

Threats Presented by Climate Change Debate on 24 January 2019

Summary

On 24 January 2019, the House of Lords is scheduled to debate a motion moved by Lord Teverson (Liberal Democrat) on the “threats presented by climate change”.

This briefing considers risks arising from climate change—identified as increasing at both global and national level—and summarises recent coordination efforts and programmes intended to mitigate them. International bodies charged with examining the scientific evidence have identified risks associated with:

- changing weather;
- rising sea levels;
- land and marine-based biodiversity and ecosystems; and
- human systems such as health, security and the economy.

Negotiations on how to meet these challenges have continued, most recently at a United Nations summit in Katowice, Poland, held in December 2018.

The UK has identified several priority climate risk areas including:

- flooding and coastal change;
- health, wellbeing and productivity;
- water supply shortages;
- natural ecosystems, soils and biodiversity;
- food production and trade; and
- new and emerging pests and diseases.

A selection of recommended reading, including detailed evidence reports, is identified at the end of the briefing for further information on this broad and evolving subject.

Introduction

It is widely held within the scientific and international policy-making communities that emissions generated from human activity have affected the Earth’s climate in recent decades. The Intergovernmental Panel on Climate Change (IPCC)—the United Nations body charged with assessing the science related to climate change—has concluded that there is “clear” evidence that the climate has warmed since the 1950s and that the dominant cause of such temperature increases is “extremely likely” to have been greenhouse gas emissions resulting from human activity. In a 2014 report summarising the scientific evidence available at that time, the IPCC stated:

Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes

are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and [the] sea level has risen.

Anthropogenic greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are **extremely likely** to have been the dominant cause of the observed warming since the mid-20th century.¹

In respect of the scientific consensus behind climate change—widely defined as a large-scale, long-term shift in the planet’s weather patterns and average temperatures, including climate system warming—the US National Aeronautics and Space Administration (NASA) has observed that “97% of climate scientists agree that climate-warming trends over the past century are very likely due to human activities, and most of the leading scientific organisations worldwide have issued public statements endorsing this position”.² It should be noted, however, that questions relating to climate change, including in respect of causes, remedies or its very existence as a phenomenon, remain contested by some observers and have become increasingly politicised in recent years. ‘Climate scepticism’ spans a range of viewpoints, and includes individuals or groups of people who are sceptical that the world is warming; the influence of humans in climate warming; the pace and extent of the impacts of climate change; and/or whether urgent action and spending are necessary to address changes in the climate.³

Climate Change as a Global Challenge

The very nature of climate change means that its effects are global in scope. In 2015, an international agreement was reached at the 21st Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) in which 195 nations committed to “‘holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels’”.⁴ This agreement is widely known as the Paris agreement after the city in which the COP21 meeting was held. Following the adoption of the Paris agreement, the UNFCCC invited the IPCC to produce a special report on the environmental and societal effects of a global temperature rise of 1.5°C above pre-industrial levels.⁵

The IPCC agreed and published this special report in October 2018. It noted that human activities were estimated to have caused approximately 1°C of global warming above pre-industrial levels and predicted that, on current trends, this was likely to reach 1.5°C between 2030 and 2052.⁶ The authors of the report used available scientific evidence and models to identify the impacts that such an elevated rise would have globally. They noted that the level of future climate-related risks for natural and human systems would depend on the “magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options”.⁷ Having noted this caveat, the report identified a series of risk factors associated with a 1.5°C global warming model, in line with the ambitions outlined in the Paris agreement.

Differences in Regional Climate Characteristics

First, the IPCC report identified that a warmer climate was likely to increase the risk of extreme weather in different regions. According to the authors of the report, regional climate differences in a 1.5°C global warming scenario would include higher mean temperatures in most land and ocean regions; hot extremes in most inhabited regions; heavy precipitation in several regions; and the probability of

drought and precipitation deficits in some regions. In particular, the number of hot days was projected to increase in most land regions, with the highest increases in regions located in the tropics.⁸

Global Sea Level Rise

Second, the report noted that an increase in global temperatures was likely to lead to higher sea levels. The authors cited projections suggesting that a 1.5°C rise in temperatures would result in a 0.26 to 0.77 metre global mean sea level rise by 2100. Sea levels were likely to continue to rise beyond this date, and marine ice sheet instability in Antarctica and/or an irreversible loss of the Greenland ice sheet “could result in multi-metre rise in sea level over hundreds to thousands of years”. The authors contended that increased warming “amplifies the exposure of small islands, low-lying coastal areas and deltas to the risks associated with sea level rise for many human and ecological systems, including increased saltwater intrusion, flooding and damage to infrastructure”.⁹

Land-based Biodiversity and Ecosystems

Third, the report cited estimates, based on studies of 105,000 species, that 6% of insects, 8% of plants and 4% of vertebrates were projected to lose over half of their climatically determined geographic range in a 1.5°C global warming scenario. Other noted risks from increased temperatures for land-based biodiversity and ecosystems included a higher risk of forest fires; spread of invasive species; and permafrost thaw. Also noted as a potential risk was the transformation of ecosystems from one type to another—with high-latitude tundra and boreal forests identified as at risk of “climate change-induced degradation and loss”.¹⁰

Marine Biodiversity, Fisheries, and Ecosystems

Fourth, the report noted that warming of 1.5°C was expected to result in continued increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels. In a 1.5°C warming scenario, evidence cited suggested that:

- one sea ice-free Arctic summer would be likely per century;
- the ranges of many marine species would move to higher latitudes;
- an increase in damage to many marine ecosystems could be expected, including coral reefs and other coastal ecosystems; and
- ocean acidification caused by increasing carbon dioxide concentrations would “amplify” the adverse effects of warming, including the relative abundance and/or survival of a broad range of species.

In addition, the authors argued that climate change was likely to continue affecting fisheries and aquaculture. They cited a model suggesting that the global fisheries catch could decrease by “about 1.5 million tonnes” should global temperatures rise by 1.5°C.¹¹

Human Systems

Fifth, the report observed that climate-related risks to health, livelihoods, food security, water supply, human security and economic growth were projected to increase in a 1.5°C global warming scenario. The authors added that disadvantaged and vulnerable populations, some indigenous peoples, and local communities dependent on agricultural or coastal livelihoods were at a “disproportionately higher risk

of adverse consequences”. Additionally, “poverty and disadvantage” were expected to increase in some populations as global temperatures increased. Other noted risks included:

- potential increases in heat-related morbidity and mortality;
- potential net reductions in yields of crops such as maize, rice and wheat and potential reductions in the nutritional quality of rice and wheat;
- climate change-induced increases in water stress; and
- economic growth-related risks, particularly for countries in the tropics and southern hemisphere subtropics.¹²

Limits to Adaptation and Adaptive Capacity

Lastly, the report noted that a wide range of adaptation options were available to reduce risks in particular areas. These included:

- ecosystem restoration and biodiversity management for risks associated with natural and managed ecosystems;
- coastal defences as a tool to mitigate against rising sea levels; and
- options including efficient irrigation and green infrastructure to address issues relating to health, livelihoods, food, water, and economic growth.

However, the authors noted that there was evidence to suggest that limits to adaptive capacity existed in a 1.5°C warming scenario, and that such limits, though varying by sector, became “more pronounced at higher levels of warming”.¹³

Two further IPCC special reports—focused on how climate change affects the oceans and cryosphere and the use of land, respectively—are expected to be published later this year.¹⁴

Ongoing International Response

The October 2018 IPCC report concluded that limiting global warming to 1.5°C with “no or limited overshoot” would require “rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings) and industrial systems”.¹⁵ Global net human-caused emissions of carbon dioxide would need to fall by about 45% from 2010 levels by 2030, reaching “net zero” around 2050.¹⁶ The report added that to achieve this “systems transitions” would have to be “unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in those options”.¹⁷ However, the report noted that the international community was not on track to limit warming to 1.5°C on current plans. It observed forecasts suggesting that those mitigation measures currently announced to be in place up to 2030 were likely to lead to significantly higher global warming of about 3°C by 2100, with further warming continuing afterwards.¹⁸

At the most recent COP—COP24 held in Katowice, Poland, between 2 and 15 December 2018—signatories to the UNFCCC sought to secure agreement on how international action to mitigate climate change could be strengthened.¹⁹ The conference concluded with the adoption by all parties to the convention, including the United States and China, of a single rulebook that will apply to all countries in relation to emissions reporting and climate targets to facilitate practical implementation of the Paris agreement to limit the increase in global average temperatures to below 2°C above pre-industrial levels.²⁰ Claire Perry, Minister of State for Energy and Clean Growth at the Department for Business,

Energy and Industrial Strategy, summarised the UK Government's assessment of this outcome in a written statement following the conference:

COP24 was an important moment, representing the culmination of three years of negotiations and following shortly after the publication of a landmark scientific report from the Intergovernmental Panel on Climate Change that highlighted the severe consequences of failing to limit global warming to 1.5°C above pre-industrial levels.

In the negotiations we succeeded in securing our main objectives by delivering an operational rulebook to drive genuine climate action, creating a level-playing field, while allowing for flexibility and support for those countries that need it, in light of capacity. Inevitably there is still work to be done, particularly on carbon markets, but the overall picture is of a rulebook that enables the Paris Agreement to be taken forward in practice, marking a move from negotiation to implementation.²¹

In a statement issued at the conclusion of COP24, Lord Stern of Brentford (Crossbench), chair of the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and Political Science, commented that the conference had “ultimately succeeded in its crucial primary task of agreeing the so-called rule book for the Paris agreement”. He added that, in his view, countries “must now get on with the crucial implementation of their contributions to the Paris agreement” and plan how to “increase their reductions in emissions to allow them to submit stronger commitments” ahead of the expected COP26 meeting in 2020. He argued that the progress the world was currently making was “inadequate given the scale and urgency of the risks we face”.²²

The UN Secretary General, António Guterres, characterised the COP24 agreement on a rulebook to implement the Paris agreement as the “basis for a transformative process which will require strengthened ambition from the international community”.²³ Mr Guterres will host a climate summit in September 2019 to facilitate international efforts to mitigate climate change.²⁴

Climate Change as a Domestic Challenge

As well as being global in scope, climate change can affect particular regions and countries in different ways. The UK Government's view is that there is “clear evidence to show that climate change is happening” and that the UK is “already affected by rising temperatures”.²⁵

The Climate Change Act 2008 sets out the framework in which the UK approaches climate change.²⁶ The act commits the Government to reducing greenhouse gas emissions by at least 80% of 1990 levels by 2050 through a system of carbon budgets that restrict the volume of greenhouse gases that can be legally emitted over a five-year period.²⁷ The act also established the independent Committee on Climate Change, which advises the Government on how to reduce greenhouse gas emissions over time.²⁸ The committee is currently chaired by Lord Deben (Conservative). Baroness Brown of Cambridge (Crossbench) serves as the committee's deputy chair and chairs the separate adaptation sub-committee, which provides independent advice on preparing for and adapting to climate change.²⁹ In June 2018, the committee cautioned that although emissions had fallen by 43% from 1990 levels, the Government was “not on course to meet the legally binding fourth and fifth carbon budgets”.³⁰

In July 2016, the Committee on Climate Change published a synthesis report produced by its adaptation sub-committee, then chaired by Lord Krebs (Crossbench), to inform a government climate change risk assessment then due in January 2017.³¹ The synthesis report concluded that changes to the UK climate were “likely to include periods of too much or too little water, increasing average and extreme temperatures and sea level rise”.³² The report identified 56 individual risks and opportunities arising

from global warming, organised within four urgency categories.³³ In particular, it identified six “inter-related” and “urgent” climate change risks facing the UK. These priority risks, together with the committee’s headline observation and urgency rating for each, are set out below.³⁴

Priority Risk Area	Headline Observation	Conclusion
Flooding and coastal change risks to communities, businesses and infrastructure	“The impacts of flooding and coastal change in the UK are already significant and expected to increase as a result of climate change”.	More action needed (highest urgency rating)
Risks to health, wellbeing and productivity from high temperatures	“Heatwaves in the UK like that experienced in 2003 are expected to become the norm in summer by the 2040s”.	More action needed (highest urgency rating)
Risk of shortages in the public water supply, and for agriculture, energy generation and industry, with impacts on freshwater ecology	“Climate change is projected to reduce the amount of water in the environment that can be sustainably withdrawn whilst increasing the demand for irrigation during the driest months. At the same time the growing population will create additional demands on already stretched resources in some parts of the country”.	More action needed (highest urgency rating)
Risks to natural capital, including terrestrial, coastal, marine and freshwater ecosystems, soils and biodiversity	“Climate change presents a substantial risk to the UK’s native wildlife and to the vital goods and services provided by natural capital, including food, timber and fibre, clean water, carbon storage, and the cultural benefits derived from landscapes”.	More action needed (highest urgency rating)
Risks to domestic and international food production and trade	“The affordability of food for the UK population is subject to domestic and international risks affecting production and prices”.	More action needed (highest urgency rating)
New and emerging pests and diseases, and invasive non-native species, affecting people, plants and animals	“The impacts of new and emerging pests and diseases are potentially high for otherwise healthy people, animals and plants. The warmer, wetter conditions expected with climate change will allow some pests and diseases to extend their range”.	Research priority (second-highest urgency rating)

Government Policy

In January 2017, the Government published a climate change risk assessment in line with its obligations under the Climate Change Act 2008. This drew on the report commissioned from the Committee on Climate Change’s adaptation sub-committee. The Government endorsed the six priority risk areas identified in this earlier report and broadly endorsed the urgency level given to individual risks identified, with the exception of some relating to food security.³⁵ It provided details of actions being taken in each risk area, adding that further details of adaptation measures would be published in 2018.³⁶

Following the 2017 climate change risk assessment, in July 2018 the Government published its most recent national adaptation programme (NAP) and strategy for climate adaptation reporting. This document set out over 100 “key actions” for the 2018–2023 period, including actions intended to:

- protect ecosystems, such as ancient and native woodland and marine areas;
- establish or maintain various environmental schemes and networks; and
- update climate change-related plans and guidance, amongst many other measures.

The Government said that the document was “intended to communicate the extent, nature and immediacy of different climate risks and what we are doing to address them, which will help inform a more mature debate on how we adapt as a society”.³⁷

The Committee on Climate Change’s adaptation sub-committee is expected to publish a report evaluating the Government’s progress on implementing the NAP in June 2019.³⁸ However, in an article published on the same day as the NAP was published, Kathryn Brown, Head of Adaptation at the Committee on Climate Change Secretariat, contended that the NAP appeared to be only a “partial plan” and that it was “hard to say at this stage” whether the programme was “sustainable and effective”.³⁹ She added:

The main risks we have highlighted—flooding and coastal change, high temperatures, water shortages and many others—are centre-stage in the opening pages of the new NAP. But only some of the relevant urgent risks are dealt with in the list of actions in the report. Of the 56 risks and opportunities we have previously identified, a quick count shows that 27 are missing from the list of actions, including 16 urgent risks.

Diving into the content, we have previously raised the risks to the UK from climate change impacts abroad. But there are no actions in the NAP to help manage these risks, with the exception of an honourable mention of the Food Security Strategy. Another key gap is around actions to manage the transition period ahead of the withdrawal of ‘Flood Re’, which helps people who live in flood risk areas to get affordable home insurance. The implications of removing this scheme are profound for those living in flood risk areas. And in many other cases the actions the Government identifies in response to the risks are not new: many are based on work that has been underway for several years. In particular, actions to reduce the risks to people from overheating in homes, which was one of the highest priority risks identified in the [2017] climate change risk assessment, are absent.⁴⁰

In a speech delivered in November 2018 to mark the launch of the Met Office’s UK climate projections 2018 analysis tool, Michael Gove, Secretary of State for Environment, Food and Rural Affairs, commented further on the impact of climate change on everyday life and the Government’s climate-related plans.⁴¹ He referred to the UK climate projections tool showing that, in a high emission scenario, average summer temperatures could be up to 5.4°C warmer across the UK by 2070. The Environment Agency has stated that such an increase would be likely to lead to an increased risk of drought and an increase in heat-related morbidity and mortality rates, amongst other effects.⁴² The projections had also shown that average summer rainfall could decrease by up to 47%, while winters could be up to 4.2°C warmer and there could be up to 35% more precipitation in winter, resulting in flooding and other issues, by the same year.⁴³ Mr Gove stated that flood defence work, amongst other activity, had been informed by such projections. In respect of internationally coordinated action, he added that the UK was “leading international efforts on climate resilience” ahead of the UN climate summit in 2019.

The Government has commissioned the Committee on Climate Change to produce a new evidence report, due to be published in 2021, to support the next climate change risk assessment. This study is expected to be supported by new research, including projects on future water availability; flooding; how climate-related risks interact; and how behavioural change can affect climate risks and opportunities.⁴⁴

Leaving the European Union

In 2017, the House of Lords European Union Committee observed that UK climate change policy had, in recent years, “become increasingly enmeshed in EU policy”.⁴⁵ For example, the UK participates in the

EU Emissions Trading System (EU ETS) set up in 2005.⁴⁶ Both the UK and EU are parties to the UNFCCC and the Paris agreement.⁴⁷ However, it is not yet clear whether the UK will continue to participate in EU climate mitigation initiatives such as the EU ETS following its withdrawal from the EU, and to what extent the UK and EU will cooperate on other climate change-related policies and mitigation mechanisms in the future.⁴⁸

Further Information

- United Nations, '[Climate Change](#)', accessed 15 January 2019; and '[Climate Change: A Global Issue—Major Reports](#)', accessed 15 January 2019
- IPCC, '[Reports](#)', accessed 15 January 2019
- Committee on Climate Change, '[Publications](#)', accessed 15 January 2019; and '[Implications of the Vote to Leave the EU](#)', accessed 15 January 2019
- House of Commons Library, [Brexit: Energy and Climate Change](#), 9 November 2018
- House of Lords Library, [Leaving the European Union: UK Climate Change Policy](#), 15 June 2017
- House of Lords European Union Committee, [Brexit: Environment and Climate Change](#), 14 February 2017, HL Paper 109 of session 2016–17; and [Government Response](#), April 2017

¹ Intergovernmental Panel on Climate Change, [Climate Change 2014: Synthesis Report—Headline Statements from the Summary for Policymakers](#), 5 November 2014, p 1. Bold in original. See also: IPCC, [Climate Change 2014: Synthesis Report—Summary for Policymakers](#), 2014.

² Met Office, '[What is Climate Change?](#)', accessed 14 January 2019; and NASA Global Climate Change, '[Evidence: Climate Change—How Do We Know?](#)', 13 December 2018.

³ See, for example: James Painter, [Poles Apart: The International Reporting of Climate Scepticism](#), Reuters Institute for the Study of Journalism, November 2011, p 1.

⁴ Intergovernmental Panel on Climate Change, [Special Report: Global Warming of 1.5°C—Frequently Asked Questions](#), 2018, p 5.

⁵ *ibid.*

⁶ Intergovernmental Panel on Climate Change, [Special Report: Global Warming of 1.5°C—Summary for Policymakers](#), 2018, p 6.

⁷ *ibid.*, p 7.

⁸ *ibid.*, p 9. These risk factors are subject to differing levels of confidence.

⁹ *ibid.*, pp 9–10.

¹⁰ *ibid.*, p 10.

¹¹ *ibid.*, pp 10–11.

¹² *ibid.*, pp 11–12.

¹³ *ibid.*, p 12.

¹⁴ Intergovernmental Panel on Climate Change, '[Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C Approved by Governments](#)', 8 October 2018; '[The Ocean and Cryosphere in a Changing Climate](#)', accessed 14 January 2019; and '[Climate Change and Land](#)', accessed 14 January 2019.

¹⁵ Intergovernmental Panel on Climate Change, [Special Report: Global Warming of 1.5°C—Summary for Policymakers](#), 2018, p 17.

¹⁶ Intergovernmental Panel on Climate Change, '[Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C Approved by Governments](#)',

8 October 2018.

¹⁷ Intergovernmental Panel on Climate Change, [Special Report: Global Warming of 1.5°C—Summary for Policymakers](#), 2018, p 17.

¹⁸ *ibid.*, p 20.

¹⁹ United Nations Climate Change, '[Katowice Climate Change Conference: December 2018](#)', accessed 14 January 2019; and House of Commons, '[Written Statement: UNFCCC Twenty Fourth Conference of Parties—Update](#)', 20 December 2018, HCWS1231.

²⁰ COP24 Katowice 2018, '[Success of COP24: We have the Katowice Rulebook](#)', 15 December 2018; and Leslie Hook, '[Deal Struck at Climate Talks to put Paris Pact into Action](#)', *Financial Times* (£), 15 December 2018. US President Donald Trump has stated that he intends to withdraw the US from the Paris agreement, but this can only take effect from late 2020 (Brad Plumer, '[Climate Negotiators Reach an Overtime Deal to Keep Paris Pact Alive](#)', *New York Times*, 15 December 2018). The IPCC special report on 1.5°C warming was not unanimously adopted at COP24 due to opposition from the United States, Russia, Saudi Arabia and Kuwait (Matt McGrath, '[Climate Change: COP24 Fails to Adopt Key Scientific Report](#)', BBC News, 8 December 2018).

- ²¹ House of Commons, '[Written Statement: UNFCCC Twenty Fourth Conference of Parties—Update](#)', 20 December 2018, HCWS1231.
- ²² LSE Grantham Research Institute on Climate Change and the Environment, '[Nicholas Stern Comments on the Outcome of COP24](#)', 16 December 2018.
- ²³ United Nations, '[Katowice Climate Conference](#)', accessed 14 January 2019.
- ²⁴ United Nations, '[UN Climate Summit 2019](#)', accessed 14 January 2019.
- ²⁵ Department for Business, Energy and Industrial Strategy, '[Climate Change Explained](#)', 31 July 2018.
- ²⁶ Committee on Climate Change, '[UK Regulations: Climate Change Act](#)', accessed 15 January 2019; and LSE Grantham Research Institute on Climate Change and the Environment, '[10 Years of the UK Climate Change Act](#)', 30 March 2018.
- ²⁷ Committee on Climate Change, '[UK Regulations: Climate Change Act](#)', accessed 15 January 2019; and House of Lords Library, '[Leaving the European Union: UK Climate Change Policy](#)', 15 June 2017, pp 1–2.
- ²⁸ Committee on Climate Change, '[About the Committee on Climate Change](#)', accessed 15 January 2019; and HM Government, '[Climate Change Act 2008: Explanatory Notes](#)', 26 November 2008, pp 1–2.
- ²⁹ Committee on Climate Change, '[Members of the Committee on Climate Change](#)', accessed 15 January 2019; and '[Members of the Adaptation Committee](#)', accessed 15 January 2019.
- ³⁰ Committee on Climate Change, '[Reducing UK Emissions: 2018 Progress Report to Parliament](#)', June 2018, pp 12–14.
- ³¹ Committee on Climate Change, '[UK Climate Change Risk Assessment 2017: Synthesis Report—Priorities for the Next Five Years](#)', July 2016. National summaries were produced for England, Scotland, Wales and Northern Ireland alongside the evidence report: Committee on Climate Change, '[National Summaries](#)', accessed 15 January 2019.
- ³² Committee on Climate Change, '[New Report Provides Authoritative Scientific Assessment of Climate Change Risks to UK](#)', 12 July 2016.
- ³³ Department for Environment, Food and Rural Affairs, '[UK Climate Change Risk Assessment 2017](#)', January 2017, p 9.
- ³⁴ Committee on Climate Change, '[UK Climate Change Risk Assessment 2017: Synthesis Report—Priorities for the Next Five Years](#)', July 2016, pp 4–5. Note: "More action needed" was defined as meaning that "new, stronger or different government policies or implementation activities—over and above those already planned—are needed to reduce long-term vulnerability to climate change". "Research priority" was defined as meaning that "research is needed to fill significant evidence gaps or reduce the uncertainty in the current level of understanding in order to assess the need for additional action".
- ³⁵ Department for Environment, Food and Rural Affairs, '[UK Climate Change Risk Assessment 2017](#)', January 2017, pp 3 and 10.
- ³⁶ *ibid.*, p 21.
- ³⁷ Department for Environment, Food and Rural Affairs, '[National Adaptation Programme and Third Strategy for Climate Adaptation Reporting](#)', July 2018, HC1403 of session 2017–19, p iii. See also 'Annex 2: Detailed Actions Log'.
- ³⁸ Department for Environment, Food and Rural Affairs, '[National Adaptation Programme and Third Strategy for Climate Adaptation Reporting](#)', July 2018, HC1403 of session 2017–19, p v.
- ³⁹ Kathryn Brown, '[The New National Adaptation Programme: Hit or Miss?](#)', Committee on Climate Change, 19 July 2018.
- ⁴⁰ *ibid.*
- ⁴¹ Department for Environment, Food and Rural Affairs, '[Michael Gove Speech on UK Climate Change Projections](#)', 26 November 2018; and '[Most Detailed Picture Yet of Changing Climate Launched](#)', 26 November 2018.
- ⁴² Environment Agency, '[Climate Change Impacts and Adaptation](#)', November 2018.
- ⁴³ Met Office, '[UK Climate Projections](#)', 26 November 2018.
- ⁴⁴ Committee on Climate Change, '[CCC to Advise the Government on its Third Assessment of UK Climate Change Risks](#)', 21 December 2018.
- ⁴⁵ House of Lords European Union Committee, '[Brexit: Environment and Climate Change](#)', 14 February 2017, HL Paper 109 of session 2016–17, p 3.
- ⁴⁶ European Commission, '[EU Emissions Trading System](#)', accessed 16 January 2019.
- ⁴⁷ United Nations Climate Change, '[United Kingdom of Great Britain and Northern Ireland](#)' and '[European Union](#)', accessed 16 January 2019.
- ⁴⁸ House of Commons Library, '[Brexit: Energy and Climate Change](#)', 9 November 2018, p 35.

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