the UK has helped to define the path. Strong steps and clear signposts are needed now to keep the UK on track and to support international action.



Lord Deben
Chairman, Committee on Climate Change



Baroness Brown of Cambridge
Chair, Adaptation Sub-Committee

Two new plans are needed now to meet the UK's climate change objectives.

Humanity has prospered in a largely stable global climate. That stability is now at risk. The climate is changing and human actions are causing the changes. Those actions mean that carbon dioxide levels are higher than at any time in human history, which will have an impact on all our lives. For example, rising sea levels threaten cities that have been built on the coast, changes in rainfall patterns will increase the risks of floods, and changes in water availability will affect agriculture and the crops that we rely on for food. The climate is changing already while greenhouse gas emissions continue, so we cannot delay actions to address this challenge.

The UK's 2008 Climate Change Act provides a framework with clear timetables and expectations on Government and on Parliament. In particular, the Act now requires that two plans are produced: one to reduce the UK's emissions of greenhouse gases and a second to improve the UK's resilience to the risks from climate change.

The world is responding alongside the UK. There is strong commitment to action around the world; innovation, leading to falling costs of low-carbon technologies, is happening at a pace not anticipated even five years ago; and there is increasing clarity about the wider benefits of action to tackle climate change. However, ongoing emissions of greenhouse gases, and the impact of those already emitted, require further urgent, meaningful actions.

The UK can successfully navigate the transition to a growing, low-carbon economy but new policies to deliver that transition are overdue:

- **The fifth carbon budget** was enshrined in law on 20 July 2016. It requires a reduction in emissions of 57% by 2030 compared to the levels in 1990. The Government also recognised that it was not on track to the earlier, fourth, carbon budget. The UK commitment to achieve the domestic budgets and to the Paris Agreement means that action is necessary. Specifically, domestic legislation requires that the Government place before Parliament the "proposals and policies" for meeting the agreed target: "[a]s soon as is reasonably practicable" after a carbon budget is set. It is nearly a year since the fifth carbon budget was set. Many existing policies are running out and additional new policies are required. **Parliament must now be informed about how the agreed targets will be met.**
- **The second UK Climate Change Risk Assessment (CCRA2)** was laid before Parliament on 18 January 2017. This sets out the Government's view of the risks to the UK from climate change, including risks to households and businesses from flooding. The Government is now required, by law, to lay before Parliament "proposals and policies" that address those risks "as soon as is reasonably practicable". **Work to update the National Adaptation Programme that will set out those objectives, policies and proposals is required now so that it can be published in early 2018.**

On 8 June 2017, the British public elected a new Parliament. Parliament must address the process of leaving the European Union, which would mean that much environment-related legislation needs to be transferred into UK law. At the same time, many of the most significant domestic policies for reducing emissions and tackling the risks from climate change end around 2020, including:

- the levy control framework that supports low-carbon power
- fuel efficiency standards for new cars that reduce their emissions
- the renewable heat incentive to reduce emissions from buildings

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- capital funding for flood defences to protect homes and businesses and
 - clearly targeted biodiversity plans that help build the resilience of the natural environment to climate change.

Two plans are required by law; two plans are needed.

The plans to be developed by the new Government will be drawn up against a backdrop of changes that could help to deliver better policy, some of these changes also present risks to their delivery.

The publication of the actions to meet the emission reduction targets and to help people and organisations respond to the risks from climate change come against a backdrop of:

1. Scientific understanding of climate change: the links between human actions, greenhouse gas emissions and climate change are clearer than ever and there is increasingly clear evidence about widespread impacts. This evidence is widely accepted, diverse and increasingly specific to particular countries or regions. At a high level it includes evidence about:

- *Atmospheric changes:* 2016 was the first year for over 800,000 years where atmospheric CO₂ concentrations averaged over 400 parts per million. Concentrations of other powerful greenhouse gases are also rising.
- *Global temperature rise:* 2016 was the hottest year on record, with global temperatures about 1.1°C higher than in the late 1800s. Each of the last three decades has been successively the hottest decade on record.
- *Impacts on people and the environment:* recent UK floods took place within a context of rising future risks from flooding because of climate change. The second UK Climate Change Risk Assessment highlights risks to our health from higher temperatures and to agriculture and industry from water scarcity. The oceans are warming and much of that warming has occurred in the past 20 years. Arctic sea ice extent reached record lows in 2016, continuing a declining trend since at least the 1970s.

All of these changes will increasingly affect the lives of people in the UK and around the world.

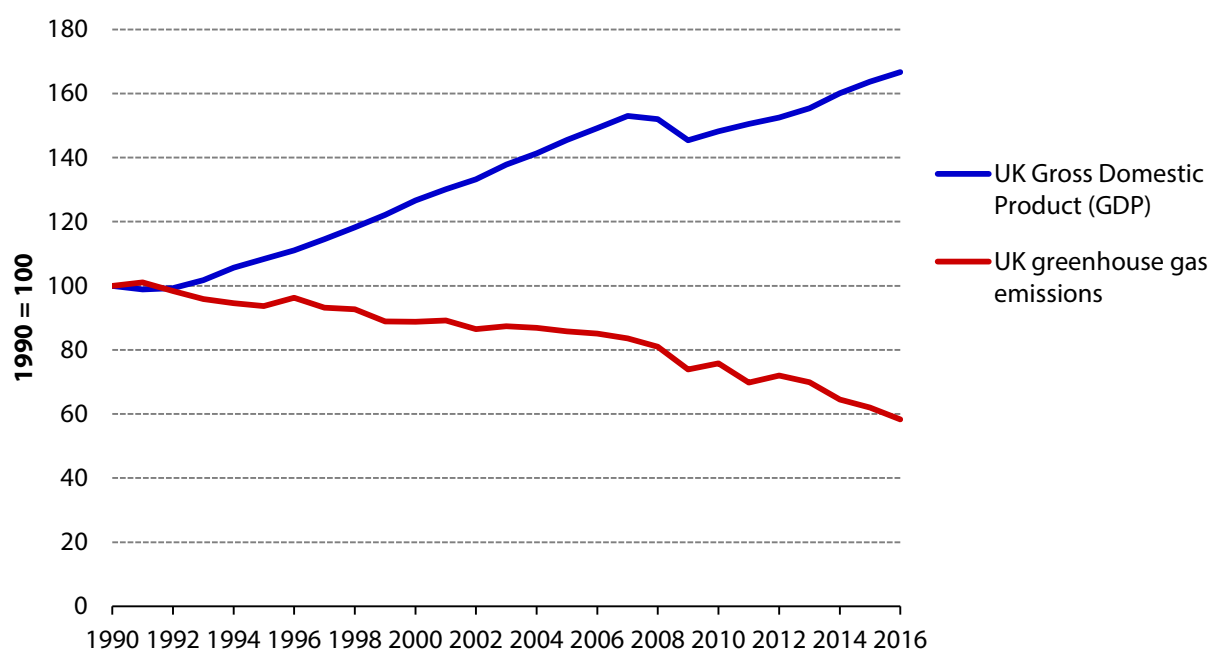
2. Technological innovation and increasing opportunities: technological innovation, at a pace that was not anticipated even five years ago, is creating economic opportunities and driving down the costs of acting to reduce emissions. Technological change is leading to a global transition to a lower-carbon world:

- Dramatic and ongoing decreases in the costs of a number of important low-carbon technologies have been experienced over the past decade driven by large-scale deployment often supported by policy decisions of UK and other governments. They include the costs of solar and wind powered electricity generation, as well as the cost of batteries, electric vehicles and associated infrastructure (e.g. smarter network control systems).
- More efficient appliances have reduced household energy demand, and energy bills, in the UK since 2008 driven largely by clear, predictable product standards. Despite having more gadgets in the home electricity demand is down 17% and gas demand 23% lower than in 2008.
- Britain's low-carbon economy has grown to about 2-3% of GDP, a comparable size to energy-intensive manufacturing. This is a fast growing segment of GDP. The wider global transition is likely to continue to provide opportunities, and challenges, which should be reflected in the wider national industrial strategy.

3. Progress in the UK and internationally...and remaining challenges: the UK has been successful in its efforts to begin the transition to a cleaner economy without having a negative impact on GDP growth. Steps are also being taken to develop greater resilience to the risks from climate change. Countries around the world are also acting.

- *Progress in the UK:* UK emissions have fallen by over 40% since 1990 while GDP has increased by over 60% (see Figure 1 below). For over a quarter of a century the UK has witnessed falling greenhouse gas emissions alongside rising GDP. At the same time, the risks of river and coastal flooding are being tackled through a six-year commitment to funding flood defences, while nearly all of the actions in the first National Adaptation Programme are complete or on track.
- *Progress elsewhere:* the UK is part of a wider international transition. Over 190 countries signed the Paris Agreement that has now come into force. It sets the international framework for action to tackle climate change, including support for measures to adapt to its effects. The Paris Agreement has more ambitious aims than the basis for the current UK targets. China, India, the UK and the EU have all re-committed to the lower-carbon economy embodied in the Paris Agreement in recent months. This clarity further reduces any competitiveness concerns and increases future opportunities for low carbon businesses. While many of the States and cities in the United States are acting, the announcement by the Federal Government of the United States to withdraw from the Agreement risks undermining international progress and slowing domestic US actions.
- *Limitations in progress to date in the UK:* Most of the UK success in reducing emissions to date comes from sharp reductions in the power and waste sectors. Despite improvements in technology, emissions in the transport and building sectors are rising and the abandonment of existing plans for carbon capture and storage leaves industry without a long-term strategy for reducing emissions. Ten years on from the widespread flooding in 2007 the risk of surface water flooding from heavy rainfall is a continuing concern. Important aspects of the Flood and Water Management Act are not being fulfilled, while many indices of the state of the natural environment continue to worsen or have stalled. Recent storms show infrastructure remains vulnerable to severe weather (see Figure 2 below).

Figure 1. Emissions have fallen 42% while the economy has grown over 60% since 1990



Source: BEIS (2017) *Provisional GHG statistics for 2016*; BEIS (2017) *Final GHG statistics for 1990-2015*; ONS; CCC calculations.

Notes: Series indexed to start at 100. In 2016 UK GDP was £1.9 trillion and GHG emissions were 466 MtCO₂e.

Figure 2. Highest priority risks for the United Kingdom from climate change



Source: UK Climate Change Risk Assessment 2017, Synthesis Report, Figure SR.1. Available at: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf>

4. The future impacts of exiting the EU: leaving the EU would have an effect on *how* the UK makes the transition to a low-carbon, more resilient country, but it does not change the scientific evidence about climate change, nor the legal duties on the Government to act. Leaving the EU creates both opportunities and risks for advancing the development of a growing, lower-carbon, climate resilient economy:

- Prior to the referendum decision it had been anticipated that about half of the emission reduction required to 2030 was to come from the UK and other EU countries agreeing and implementing the next phase of existing EU policies. These policies cover areas such as fuel efficiency standards for vehicles and other product standards, the EU Emissions Trading System, and specific sectoral initiatives (e.g. the Waste Directive and F-gas regulations).
- Programmes to improve the resilience of the natural environment to climate change have been driven by EU legislation and enforcement of environmental law and policy (e.g. the Habitats and Birds Directives and the Water Framework Directive) which would have to be replaced by UK measures that are at least as effective.
- The most significant opportunities from the EU exit process (e.g. reform of the Common Agricultural Policy, industrial strategy focused on future jobs from the low-carbon transition) will require clear strategic thinking, but time and resources risk being in short supply given other pressing demands ahead of the UK formally leaving the EU.

5. The increasing devolution of powers: the trend over several Parliaments to devolve more powers from Westminster means that meeting the UK's climate change objectives increasingly depends on actions to be taken by the nations that make up the UK, alongside many of its cities and regions:

- *Scotland* is in the process of revising its Climate Change Act and developing a new suite of policies. Scotland continues to have considerable success at reducing emissions from the power sector to minimal levels. However, progress to reduce emissions and increase resilience in buildings, transport and the natural environment will need further action by the Scottish Government.
- *Wales* has been putting in place its framework for climate change action over the past few years. By the end of 2018 the Welsh Government will have carbon budgets in place. While agreement on carbon budgets is essential, it will also be necessary to consider how to make progress more quickly, given that Wales is likely to miss its previous 2020 target to reduce emissions by 40% against 1990 levels. The second UK Climate Change Risk Assessment evidence report provides an overview of risks specific to Wales, but to date there has not been an independent assessment of its resilience to climate risks.
- *Northern Ireland* must also make its contribution to achieving the UK's overall targets for reducing greenhouse gas emissions. The Committee will have a more detailed discussion with the Northern Ireland Executive later this year. The second UK Climate Change Risk Assessment Evidence Report provides an overview of risks specific to Northern Ireland but to date there has not been an independent assessment of its resilience to climate risks.

Within England some local authorities have been implementing measures to reduce emissions and provide better protection for residents and communities from risks that are rising because of climate change. The devolution of powers and funding to elected mayors and combined authorities presents further opportunities for measures tailored to local circumstances in areas such as: low emission vehicles, energy efficient, low-carbon and climate-resilient buildings, and investment in natural capital, flood alleviation, and resilient local infrastructure. At the same

time, a supportive national framework (including strategic and regulatory decisions and, where relevant, funding) is still vital to continued progress.

Climate policy is increasingly connected to wider issues, leading to new opportunities to create multiple benefits from action to address climate change.

Action to reduce emissions and prepare for climate change delivers wider benefits. It is increasingly clear that addressing other issues effectively (e.g. addressing fuel poverty, improving health, reducing waste) will help to tackle climate change and that tackling climate change can help to address wider concerns (e.g. enhancing energy security, improving health). These wider benefits include:

- *Reducing household bills:* energy efficiency measures reduce demand for energy to meet household and business needs. The result is lower household bills than would otherwise be the case. Energy bills for typical households in 2016 were lower, in real terms, by about £10 per month compared to their level in 2008 (when the Climate Change Act was passed). Improvements in a range of energy efficiency measures, including more efficient appliances and boilers, as well as insulation, helped to offset the cost on bills that was needed to support the emergence of some low-carbon technologies. Targeting energy efficiency improvements at families struggling to pay their bills could help them even further.
- *Improving health:* the impact of air pollution from vehicles requires action. A decisive shift to electric vehicles will both improve air quality and reduce greenhouse gas emissions, as will the ongoing retirement of coal-fired power stations. Some of the actions to improve the resilience of the UK to climate risks could also benefit health: managing the risks of overheating including through improved design of buildings and cities, better management of green spaces, ensuring good quality water is available to meet demand, and avoiding the significant negative health and wellbeing impacts of flooding.
- *Developing a stronger economy, including affordable energy supply:* history indicates that reducing emissions in the UK is compatible with rising GDP, a competitive economy and a secure energy supply (see Figure 1 above). Additional costs of low-carbon energy make up a very small proportion of private sector costs of production for all but the most energy-intensive sectors. The energy-intensive sectors are now largely exempt from those costs while the rest of the economy has been growing consistently. The low-carbon economy is 2 - 3% of GDP which is comparable in size to energy-intensive manufacturing. Growing global demand for low-carbon goods and services presents a significant opportunity for which the UK is well placed to compete given domestic action to tackle emissions and to prepare for the risks from climate change. Sources of energy have also diversified, with reduced reliance on imported fossil fuels.
- *Reducing waste:* The reduction and recycling of waste has reduced the need for new landfill. The reduction and recycling of waste, alongside capturing more fugitive emissions from existing landfill, has also resulted in emissions from waste reducing by 73% since 1990, the single biggest reduction from any sector.
- *Building 21st Century infrastructure:* smarter electricity networks, rapid electric vehicle charging, and making ports, airports, and energy and telecommunications networks more resilient to storms, all help to increase productivity and improve the resilience of the UK regardless of climate change. They are also vital to reducing emissions and reducing vulnerability to a changing climate.

Some actions also involve upfront investments and further action to change behaviours. These include:

-
- Support for emerging technologies (e.g. offshore wind, electric vehicles) and new technologies (e.g. carbon capture and storage and, if needed, hydrogen gas networks).
 - Support where markets are failing to deliver necessary levels of protection: for example flood resilience for high risk homes so that insurance can be affordable without the need for subsidies, protecting important inter-connected infrastructure, standards to ensure homes are energy efficient and do not overheat in hot weather.
 - Changes to existing tax and subsidy regimes to alter prices for products. These include carbon pricing, transport taxes and landfill and other specific tax measures, as well as the reform of agricultural payments and other measures as we leave the EU.

The interconnection between action to tackle climate change, and a range of wider benefits and upfront investments, is reflected in the commitments to reduce emissions that have been agreed by Parliament. These commitments balance the investments needed against the importance of tackling climate change and the wider benefits associated with that action. The Government now needs to set out the particular set of policies that will be used to meet these commitments.

Investors, business leaders and the public have been waiting too long for clear direction from central government.

The plan to reduce emissions and the second National Adaptation Programme need to provide policies and proposals which ensure further action takes place and that the commitments made by Parliament are delivered.

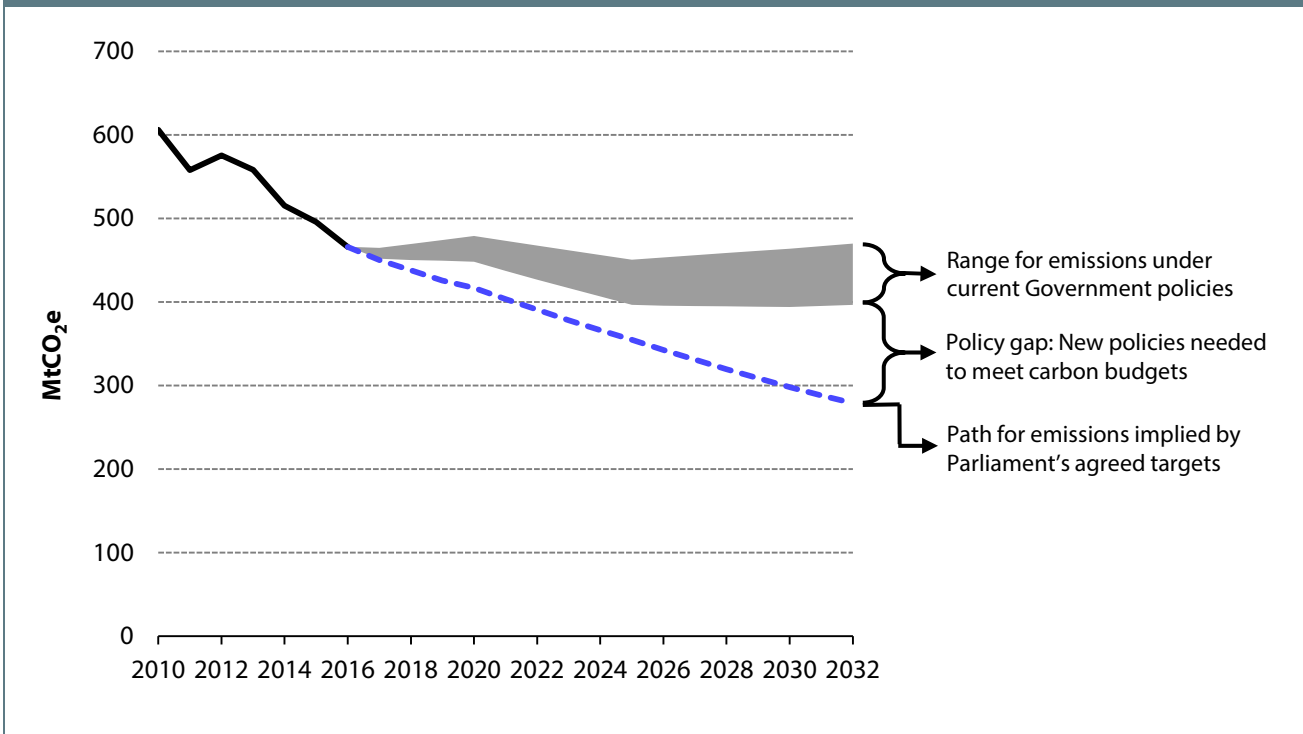
- **Emissions reduction plan:** a plan is now urgently needed to meet the targets that have been agreed by Government and Parliament. The plan has taken a long time to be produced. For example, the 2011 *Carbon Plan* was produced six months after the fourth carbon budget was legislated. The longer time required to date in part reflects wider events. However, it is now neither justified nor wise to delay any further the publication of the plan that is required by law. The plan must address the gap, set out in Figure 3 below, between Parliament's agreed targets and the expected impact of existing policies. It must:
 - Cover each sector of the economy including plans to bring forward about 80-100 TWh more low-carbon generation by 2030, accelerate the uptake of electric vehicles, provide a path for the uptake of low-carbon heat alongside energy efficiency, re-start work on carbon capture and storage and address forestry, peat restoration and land management practices to allow the natural environment to take-up and store carbon and reduce emissions from agriculture.
 - Describe how the measures it includes meet the requirements of the fifth carbon budget covering 2028 to 2032, as well as how it keeps the UK on the cost-effective path to the 2050 target.
 - Clarify which combination of policy instruments, in which sectors, will be used to support the changes. This includes, for example, the use of carbon pricing, standards and regulations, research and development funding, subsidies, market design and taxation.

Annex 1 at the end of this summary provides an overview of the issues that must be addressed. Volume 2 of the report provides a detailed discussion of progress to date and implications for future action.

- **National Adaptation Programme:** at the beginning of 2017, the Government presented to Parliament its latest assessment of the risks and opportunities to the UK from climate change. The assessment found potentially significant negative impacts on people and organisations, as well as opportunities for farmers and other businesses. A clear, strategic programme from Government is now required that addresses the adaptation priorities (see Figure 4 below). Work should start on that immediately so that it can be published in the first half of 2018. The new National Adaptation Programme should:
 - Address, as a matter of urgency, the priority areas where vulnerability to climate change is increasing. These include: flood risks to homes and businesses, risks to the natural environment, including to soils and protected habitats, and to human health and wellbeing.
 - Act on wider international risks that could affect the UK, including food supplies and international supply chains, as well as the marine environment, and include measures to improve understanding of the changing risks from pests, diseases and invasive species.
 - Recognise and address the important interdependencies between climate change risks. Policy responses that fall across the remits of different departments, and between national, local and devolved governments, need to be better co-ordinated.

Annex 2 at the end of this summary provides an overview of the issues that must be addressed. Volume 3 of the report provides a detailed discussion of progress to date and implications for future action.

Figure 3. Current policies fall far short of what is needed to meet the targets agreed by Parliament



Source: BEIS (2017) *Provisional GHG statistics for 2016*; BEIS (2017) *Final GHG statistics for 1990-2015*; BEIS (2017) *Updated energy and emission projections 2016*; CCC analysis.

Notes: The grey area here corresponds to the yellow area in Figure 1.6 in Chapter 1 of Volume 2 of this report.

Figure 4. Adaptation priorities: are plans in place, and is progress being made?

		Is there a plan? →		
		RED	AMBER	GREEN
Is progress being made in managing vulnerability?	RED	<ul style="list-style-type: none"> • Development and surface water flood risk (n/a) • Soil health and carbon sequestration (↑) 	<ul style="list-style-type: none"> • Property-level flood resilience (n/a) • Surface water flood alleviation (↑) • Resilience of terrestrial habitats (↑) • Resilience of freshwater habitats (↑) • Biodiversity in the farmed countryside (↔) 	<ul style="list-style-type: none"> • None
	AMBER	<ul style="list-style-type: none"> • Health impacts from heat and cold (n/a) • Commercial fisheries and aquaculture (new) 	<ul style="list-style-type: none"> • Marine and coastal habitats (n/a) • Resilience of port and airport infrastructure (↓) • Infrastructure interdependencies (↔) • Business supply chain interruptions (↔) • Business opportunities from climate change (↑) 	<ul style="list-style-type: none"> • Development in areas at river and coastal flood risk (n/a) • Capacity of people to recover from flooding (↔) • Coastal change risk management (new) • Pathogens, air quality and UV radiation (↔) • Effectiveness of emergency planning system (↑) • Water management in the natural environment (n/a) • Commercial forestry (↑) • Design and location of new infrastructure (↔) • Resilience of road and rail infrastructure (↔) • Business impacts from extreme weather (↔)
	GREEN	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Water demand in the built environment (↑) • Crops and livestock (n/a) 	<ul style="list-style-type: none"> • River and coastal flood alleviation (↓) • Resilience of water and energy infrastructure (↓) • Water demand by industry (↓)
GREY		<ul style="list-style-type: none"> • Resilience of digital and ICT infrastructure (↑) 		<ul style="list-style-type: none"> • None

Source: ASC assessment of policies and plans, and progress, for each adaptation priority.

Notes: Adaptation priorities have been categorised as follows:

- **Red:** plans and policies do not address climate change risks, indicators of vulnerability are increasing.
- **Amber:** plans and policies partially address climate change, indicators of vulnerability show mixed progress.
- **Green:** plans and policies are in place, indicators of vulnerability are generally falling.
- **Grey:** insufficient evidence to form a judgement.

Changes to the assessment since 2015 are shown in brackets after the title:

↑ - increased concern, ↓ - decreased concern, ↔ - no change since 2015, new - not part of 2015 assessment, n/a - scope of assessment has changed so comparison with 2015 not possible.

The emissions reduction plan and the National Adaptation Programme will need to prioritise action across the economy. Priorities should include:

- **Transport and other infrastructure:** vehicles and infrastructure are crucial to reducing emissions and ensuring resilience to severe weather and wider risks from climate change. Government policy needs to consider the ongoing technological revolution (e.g. autonomous vehicles, mechanisms to share vehicles, online shopping and communication) that could change whether, when and how we travel. It should also:

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- Set stretching targets to limit emissions per kilometre for new cars and vans beyond 2020; and ensure aviation and shipping policy is consistent with carbon budgets. This will require continued support for the roll-out of electric vehicles through time-limited support to buy them and effective roll-out of new charging infrastructure; as well as a new aviation strategy. Fiscal incentives could also support these ambitions.
 - Ensure that reporting requirements for important national infrastructure are fit-for-purpose (e.g. through the reporting process for the third round of the Adaptation Reporting Power) and that information sharing between infrastructure operators and local resilience forums is adequate to plan for climate risks, notably flood risk.
 - **Built environment:** existing and new buildings need to be affordable to run and be healthy to live in as the climate warms while emissions from buildings need to fall significantly. This requires:
 - A clear strategy for energy efficiency and low-carbon heat that addresses risks from overheating and accelerates the delivery of energy efficiency measures, heat networks and heat pumps in cost-effective locations for both households and businesses, and tests the possibility for low-carbon hydrogen to meet heat demand.
 - A comprehensive approach to reducing flood risk that includes: (i) implementing improved drainage in urban areas (including more widespread use of sustainable drainage systems); and (ii) ensuring that homes are insurable without subsidies as Flood Re begins to be withdrawn from 2021.
 - Measures to prevent overheating in new and existing homes, hospitals, care homes, schools and other public buildings. This will require, among other things, a review of the planning system and its ability to support the delivery of mitigation and adaptation objectives.
 - **Power and industry:** policies will need to be extended to continue with the success to date in reducing power sector emissions and improving resilience:
 - Further clarity is needed about the source and process for contracting about 80-100 TWh of new, low-carbon electricity that is needed through the 2020s (in addition to funding already allocated for offshore wind auctions and the new nuclear plant at Hinkley Point). A new plan is needed to re-start carbon capture and storage projects in the UK, to support power sector and industrial emission reduction, and to provide an option for low-carbon hydrogen for heating.
 - The evolution of the regulatory framework, including price control reviews and investment decisions, needs to incorporate future projections of climate risk alongside measures to increase the flexibility of the power system to respond to changes in the supply of and demand for electricity.
 - **Land and the natural environment:** land management, agriculture and the wider natural environment have crucial roles to play in reducing emissions and improving resilience to climate risks. Furthermore, in the absence of action, the changing climate is likely to threaten the ability of the natural environment to sustain current levels of biodiversity and to continue to provide essential goods and services to people, including clean water, food, flood protection, climate regulation and recreation:
 - The role of soils, forestry and agriculture needs to be central to any strategy to reduce emissions over the longer term. The financial and non-financial barriers to the use of land to support emissions reduction need to be addressed.

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- Long-term plans for the UK's natural environment are needed that take climate change into account. They need to include the sustainable management of soils, including peat, extending and improving upon current goals in the biodiversity strategy for England, and detailed work on the links between climate change and marine ecosystems.

Government and Parliament have agreed cost-effective levels for greenhouse gas emissions from 2017 until 2032. The most urgent risks facing the UK from climate change are also agreed. The UK helped to negotiate and has ratified the international Paris Agreement that is more ambitious than current UK targets. It has re-iterated its support for the Agreement, alongside China, India and the EU, despite the announcement by the Federal Government of the United States to withdraw. Faced with such domestic and international agreement – on emissions reduction and climate risks – strong policies are required to ensure action takes place.

Government policy must also help to re-enforce much wider actions. Private funds (e.g. from pension, insurance and banking intermediaries), behaviour change (e.g. how much and what we drive, how we heat our homes, and the food we eat) and regulatory measures (e.g. price control and other reviews by Ofgem, Ofwat and Ofcom, investment and financial regulation from the Pensions Regulator and the Prudential Regulatory Authority) will respond to the direction set by the Government. They need clear national guidance and actions to be effective and efficient.

The UK has an approach to tackling climate change that identifies and promotes the most cost-effective actions. Tackling climate change is also linked to broader benefits including: cleaner air, a stronger industrial strategy, energy security and infrastructure fit for the 21st Century. Such action requires upfront investment to reduce costs and risks over the medium term. The Government must set out how it will proceed to ensure costs are affordably and fairly distributed across the population and through time (e.g. between generations).

Action to tackle climate change can no longer be postponed. Two new plans, for the new Parliament, are needed to put the UK on track to meet its 2030 commitments and the 2050 goal, to grasp the opportunities offered by the low-carbon transition, and to prepare the country for climate change.

Annex 1 – Emissions reduction

Table 1. Policy requirements for the Government's plan to meet the fourth and fifth carbon budgets			
Policy requirement	Stronger implementation required	New policy required	New strategy required
Power (17% of 2016 emissions): Emissions intensity to fall by around 65% (to below 100 gCO₂/kWh) between 2016 and 2030, with options developed to allow near-zero emissions by 2050			
Extension of existing approaches to contract an additional 80-100 TWh low-carbon generation in the 2020s beyond existing plans (i.e. 130-150 TWh in total)		x	
A new strategic approach to carbon capture and storage deployment in the UK should include power plants as anchor loads for strategic clusters		x	x
Implementation of plans for increasing flexibility (e.g. storage, interconnection, demand response, flexible generation)	x		
Continued application of a carbon price after leaving the EU	x		
Contingency plans for delay or cancellation of planned projects , for example of new nuclear power plants		x	
Buildings (19% of 2016 emissions): Emissions to fall by around 20% between 2016 and 2030, with options developed to allow near-zero emissions by 2050			
New-build: Standards to ensure new-build properties are highly energy efficient and can use low-carbon heating systems from the start		x	
Existing buildings: A stable framework and direction of travel for improving the energy and carbon efficiency of existing buildings joining up energy efficiency and low-carbon heat, with: an attractive, well-timed offer to households and SMEs; simple, highly visible information and certification, including enhanced business reporting, alongside installer training; backed by standards for emissions performance of buildings that tighten over time	x	x	x
Reformed support for low-carbon heat through the 2020s , that deals with current barriers, provides a process for decisions on heat infrastructure, and is attractive enough to drive deployment of heat pumps, heat networks and biomethane in line with CCC scenarios	x	x	x
Active preparations for strategic decisions in the early 2020s on the role for hydrogen for heat and the future of the gas grid , including pilots, demonstrations, and research on the challenges of a wider-scale hydrogen switchover			x
Industry (22% of 2016 emissions): Emissions to fall by around 20% between 2016 and 2030			
An overall approach to long-term industrial decarbonisation , developing existing 'Roadmaps' into specific actions and milestones and extending coverage to other industries		x	x
A strategic, funded approach to industrial carbon capture and storage , based around clusters alongside power installations and shared infrastructure, with a new funding mechanism for industry		x	x
An effective approach to drive sustained uptake of low-carbon heat in industrial processes and buildings		x	
The EU ETS and EU efficiency standards and policy to be preserved or replicated and strengthened in future	x	x	
A stronger policy framework for industrial energy efficiency , including an effective reporting mechanism	x		
Tightly regulate and closely monitor any onshore petroleum wells (i.e. shale gas) during development, production and decommissioning to ensure rapid action to address leaks	x	x	

Policy requirement	Stronger implementation required	New policy required	New strategy required
Transport (26% of 2016 emissions): Emissions to fall by around 44% between 2015 and 2030 with options developed to allow near-zero emissions by 2050			
Stretching standards for new car and van CO₂ beyond 2020 , that require increased electric vehicle sales, are independently enforced and use real-world testing procedures		x	
Policies to deliver a high uptake of electric vehicles, of around 60% of new car and van sales by 2030 , including: time-limited financial support, preferential tax rates and effective roll-out of charging infrastructure	x		
Implementation of policy to deliver 8% of sustainable biofuels by energy by 2020 and maintain the biofuels volume after 2020	x		
Policies to support emissions reduction from HGVs , including new vehicle efficiency standards requiring electric options for smaller trucks, more efficient logistics, increased uptake of eco-driving measures, and a shift to lower-carbon modes (e.g. rail)		x	
National and local policies to reduce demand , to deliver car-km reductions of at least 5% below the baseline trajectory	x	x	
A plan to limit UK aviation emissions to the level assumed when the fifth carbon budget was set : around 2005 levels by 2050, implying around a 60% potential increase in demand, supported by strong international policies		x	x
Agriculture, land-use and forestry (8% of 2015 emissions): Emissions to fall by around 19% between 2015 and 2030, and afforestation rates to deliver 15,000 hectares per year			
The new 'Smart' inventory for agriculture emissions to be introduced in 2018 , to enable better monitoring and tracking of progress	x		
A stronger policy framework for reducing emissions from agriculture and land use in all UK nations to 2022 , as current progress is off track	x	x	
New farming policies to 2030 that move beyond the current voluntary approach and replace CAP with a framework that links support to emissions reduction and removals		x	x
Addressing financial and non-financial barriers to increase afforestation and on-farm tree planting	x	x	
Waste (4% of 2015 emissions): Emissions to fall by around 53% between 2015 and 2030			
Strengthened approaches through the waste chain, from creation to disposal , including reducing waste arising, separate collections (e.g. of food waste), stopping biodegradable waste going to landfill, and maintaining or increasing methane capture at landfill sites	Wales Scotland	England N Ireland	
F-gases (3% of 2015 emissions): Emissions to fall by at least 68% between 2015 and 2030			
A UK approach to reduce F-gas emissions by at least 68% , in line with the EU regulatory minimum: Government to investigate and pursue any further cost-effective opportunities		x	
Cross-cutting priorities			
A new strategic approach to carbon capture and storage deployment in the UK , including preparations for possible use in the production of low-carbon hydrogen		x	x
An updated strategy for increasing the supply of sustainable bioenergy feedstock and using it effectively			x
A strategy for developing options for removing greenhouse gases from the air			x
Notes: All policies, whether new or existing, will need to be strongly implemented. Latest non-CO ₂ data is for 2015.			

Annex 2 – Preparing for climate change

Table 2. Recommendations from the second statutory assessment of the NAP		
Recommendation	Owner	Timescale
The National Adaptation Programme (Chapter 2)		
<p>1. To ensure that activity and investments have a significant, cost-effective impact on reducing vulnerabilities, the second NAP should:</p> <ul style="list-style-type: none"> -- set clear priorities for adaptation; -- ensure objectives are outcome-focused, measurable, time-bound and have clear ownership; -- prioritise the core set of policies and actions that will have the biggest impact; -- build on the breadth of community and business engagement in the first NAP; and -- include effective monitoring and evaluation. 	Defra	Next NAP report in 2018
<p>2. The second NAP should address the important interdependencies between climate change risks and policy responses which fall within and across the remits of different government departments, and national, local and devolved governments, to ensure relevant policies and activity are co-ordinated across the programme.</p>	Defra	Next NAP report in 2018
<p>3. To ensure continuous improvement in the approach to reducing climate change risks, the second NAP should have a strong focus on evidence and evaluation:</p> <ul style="list-style-type: none"> -- there is the need and opportunity to work through UK Research and Innovation and the individual research councils to develop the evidence base in time to inform the third UK Climate Change Risk Assessment in 2022, making full use of the new UK Climate Projections in 2018; -- more attention needs to be paid to the evaluation of existing policies and approaches in order to learn lessons for future initiatives; and -- the costs and benefits of more ambitious policy options need to be considered and appraised. 	Defra	Next NAP report in 2018
<p>4. The Government should explore cost-effective ways to communicate the risks from climate change and the actions that can be taken to reduce vulnerabilities. Priorities include:</p> <ul style="list-style-type: none"> -- engaging vulnerable groups and communities exposed to specific risks such as higher temperatures, coastal change, and increases in flood risk; -- challenging the relevant professional bodies (such as the Landscape Institute, the Royal Town Planning Institute, and the Institution of Civil Engineers), and trade associations (for example the National Federation of Builders), to increase their level of engagement with members regarding climate change, and to improve the training, guidance and professional accreditation they offer; and -- raising awareness amongst the general public including through community groups and national membership organisations such as the National Trust, the Royal Horticultural Society, and the RSPB. 	Defra	Next NAP report in 2018

Table 2. Recommendations from the second statutory assessment of the NAP

Natural environment (Chapter 3)		
5. A critical part of the next National Adaptation Programme should be a long-term plan for the natural environment that takes climate change into account, builds on the level of ambition of current EU policies, and is consistent with the framework developed by the Natural Capital Committee. In line with the ASC's previous advice, there should be associated targets, actions, and a monitoring and evaluation framework.	Defra	By 2019
6. Action should be taken to enhance the condition of priority habitats and the abundance and range of priority species. This action should maintain or extend the level of ambition that was included in Biodiversity 2020. An evaluation should be undertaken of Biodiversity 2020, including the extent to which goals have been met and of the implications for resilience to climate change.	Defra	By 2021
7. Research on the risks to the marine food chain and ecosystem from rising sea temperatures, deoxygenation and ocean acidification should be undertaken over the course of the next National Adaptation Programme period, to inform future marine and fisheries policies. The research should assess the extent to which adaptive actions could increase the resilience of marine habitats and species to climate change.	Defra	By 2022
8. Goals and actions to achieve sustainable yields by 2030 should be included in new policies that will replace the Common Fisheries Policy. Indicators of sustainable management should also be reviewed to ensure they take account of changing distributions of fish species due to climate change.	Defra	By 2019
9. New agricultural land management policies should take account of the need to improve water quality and the condition of habitats and soils, in order to build resilience to climate change. Targets should be set that focus on outcomes, and monitoring undertaken to understand if these targets are being met.	Defra	By 2020
10. To support adaptation efforts, a plan should be put in place to deliver the aspiration for all soils to be managed sustainably by 2030. The plan should include a scheme to monitor uptake of soil conservation measures, and specific proposals to reverse the ongoing loss of lowland peat soils, in order to provide mitigation and adaptation benefits.	Defra	By 2019
11. A target for restoring all designated upland blanket bog habitats to favourable condition by 2030 should be adopted in order to contribute to both adaptation and mitigation efforts.	Defra	By 2019

Table 2. Recommendations from the second statutory assessment of the NAP

People and the built environment (Chapter 4)		
12. More and better co-ordinated action is needed to manage the lack of capacity within drainage systems to cope with possible increase in the frequency and severity of heavy rainfall. Defra and the National Infrastructure Commission should initiate a comprehensive assessment to quantify the need for investment and other policy actions to manage surface water flood risk, including, but not limited to, retrofitting sustainable drainage systems (SuDS). Urgent investments need to be considered by water companies and Ofwat as part of the 2019 price review, and the comprehensive assessment should be in place to inform local planning policy and major investment decisions in the 2024 price review.	Ofwat	2019 Price Review and 2024 Price Review
13. Policy is needed urgently to address the outstanding barriers to deliver high quality, effective SuDS in new development that achieve the full range of potential environmental co-benefits. In particular, there is a need for: <ul style="list-style-type: none"> -- More comprehensive and ambitious national standards for SuDS. -- The automatic right to connect new development to the existing sewerage network to be made conditional on the national SuDS standards being met. -- A clear policy on who should maintain and adopt SuDS by default. 	DCLG	2020
14. Defra should develop a long-term strategy to manage flood risk down to tolerable levels in each part of the country (as we first recommended in 2015), so that as Flood Re is withdrawn properties can remain insurable at reasonable cost. This should include: <ul style="list-style-type: none"> -- Monitoring the impact of the actions adopted following the Bonfield Review to achieve, in five years' time, an "environment where it is standard practice for properties at high risk to be made resilient". -- Actively communicating the risk and possible adaptation actions to households and communities that are expected to remain or become at high flood risk by the 2030s. -- Ensuring that Flood Re incentivises households to take up property-level resilience measures, which insurers should allow to be implemented during post-flood repairs. 	Defra	2020
15. The Environment Agency, with Coastal Groups, should review the ambition within, and progress being made in implementing, Shoreline Management Plans (SMPs), and prepare communities for the coastal adaptation that will need to take place between now and the middle of the century.	EA	2020
16. As recommended in our 2015 report, a standard or regulation should be put in place to reduce the risk of overheating in new homes.	DCLG	2020
17. Further action should be taken to assess and reduce the risks of overheating in existing buildings, with the priorities being hospitals, schools, care homes and prisons. This could be undertaken for example through the relevant standards agencies such as the Care Quality Commission and Ofsted.	Department of Health, Department for Education, Department for Justice	2020

Table 2. Recommendations from the second statutory assessment of the NAP

<p>18. The Cabinet Office should, in consultation with Local Resilience Forums:</p> <ul style="list-style-type: none"> -- Commission an independent review of the planning scenarios underpinning local Risk Registers to ensure they i) they are consistent with plausible worst case scenarios, and ii) use the results to help LRFs assess the resources needed to manage these events. -- Strengthen the Emergency Planning Guidance to clarify and test responsibilities for coordination amongst Category 1 and Category 2 responders, as well as between neighbouring LRFs. 	CO	2020
Infrastructure (Chapter 5)		
<p>19. Defra should review and strengthen its guidance for ARP3 to elicit more comparable data and conclusions about the adaptation of infrastructure. Use of consistent incident reporting and indicators of network resilience will allow performance to be tracked over time. Reporting protocols should be developed in partnership with sector organisations, the Cabinet Office, the National Infrastructure Commission, and the new National Infrastructure Resilience Council.</p>	Defra	2018
<p>20. Defra should ensure that all major infrastructure operators in the digital and ICT sector take part in the third round of the ARP. This will ensure that the sector has considered risks, and that operators, individually and collectively, have developed risk management plans.</p>	Defra	2019
<p>21. To assist with the assessment and management of interdependencies the Cabinet Office should review information sharing arrangements between infrastructure operators, as well as between operators and Local Resilience Forums. Further steps may be necessary to ensure that the legal duties within the Civil Contingencies Act are being fulfilled in practice, including the duty for Category 1 and Category 2 responders to cooperate and share information.</p>	Cabinet Office	2018
Business (Chapter 6)		
<p>22. The Government should promote voluntary disclosure of climate change risks by both large and small companies, including the risks in relation to supply chains.</p> <ul style="list-style-type: none"> -- The investment community should further emphasise the need for meaningful disclosure of how companies assess and manage climate change risks, in line with the recommendations of the Task Force on Climate-related Financial Disclosures. -- The Financial Reporting Council's UK Stewardship Code should ask investors to consider company performance and reporting on adapting to climate change. -- As a form of disclosure, the Government should promote corporate natural capital accounting and reporting, as recommended by the Natural Capital Committee. 	Defra/BEIS	By 2020

Table 2. Recommendations from the second statutory assessment of the NAP

23. The Government should consult on the measures needed in the next NAP to provide appropriate information and advice to support adaptation activity by businesses in England. For example, the Government could work with bodies such as the Confederation of British Industry, the Institute of Directors, the Federation of Small Businesses, Local Enterprise Partnerships, local chambers of commerce, and key individual sector associations, to promote use of the guidance and tools that were developed by the Environment Agency and Climate UK before their closure.	Defra/BEIS	2018
24. The Government should examine how public procurement rules could be used to promote the disclosure and management of climate change risks including within supply chains. For example, the Crown Commercial Service could require companies tendering for contracts to explain how risks have been considered and addressed both within tenders and by their overall business.	Defra/Crown Commercial Service	By 2020
Local government (Chapter 7)		
25. The Government should set out in the next NAP how it will ensure local authorities have access to the technical expertise, guidance, and practical tools they need following the closure of the Environment Agency's Climate Ready Support Service, Climate UK, and Climate Local. There is potential for professional bodies such as the Royal Town Planning Institute and the Chartered Institution of Water and Environmental Management to take a greater role in providing information, training and advice.	Defra/DCLG	2018
26. To stimulate activity and improve monitoring and evaluation, local authorities should be included within the scope of the third round of reporting under the Adaptation Reporting Power. Defra should identify the most efficient and effective means for local authorities to report on the action they are taking and the progress being made to prepare communities for climate change.	Defra	2018
27. The next NAP should develop stronger sub-national approaches to climate change adaptation that promote business and infrastructure resilience, healthy communities, and investment in natural capital. For example, there is the opportunity to build on current arrangements and work with London and the core city regions, the metro mayors, and the Local Enterprise and Local Nature Partnerships.	Defra	2018
28. The Government should review the effectiveness of the land-use planning system in achieving reductions in greenhouse gas emissions from buildings and transport, and enhancing the resilience of communities and the built environment to the impacts of climate change. The review should consider both strategic and local land-use allocation, and building and infrastructure design.	DCLG	2019

