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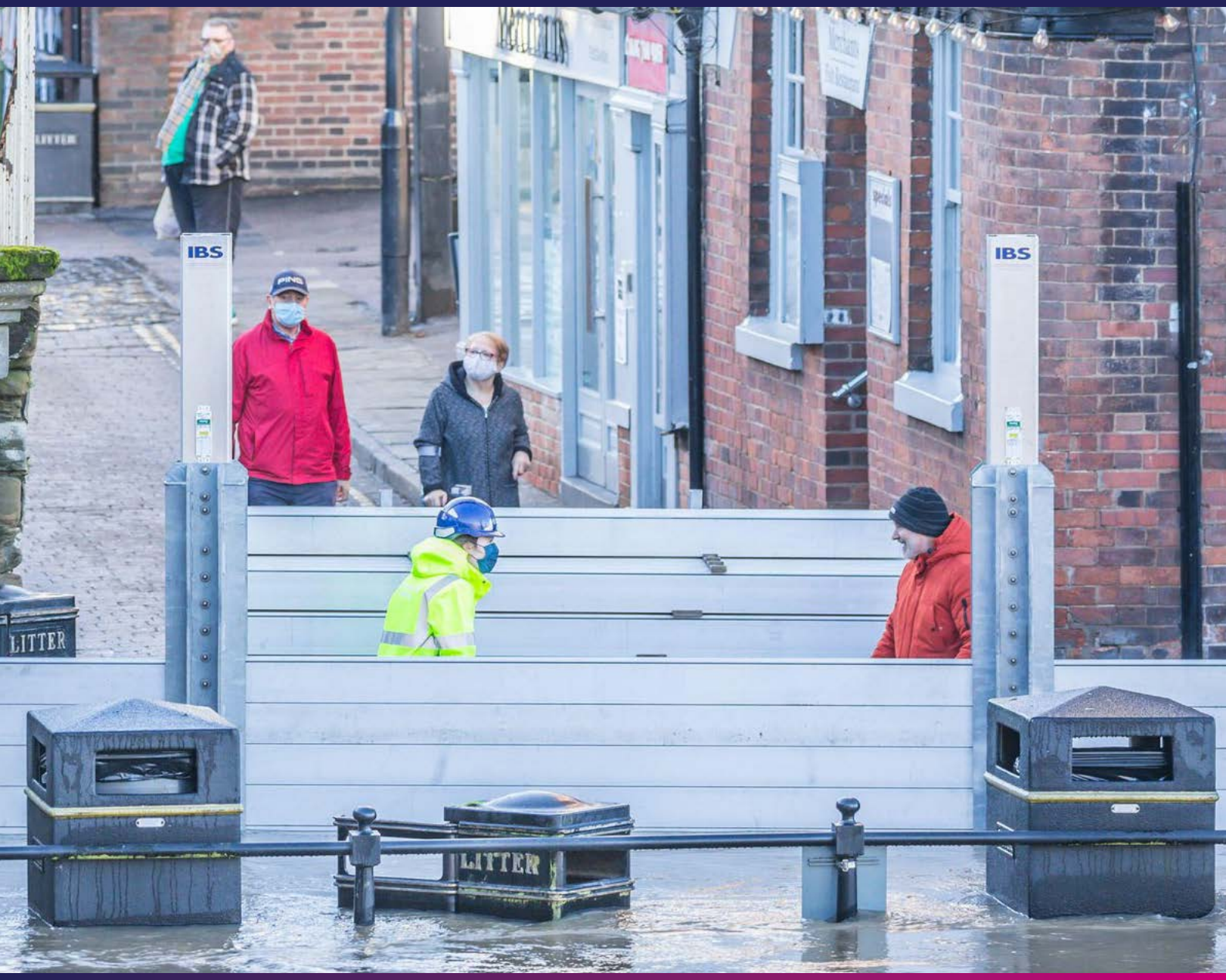
Adapting to climate change

How the UK can better manage a rapidly changing environment



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About this report

The impacts of climate change are beginning to be felt but successive governments have failed to prepare the UK to adapt effectively. This report looks at how government could move adaptation up the agenda and improve UK climate resilience.

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Summary

The impact of climate change is beginning to be felt in the UK. These effects are likely to only intensify over the coming years, with extreme weather events becoming more common and their wider implications, from migration flows to food security, also moving more prominently into public consciousness. Despite this, successive governments have failed to prepare the UK to adapt to these changes. New housing developments are still being built in areas at future risk of flooding, much of the UK's existing housing stock is poorly prepared for hotter temperatures, and some of its older infrastructure is already struggling to cope with extreme weather.

Adapting to climate change will require substantial investment from both the public and private sectors – something made much harder in a fiscally constrained environment. But failing to adapt is likely to cost far more. These costs will come from many sources, most obviously in the need to call on disaster response teams and invest in expensive equipment but also in less visible areas, like shoring up insurance markets.

The National Adaptation Plan (NAP3) – the most recent UK government plan for adapting to climate change – was a meaningful improvement on previous attempts but still fails to provide an overall vision for what a well-adapted UK would look like. This makes it harder to set out a clear strategy. Nor did it articulate the level of urgency required. This is in part because adaptation has traditionally been the 'Cinderella' of climate change, overlooked in favour of mitigation – which has clearer metrics and attracts private investment more easily. Indeed, climate mitigation has been moved into its own department, the Department for Energy Security and Net Zero (DESNZ), while adaptation remains under the wide-ranging brief of the Department for Environment, Food and Rural Affairs (Defra).

But while adaptation has often struggled to get traction across government there have been some positive movements in recent years. In 2023 a Climate Resilience Board was established, co-chaired by the Defra director of environment strategy and the Cabinet Office head of resilience, bringing a focus on adaptation into the centre of government. It is yet to become clear what impact it will have, but so far the existing set-up has not delivered the pace of change required to minimise harms and costs from increasing climate change impacts.

Part of the difficulty in planning and carrying out adaptation projects, like retrofitting housing to handle heatwaves, prepping infrastructure for extreme weather and safeguarding food security, is that so many different departments 'own' the relevant policy areas and levers. For instance, DESNZ is responsible for the energy system and climate mitigation; the Department for Levelling Up, Housing and Communities (DLUHC) has control over housing and building regulations; the Cabinet Office is home to the resilience directorate; and, of course, the Treasury is the ultimate arbiter of departments' spending.

There was a widely held, if not unanimous, view among interviewees for this report that responsibility for climate change adaptation should be moved out of Defra (as climate change mitigation was). But while the advantages of moving adaptation to a different department might appear obvious on the surface, none is clear cut on closer inspection. The recently created DESNZ might seem the most logical option, with its ownership of the broader net zero policy agenda. However, it already has a large delivery programme and it is not clear that it would find it much easier than Defra to corral other departments, one of the biggest stumbling blocks to effective adaptation. The same is true of DLUHC.

Conversely, the Treasury and Cabinet Office may be better *able* to take a stronger lead on co-ordination across departments but it is unclear whether either would be willing to fully commit to doing so for adaptation. In both cases, new resource would be needed to take on another complicated policy area.

Our view is that none of these options is better than leaving the lead in Defra, which has already built up expertise in this area. A joint minister or unit could bridge some of the difficulties outlined above. Wherever the responsibility for adaptation sits in government, and particularly if it remains in Defra, it is vital to embed adaptation in policy and decision making. The Treasury's role will be especially important. To do this we recommend:

Embedding adaptation in core financial control mechanisms by:

- Making it clear that a core part of accounting officer responsibilities is ensuring that future spending is value for money, after taking account of potential climate change impacts.

- Ensuring that questions on adaptation in Infrastructure and Projects Authority 'gateway reviews' are properly asked and answered.

- Making adaptation a cross-cutting theme in the next spending review and ensuring that it is aligned with the NAP3 process.

- Ensuring any future 'net zero tests' used to judge planned policies' impact on the UK's net zero goals include adaptation as well as mitigation.

Developing indicators to enable governments, parliament and the public to monitor whether government action is helping to reduce future risk to acceptable levels.
These should be in place in time for the Climate Change Committee's 2025 progress report and ideally would be developed jointly by the governments of the UK, Scotland, Wales and Northern Ireland. And that:

Parliament should improve its scrutiny of adaptation to ensure that progress is being made at the pace required to minimise both harms and long-term costs.

What is adaptation and why does it matter?

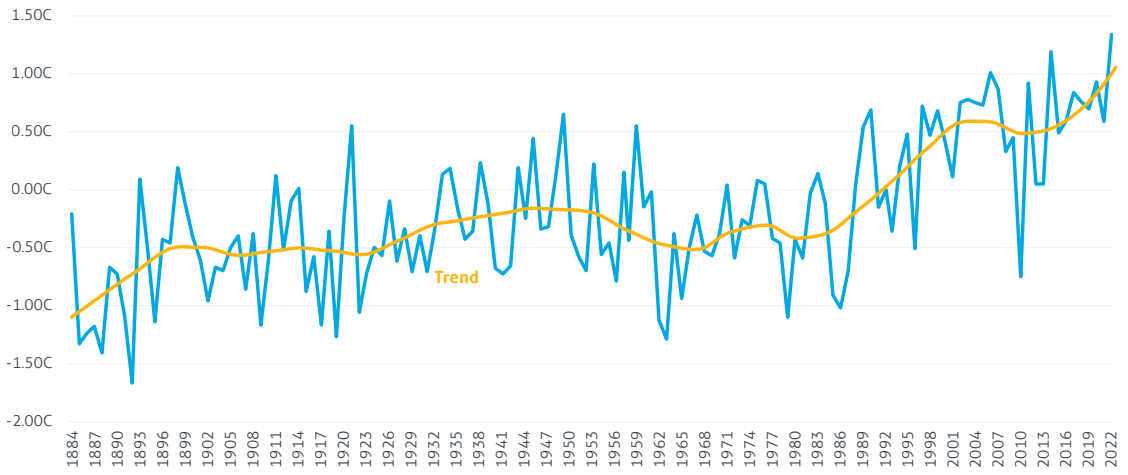
Climate change is no longer a future problem

The impacts of climate change are beginning to be felt around the world. Global temperatures in September 2023 were around 1.8C above pre-industrial levels and described by one climate scientist as "absolutely gobsmackingly bananas".[1] In Canada, wildfires burnt an area bigger than England and Wales, and flooding killed thousands of people in Libya.[2] Shipping capacity in the Panama Canal was reduced due to drought, pushing global trade through other often less secure and more costly routes.[3]

In the UK, the last decade was the warmest on record, with the annual average temperature from 2013 to 2022 rising by around 0.75C above the average of the 1981–2000 period, consistent with a long-term warming trend since the 1980s.[4] Last year was the UK's second hottest year on record,[5] while the year before saw temperatures of 40C for the first time. That year also saw the UK record more than 4,500 heat-related deaths, its highest annual number of wildfires, and experience disruption to power infrastructure; Storm Eunice was the most damaging storm to hit England and Wales since 2014, with 1.4 million properties left without power.[6,7]

And the year before that, 2021, Storm Arwen left more than one million people without power, resulting in around £44 million in compensation payments from energy companies and causing approximately £250-300m in insurance losses. Floods, too, have become a serious problem: the economic losses from flooding in England even just between November 2019 and March 2020 were estimated at around £333m – and would have been larger without flood defences.[8]

Figure 1 **UK annual temperature (relative to 1981–2000 average), 1884–2022**



Source: Institute for Government analysis of Climate Change Committee, Progress in adapting to climate change – 2023 Report to Parliament – Charts and data, 2023. Notes: Trend calculated using LOESS (locally estimated scatterplot smoothing).

Mitigation attempts – like net zero by 2050 – aim to minimise climate change. But climate change over the next few years is already unavoidable and the impacts of those changes will be felt whether the world reaches 'net zero' (or other related targets) or not.

Hitting net zero is vital for avoiding more extreme impacts later in the century – benefits of emission reductions are only expected to be seen after 2040[9] – but it will not remove the requirement to deal with climate impacts in the near term. This is where adaptation comes in.

What does adaptation mean in the context of the UK?

The impacts of climate change over the medium term depend on how successful mitigation efforts are, but could be significant – and under high-warming scenarios could be much more severe. Other countries will be more severely affected, but climate change is still likely to be a serious challenge for the UK in many areas. It has the potential for direct and indirect impacts including sea-level rise, flooding, extreme heat, disruptions to food supply, water security, transport, increased migration and health impacts, among others.[10,11]

Hotter summers and more frequent heatwaves will mean that buildings need to be retrofitted to keep them comfortable and prevent heat-related illness and deaths. Recent research suggested that the UK will see one of the world's most dramatic relative increases in days with uncomfortably hot temperatures.[12] Examples of the type of retrofit measures that might be required include improving ventilation and adding passive cooling measures like shutters, or in some cases air conditioning, although that increases power consumption and strain on the electricity grid.[13]

The UK Health Security Agency (UKHSA) estimates that heat-related deaths under a high-warming scenario without additional adaptation could increase from around 1,602 deaths per year in 2007–18 to 10,889 in the 2050s.[14] Infectious diseases like dengue fever and West Nile virus that require higher temperatures could also become transmissible in London and other areas.[15]

Infrastructure will need to be upgraded to ensure it can function well under future weather extremes; for example, to ensure that the power system and railway lines can stand up to higher temperatures. Floods are projected to become more frequent, with buildings, health care facilities, transport lines and schools at increasing risk of flooding.[16] New infrastructure and natural flood management programmes will be needed to protect against flooding and difficult decisions will have to be made in coastal areas about whether to fund costly flood barriers or relocate communities.

The UK is highly reliant on imports and the proportion of foods that come from climate-vulnerable countries is increasing; extreme weather in Spain and Morocco in 2023 led to empty shelves in supermarkets.[17] This means action could be required to create more resilient food supply chains; for example, by supporting domestic food production and taking climate change into account in trade policy.[18,19] Low-income

households at risk of food insecurity might also require additional support. The governor of the Bank of England has pointed out that climate change is increasing the risk of poor harvests with potential impacts on domestic food price inflation.[20]

While we have a reasonably clear idea of the changes likely in the near future, there is still the possibility of more extreme impacts, as environmental changes could interact and cascade in unexpected ways. One example is a shutdown or excessive slowdown in the Atlantic meridional overturning circulation (AMOC), which could lead to plummeting temperatures in the northern hemisphere, with potentially severe impacts for UK food production and requiring far greater changes to agricultural practices and critical infrastructure.[21,22]

Adaptation requires significant investment, but failing to adapt will cost far more

Even if warming is kept to the lower end of the possible scenarios and more extreme impacts do not materialise, the UK will still experience significant and costly impacts unless action is taken. The valuation report attached to the Third Climate Change Risk Assessment (CCRA3) – the Climate Change Committee's (CCC) advisory report to the government ahead of the NAP process – estimates that economic damages for eight of the risks identified by the CCC could exceed £1 billion per year.[23] The government's third National Adaptation Programme (NAP3) estimates that the impacts of climate change could cost England's economy between 1% and 1.5% of GDP by 2045. NAP3 also says that disruption from climate change has the potential to reduce government revenues, damage infrastructure and reduce economic growth.[24]

One near-term cost for the public of failing to adapt is likely to be rising insurance premiums, while the government could be forced to intervene in the insurance market, as it already does through Flood Re (publicly backed flood reinsurance) and Pool Re (for terror attacks), if significant numbers are unable to insure their homes.[25,26,27,28,29] The July 2021 London floods resulted in £281m in insurance losses.[30]

It is difficult to estimate the costs of adaptation exactly because future climate changes and the effectiveness of adaptation actions are uncertain. The National Audit Office (NAO) has also criticised the government for its failure to set out a vision of what a well-adapted UK would look like or what level of risk it is prepared to accept, making it hard to identify the desired goal of adaptation.[31]

But required investment will be significant. Estimates from the Environment Agency suggest that overall investment of around £1bn per year will be needed to prepare for a probable range of flood hazards. The National Infrastructure Commission estimates that around £0.7bn per year will be needed to build resilience to a 1-in-500-year drought event. Similarly, around £3bn per year might be required this decade to protect and restore biodiversity; for example, by protecting and restoring peatland, forests and other natural habitats, linking them to create wildlife corridors, and improving the health of waterways.[32]

Figure 2 **Estimates of climate adaptation investment over next decade**

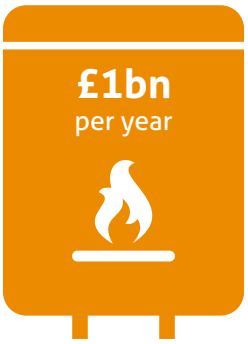
Flood protection

Estimates from the Environment Agency indicate overall investment flows of around **£1 billion per year** will be needed to ensure that the UK is prepared for a probable range of flood hazards decade to protect and restore biodiversity and make it more resilient to future climate change impacts.

Public water system

Estimates from the National Infrastructure Commission suggest that investment in the order of **£0.7 billion per year** will be needed to build resilience to a 1-in-500-year drought event accounting for both future climate change and population growth.

Housing retrofit



Estimates from the Climate Change Committee suggest investment needs could be on the order of **£1 billion per year** this decade to reduce overheating risks. Additional investment will be needed for property level flood resilience.

Nature restoration

Available estimates suggest around **£3 billion per year** of investment might be required this decade to protect and restore biodiversity and make it more resilient to future climate change impacts.

Overall

The Climate Change Committee suggests that it is plausible that additional investment in the order of **£10 billion per year** may be needed this decade to improve the UK's preparedness for climate change.

Source: Institute for Government analysis of Climate Change Committee, *Investment for a well-adapted UK*, January 2023, www.theccc.org.uk/publication/investment-for-a-well-adapted-uk

If climate change impacts are not taken into account for decisions that have long-term effects, such as new housing or infrastructure, there are likely to be costly remedial actions in the future.[33] For example, the CCC estimated that the cost of retrofitting housing to cope with overheating could be in the order of £1bn per year this decade – every new house that is built without taking into account future climate risks could add to that total.[34] Overall, the CCC suggests that additional investment in the order of £10bn per year may be needed this decade to improve the UK's preparedness for climate change.[35]

Not all of this investment will be public, but a large percentage of the costs of failing to prepare could fall on the state, making many strategic investments in adaptation good value for money.[36] Early adaptation actions can help reduce future costs – a report on the monetary valuation of risks and opportunities for CCRA3 found that for a range of early interventions cost-benefit rates generally ranged from 2:1 to 10:1.[37,38] The government's resilience framework noted that "every £1 spent advising on flood risk matters in spatial planning applications" had "saved £12 in future flood damages".[39]

The UK is not prepared for a changing climate

The 2022 Climate Change Risk Assessment (CCRA) stated that the UK government accepted that its actions had "not been sufficient in meeting the increasing risks from climate change", but that it had "been working at pace to mainstream adaptation to climate change in policy planning across government".[40] NAP3 highlighted various government initiatives including: reviewing infrastructure regulation; updating building regulations to reduce excess heat in new residential buildings; a framework to support the development of nature markets – where buyers purchase ecosystem services like tree planting, generally to meet regulatory requirements from government; local nature recovery strategies, to take account of climate trends and hazards affecting local areas; plans for overheating in schools and hospitals; and updates to the National Planning Policy Framework (NPPF). There is currently funding of £5.2bn for flood and coastal schemes, £2.2bn for water quality and resilient supply, £750m for the Nature for Climate Fund, £80m for the Green Recovery Challenge Fund, and a £15m joint research initiative led by Defra and UK Research and Innovation.[41]

Specific agencies and non-departmental public bodies (NDPBs) have also started their own initiatives, including, for example, the UKHSA Adverse Weather and Health Plan, which aims to make the health system better adapted to extreme weather events, as well as the Met Office pilot, the Local Authority Climate Service, to help local authorities plan adaptation actions.[42,43]

However, despite all these initiatives the CCC's 2023 report on adaptation progress found that the UK was not adequately prepared, with "very limited evidence of the implementation of adaptation at the scale needed to fully prepare for climate risks facing the UK". It stated that the current approach is not leading to delivery on the ground and that significant policy gaps remained. It found that no sectors are currently well adapted to the risks of climate change and that significant opportunities to embed adaptation within critical policy areas had been missed or key policies delayed, describing a "lack of urgency" from the government over recent years.[44]

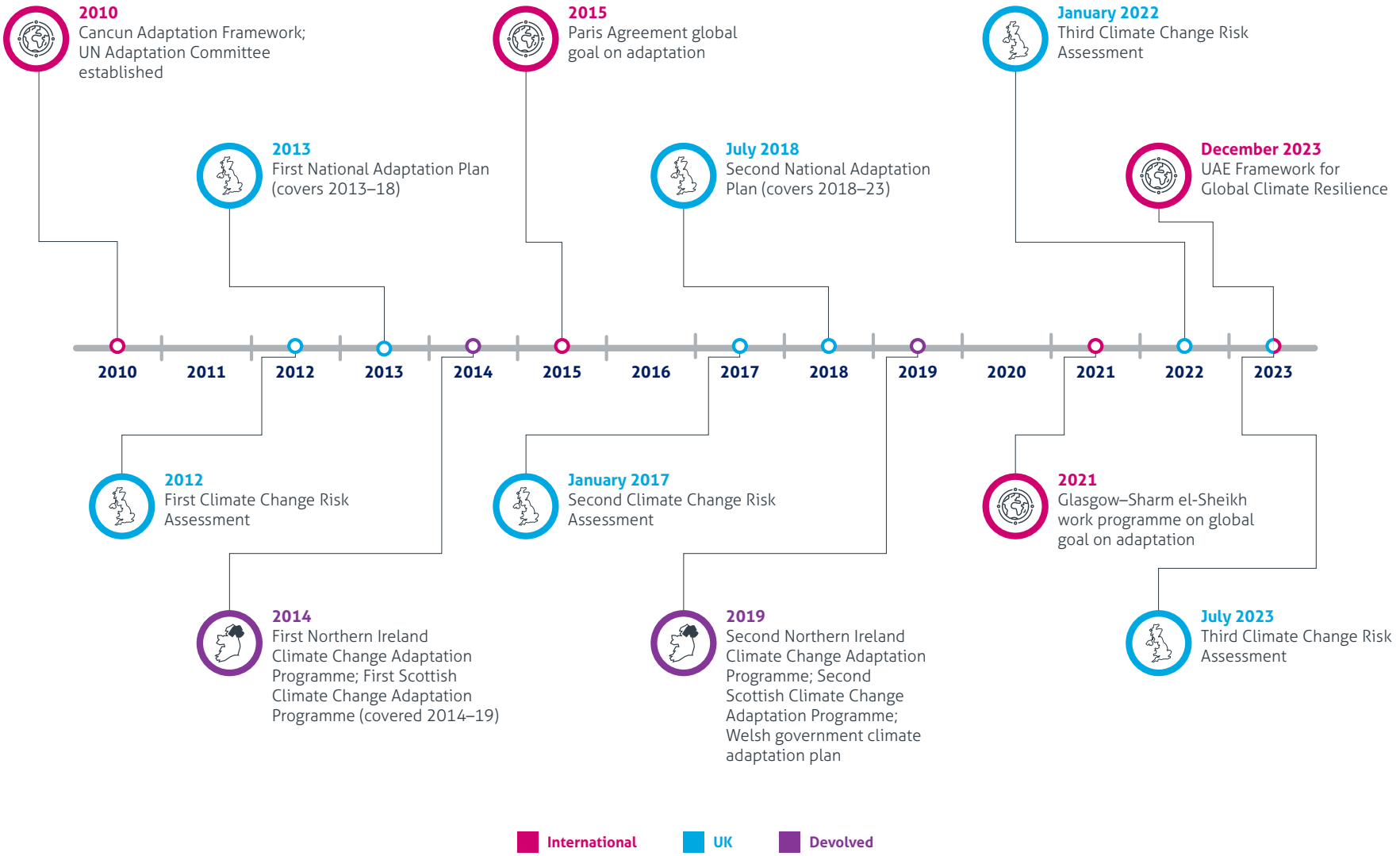
Some of the examples the report gives are particularly damning. New housing developments are still being built in areas at future risk of flooding.[45] And UK housing is poorly prepared for hotter temperatures, with research for the CCC suggesting that there is already risk of overheating in parts of the UK domestic housing stock.[46] Although the CCC welcomed the update to building regulations putting in place standards for overheating, it found a lack of policy to address overheating in existing homes and buildings.[47] The need for action on building regulations, and on coping with heat more generally, was reinforced by the Environment Audit Committee (EAC) in its recent study on heat resilience and sustainable cooling. It said that although NAP3 was an improvement on its predecessors, it "does not demonstrate sufficient urgency or ambition with regards to heat resilience measures".[48]

Recent weather events have highlighted vulnerabilities in critical infrastructure, such as when power outages caused by Storm Arwen in November 2021 left some people without access to land lines (having been upgraded to digital-only connectivity) and unable to contact the emergency services, or when a problem with railway drainage almost caused a National Blood and Transplant centre in Bristol to flood.[49] Much of the UK's infrastructure is already ageing and will struggle to deal with climate impacts – the railway system, much of which was originally built in the Victorian era, is already struggling to deal with increasingly severe weather.[50,51,52]

In some areas, like water supply, the CCC found credible plans but delivery and implementation of those plans falling short. Similarly, it found plans for flood defences and improved flood risk mapping were credible but that maintaining defences and managing risk from surface water flooding would require further funding. Other areas like the health system were also highlighted as needing further planning and action.[53]

In evidence to the EAC, Baroness Brown, chair of the CCC's adaptation sub-committee, stated that NAP3 was the best adaptation plan so far but that it still failed to set out a clear vision for what a well-adapted UK would look like, making it difficult to measure progress. It had very few new high-value initiatives and lacked ambition, she said.[54]

Figure 3 **Timeline of climate adaptation plans, 2010–23**



Source: Institute for Government analysis of news reports.

How government approaches adaptation

The Climate Change Act 2008 requires the UK government to produce a national Climate Change Risk Assessment (CCRA) every five years, followed by the National Adaptation Programme (NAP), which sets out the actions that the UK government will take to adapt over the following five years. The third iterations of these, CCRA3 and NAP3, were published in 2023. Most policy areas relevant to climate change adaptation are devolved and Northern Ireland, Scotland and Wales also have their own plans for adaptation: NICCAP2, Northern Ireland's second Climate Change Adaptation Programme; SCCAP2, the Scottish Climate Change Adaptation Programme; and 'Prosperity for All', the Welsh government's climate adaptation plan, were all published in 2019.[55]

Defra is the lead department in the UK government on adaptation, but does not own all the relevant policy levers, with key areas, like housing, for example, sitting in other departments. Its adaptation team is also small – just 17 officials worked on NAP3, although we were told a team of approximately 20 officials under a deputy director are currently working on adaptation, with other teams on specific actions assigned to Defra.[56] Defra's lead on adaptation is a legacy from when it led on climate change as a whole – but since 2008 climate change *mitigation* has been located alongside energy policy in a succession of departments; it now is the responsibility of the Department for Energy Security and Net Zero (DESNZ).

One way of thinking about adaptation is that it increases resilience to the risks created or heightened by climate change. The Cabinet Office leads on risk and resilience in general through the resilience directorate and is currently establishing new processes for looking at chronic risks including climate change. We heard that the Cabinet Office has been more active on adaptation since the creation of the resilience directorate.

NAP3 also announced a new Climate Resilience Board to oversee cross-cutting adaptation and resilience issues. It is chaired by the Defra director of environment strategy and the Cabinet Office head of resilience, and 12 departments with relevant risks in the National Risk Register participate. But few details have been provided currently and it is unclear how often it has met so far.[57] We heard that its creation has improved adaptation governance but as it has only recently been created it will take time to assess its longer term impact.

At ministerial level adaptation "will continue to be considered, as required, by the relevant Cabinet Committees";[58] there is no specific committee on adaptation, although there are committees on resilience as well as energy, climate, and net zero. Previously the Climate Action Implementation Committee was tasked with considering building "resilience to climate impacts", but adaptation is not mentioned in the public terms of reference for the current net zero committee.[59,60]

When it comes to spending and investment the Treasury's Green Book supplementary guidance on 'Accounting for the Effects of Climate Change' and 'Enabling a Natural Capital Approach' explain how departments should account for climate and environmental factors in policy development.[61] We heard that Green Book guidance on adaptation could be improved but was generally good, but that it was largely viewed as nice but optional rather than as a real requirement to take adaptation into account.

While forecasting of risks has improved in recent years, action to prepare for those risks has fallen short. The CCC found several gaps in the current system, including a lack of consideration of cascading impacts and interdependencies in adaptation planning, the absence of "clear responsibilities and mechanisms for cross-Government collaboration", and no "consistent minimum resilience standards across sectors".[62] Some regulators, including Ofgem and Ofcom, do not have statutory climate resilience remits, and while some sectors (like water, rail and road) have climate resilience standards, other sectors do not.

A recent NAO report on the government's approach to extreme weather events pointed out that while the energy sector has specific standards on recovering power after extreme weather and resilience to floods, most of these do not set a measurable level of climate change resilience. The government has committed to new resilience standards by 2030.[63]

But, as the NAO again has noted, it has not set out an overall vision for what a resilient or well-adapted UK looks like or, for example, for flooding, heatwaves and storms specified what levels of preparedness or resilience it was targeting or what level of risk it was willing to accept. The NAO also said that the government was "yet to set out the respective roles of central government, local government, the devolved administrations, the private and voluntary sectors, and the public, leading to uncertainty on what actions to take".[64]

Few of the actions set out in NAP3 have specific targets or metrics attached. The Public Accounts Committee recently criticised the use of the "properties better protected" flood metric as not taking into account maintenance of existing defences, meaning that while the programme of investment on flood defences expects to improve protection for 200,000 properties by 2027, around 203,000 properties are currently at increased risk of flooding due to deterioration of existing flood defences.[65] The lack of effective metrics and targets makes it difficult to make informed decisions and track progress.

Successive governments have failed to give sufficient attention to adaptation

Governments have consistently focused on mitigation over adaptation, with adaptation left as the "Cinderella of climate change", as CCRA3 put it – "under-resourced, underfunded and often ignored".[66] Indeed, adaptation was not originally included in the Climate Change Act in 2008 but was inserted via a Lords amendment, though Defra officials came to view the amendment as very useful in according a degree of priority to adaptation that it otherwise would not have had.[67] All interviewees suggested that Defra struggled to have enough clout to drive progress across other departments, with actions from other departments in NAP3 often being weak.[68] Adaptation was treated as secondary to mitigation even when both were managed by the same department – and continues to struggle for prominence given Defra's complex and expanded remit following the UK leaving the EU.

There also appears to have been limited attention paid to driving adaptation at the centre at either a ministerial or official level. Siloing and a lack of co-ordinated work on interdependencies and systemic risks is an issue, and regular changes of minister at Defra and other relevant departments have not helped.[69] Richard Millar, head of adaptation at the CCC, suggested recently that previous attempts to drive co-ordination through cabinet committees had "never really cut through".[70] The Joint Committee on the National Security Strategy (JCNSS) in its inquiry into critical national infrastructure (CNI) resilience stated that it "found scant evidence of climate adaptation work being driven forward by any of the relevant Cabinet Committees, which was reflected in its apparent lack of prioritisation by the Cabinet Office and the Government more widely".[71]

The UK could learn from other countries' approaches to adaptation

Countries around the world are having to engage with increasing climate impacts and the necessity of adapting. There are numerous examples of specific adaptation projects but when it comes to the national level the lack of a strong evidence base and metrics for tracking progress make international comparisons difficult.[72] Globally, the latest UN Adaptation Gap report found that the number of countries with adaptation plans had increased but that the amount of funding being sent to developing countries for adaptation had declined by 15% from 2020 to 2021.[73] As a highly internationally integrated country and one heavily dependent on food imports, the UK will be impacted by the effects of climate change in other countries – supporting, and learning from, other countries' adaptation efforts is crucial. Box 1 highlights a few of the approaches being taken in comparable countries.

Case study: International and local government adaptation plans

The Netherlands: Delta Programme and National Climate Adaptation Strategy

The Netherlands has historically had strong incentives to focus on adaptation as a low-lying coastal country with 26% of its land below sea level and a history of flooding. Conversely, drought is also likely to be an issue as summers become drier in a country where systems are designed to dissipate water quickly. The country has two major adaptation programmes. The Delta Programme focuses on flooding protection, water security and spatial planning, and is monitored yearly and reassessed every six years. The National Climate Adaptation Strategy sets out adaptation actions for sectors and risks not covered by the Delta Programme. The most recent Delta Programme sets a goal that by 2050 everyone who lives behind a flood defence will have a probability of mortality due to flooding of no more than an average of one in 100,000 annually. It also includes a schedule for dike upgrades and tailored regional priorities, while incentives and subsidies encourage local and regional adaptation initiatives.[74,75,76]

The US: Climate action plans

The US is also seeing increasing climate impacts. Since 2021 federal agencies have been required to produce Climate Action Plans that set out the steps they will take to "integrate adaptation into their mission delivery and increase resilience to the impacts of climate change".[77,78] Also in 2021 the Office of Management and Budget was tasked with developing and publishing annual assessments of climate-related financial risk exposure and working on new methodologies to quantify climate risks within the federal government's economic assumptions. The first of these assessments was published in 2022 and the initial findings described the fiscal risk of climate change as "immense", with a reduction in GDP under current pathways of 3 to 10% by the end of the century.[79] The 2022 budget included $18bn for climate resilience and adaptation programmes.[80]

In June 2023 the US National Climate Resilience Framework set out a series of principles, priorities and objectives, including embedding climate resilience into planning and processes and mobilising capital and investment. It states that federal departments and agencies are integrating climate resilience into grants, "ensuring that investments made with taxpayer dollars lead to outcomes that are effective even as the climate changes" and sets out various adaptation activities including programmes to improve grid flexibility, funding for home improvements in climate resilience and energy efficiency, guidance to improve the climate resilience of health care facilities and investments in ecosystem restoration.[81]

Canada: National Adaptation Strategy

Canada is another country that has started to experience severe climate change impacts, with large-scale wildfires and melting permafrost. Its National Adaptation Strategy is notable for having more specific and time-bound targets than, for example, the UK's NAP3. It sets an overall vision and principles, 2050 goals, 2030 objectives, near-term targets, and immediate action plans for five areas – disaster resilience, health and well-being, nature and biodiversity, infrastructure, and economy and workers.

Action plans will be developed on five-year cycles, and the next update to the National Adaptation Strategy is expected in 2030. The strategy includes a set of indicators for tracking progress in each area, including, for example, the percentage of tree canopy cover in urban areas, the status of key fish stocks and the percentage of public and municipal organisations that factored adaptation into decision making processes for infrastructure.[82]

The strategy notes the cost-effectiveness of many adaptation measures, giving an overall figure of CA$13–15 in total benefits for every CA$1 spent on adaptation measures, while estimating that implementing climate-resilient building codes in Canada has a benefit–cost ratio of 12:1 – equivalent to a 1,100% return on investment.[83] At a household level, Canada also funds adaptation measures like flood protection through its Greener Homes Initiative, which offers grants and loans to homeowners for retrofit.[84] This offers an opportunity to future-proof retrofit and encourage adaptation measures at the same time as retrofitting to reduce friction for homeowners and potentially lower costs overall.

Australia: state-specific adaptation plans

As an example of regional actions, in Australia the New South Wales government released its climate change adaptation strategy in 2022, setting up a five-yearly cycle of risk assessments and statewide action plans, although neither have yet been published.[85] It committed among other things to appointing a climate change risk officer in each NSW government cluster to embed climate change risk and adaptation across decisions by the end of 2023. It will also update policies, processes and standards such as business case guidelines and asset management to ensure that major policy decisions "rigorously consider climate change risks, opportunities and adaptation as part of business-as-usual by the end of 2023".[86]

The AdaptNSW website includes regional climate projections for temperature and rainfall changes as well as fire risk up to 2079.[87] One interesting element of the NSW approach was that there was a period when the minister for energy and treasurer roles were combined.[88] This led to, among other things, a review of how the state's investments could promote better environmental outcomes as well as being resilient to climate risks.[89]

Ireland: city-by-city action plans
The Irish government requires cities to produce adaptation plans that include an assessment of climate risks, with several Irish cities scoring highly in a recent study of urban adaptation plans. Galway's plan, for example, included a detailed risk assessment of how climate change threatened critical infrastructure, biodiversity, water resources and community services, with a comprehensive action plan including timescales and actions assigned to specific teams.[90,91]

UK (local government): Manchester City Council's Climate Change Action Plan
In the UK, Workstream 4 of Manchester's Climate Change Action Plan (2020–25) focuses on climate adaptation. However, most of the specific actions listed focus on tree planting, only one aspect of the many adaptation actions likely to be required.[92] The Manchester Climate Ready website gives information about adaptation, the latest climate projections and initiatives taking place across the city, covering tree planting, sustainable water management and flood defences.[93]

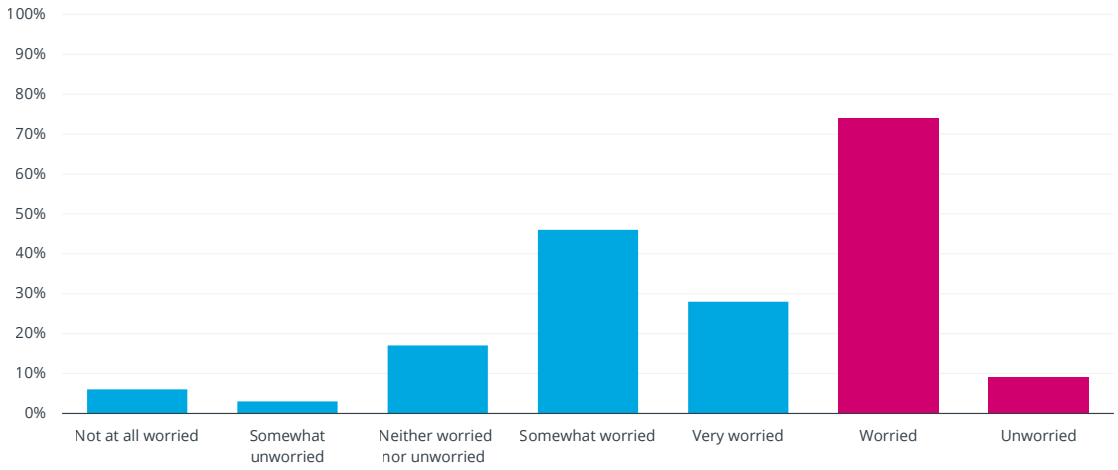
Why does government struggle to take adaptation seriously?

There is no single reason why adaptation is so neglected. Short-termism and lack of interest in prevention both characterise much of the UK government approach to public spending. Governments have long underinvested in preparedness – as exposed by the Covid inquiry – and the tightness of the fiscal situation makes it harder for politicians to justify spending to protect against future risks at the expense of current services.

Adaptation lacks the political resonance of emissions reduction in general and net zero in particular. Some who are keen to see action on mitigation think that a focus on adaptation is a way of avoiding taking steps to reduce the threat of future climate change by learning to live with it. There is no powerful lobby for adaptation and plenty of people with a vested interest in ignoring it – developers, for example, who know that building on flood plains is cheaper in the short-run. This is despite the fact that surveys suggest the public is concerned about the impacts of climate change (see Figure 4).[94]

Adaptation is often less attractive to private investors than net zero, meaning more public investment is needed – to date only 9% of flood defence investment has come from the private sector.[95] The benefits from adaptation are often widely distributed and difficult to quantify, making them hard to monetise and creating difficulties when it comes to raising capital for investment. The lack of clarity around government plans for adaptation is another barrier to private investment.[96] One challenge for government is whether it can find ways to create new markets to incentivise greater private investment in adaptation.

Figure 4 **Worries about the impact of climate change, 2022**



Source: Institute for Government analysis of Office for National Statistics, Worries about climate change, Great Britain: September to October 2022. Notes: Question – 'How worried or unworried are you about the impact of climate change?', sample size – 4,200.

There is insufficient evidence on what offers the best return on investments in adaptation – and many of the benefits will fall to private sector actors rather than to government. The economics of adaptation is less well researched and less well evidenced than on mitigation.[97,98] A search on the government's areas of research interest database shows that Defra dominates commissions specifically on adaptation, but that a wider range of departments are interested in research on understanding climate change impacts in their areas of responsibility.[99]

Adaptation is hard to distil into an easily communicated or measured target like greenhouse gas emissions. Attempts to set a target for adaptation as part of the climate change public service agreement (PSA)* towards the end of the New Labour government showed that it was very difficult to capture in a simple metric.[100] This reflects the fact that adaptation requires multiple changes with starkly differing lead times reflecting the complexity of climate impacts.

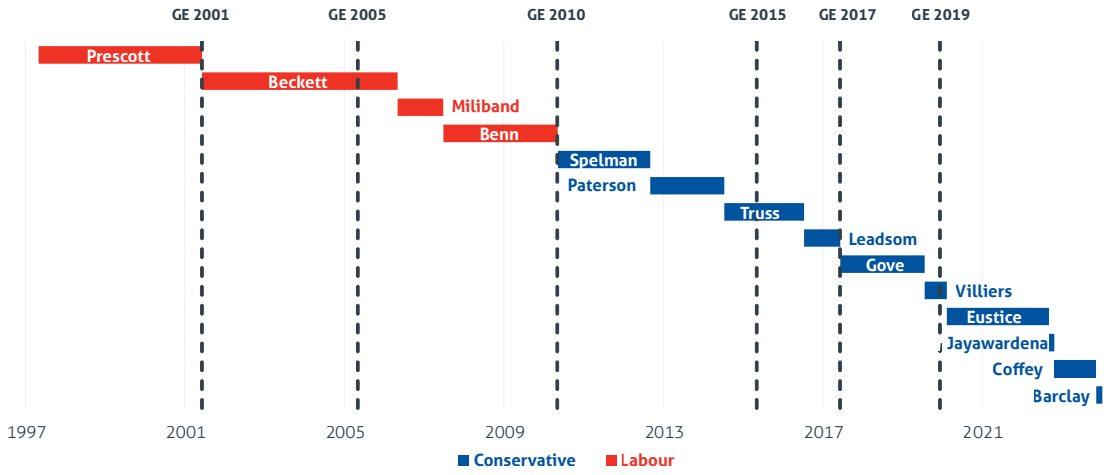
Although the 2016 Paris Agreement includes adaptation, it has not created external pressure for action on adaptation as effectively as it has on greenhouse gas emissions reduction. Adaptation is a regular focus at COP meetings, but the priority has generally been to mobilise finance to help adaptation in the most affected developing countries rather than to focus on progress in developed countries.

Flooding is one area in which adaptation actions have been more successful – perhaps because it is an area led by Defra and floods are highly visible and widely reported climate impacts (unlike heatwaves, despite the deaths from heatwaves being far larger). However, even when it comes to flooding the NAO has raised concerns about how the latest round of flood investment has been managed.[101]

* These were agreements between the Treasury and departments on key outcomes agreed as part of Comprehensive Spending Reviews. They were introduced in the first New Labour CSA and discontinued by the Coalition government.

Within government, the fact that adaptation is championed by Defra can send the message that adaptation is centred around flood management. Defra is not well placed to promote a cross-government agenda as a less high-profile government department and it has one of the most complicated post-Brexit agendas to navigate. The high pace of turnover in Defra ministers in recent years is also a challenge in building cross-government activity (see Figure 5).[102] And so far, cross-government mechanisms have not managed to raise the priority attached to adaptation by government at any level.

Figure 5 **Timeline of secretaries of state for environment, May 1997 to January 2024**



Source: Institute for Government analysis of IfG ministers database.

The cross-government PSA from the last Labour spending review has not been replaced. Adaptation (as opposed to net zero) did not rate a mention in the government's priority outcomes from the 2021 spending review and only two departments mention adaptation explicitly as public objectives – Defra, in the context of flood management and coastal erosion, and the Foreign, Commonwealth and Development Office (FCDO), which has a development metric of 'Number of people supported to better adapt to the effects of climate change as a result of ICF [International Climate Finance]'. Meanwhile, the Labour missions for government set out in 2023 by Keir Starmer have the goal of making the UK a "clean energy superpower" (now rephrased to "switch on Great British energy") and thus accelerating to net zero, but again make no mention of adaptation.[103]

What could government do better?

There is widespread agreement among people who are concerned about climate impacts that the government needs to take adaptation more seriously – and considerable concern that Defra lacks the cross-government clout needed to get other parts of government to do so. Various options have been put forward for how this might be achieved. In this section we look more closely at these options.

We look at two possible approaches: the first addresses 'where' adaptation sits in government; the second, how adaptation can be embedded more strongly into cross-government processes. These are not mutually exclusive.

Machinery of government changes: there are several other departments that could lead on adaptation

Defra is perceived to lack the clout to make other government departments take climate change adaptation seriously. Many see the solution being to move responsibility away from Defra. The government has already tried to strengthen arrangements within existing structures with the creation of the Climate Resilience Board at director level in government – chaired jointly by Defra and the Cabinet Office. It is too early to say whether that will make a significant difference.

1. Make DESNZ a department for both climate change mitigation and adaptation

The first option would be to convert the Department for Energy Security and Net Zero (DESNZ) into a genuine energy and climate change department (its name from 2008–16) giving it responsibility for both mitigation and adaptation. Both require cross-government working, and 'owning' adaptation as well as mitigation would make clear the costs of failing to tackle climate change and provide the department with a compelling narrative on the case for action.

Many of the actions required to deliver net zero will also need to be future-proofed – energy infrastructure needs to be resilient to flooding and cope with changing demand as weather patterns change; buildings need both to have their heating decarbonised and be made more energy efficient but also to be able to cope with higher summer temperatures and intense rainfall. Similarly, there is scope to combine some mitigation and adaptation actions – for example, retrofitting to reduce emissions and also prepare housing for a changing climate – to minimise costs and disruption and use workforce and supply chains most efficiently.[104]

But although there are some synergies with the DESNZ brief, the fit is in many ways no better than with Defra's. This would recreate the problem of leaving a cross-government agenda with a line department with a big agenda of its own – and one which crucially owned very few of the levers to make change happen. Any secretary of state would be likely to prioritise energy policy and net zero over adaptation so this change would be likely simply to replicate many of the reasons why Defra is failing to drive adaptation. This option would only work if there was a very clear commitment from the DESNZ secretary of state to take adaptation as seriously as mitigation.

2. Make adaptation a core task of the Cabinet Office resilience directorate

The second option is to give responsibility for adaptation to the existing Cabinet Office resilience directorate.[105] Adaptation is in many senses as much a resilience as a climate change problem and will require monitoring and contingency plans.[106] Foresight scenarios and risk monitoring are currently led by the Cabinet Office and will be key to effective adaptation.

However, the resilience directorate is a small team with responsibility for wide-ranging resilience and preparedness functions – co-ordinating adaptation actions as well might be unrealistic and draw attention away from other critical issues. Adding the capacity to lead on adaptation to the Cabinet Office would also in practice likely mean duplicating some of the expertise currently held in Defra.

The resilience directorate is already starting to work more actively with Defra on adaptation through the Climate Resilience Board. Rather than taking on primary responsibility for adaptation, Cabinet Office more widely could even more actively support and reinforce Defra in its attempts to ensure other departments are delivering adaptation actions and integrating it effectively into departmental plans and priorities.

3. Give the Treasury the lead on adaptation and climate resilience

The Treasury controls many of the key levers necessary to take action on adaptation – and in particular it is well placed to ensure that the government is not spending in ways that are likely to require expensive retrofitting to cope with climate change. Much of adaptation is about ensuring that the government takes a sensible view of future risk and is ensuring long-run value for money. That should be core to the Treasury mindset and no department is better placed to ensure that happens.

Unfortunately, however, that is not the revealed preference of the Treasury under successive administrations. A routine criticism of the Treasury is that it is too short-termist and does not prioritise spend to save or indeed prevention generally – and adaptation to ensure climate resilience is the ultimate spend to save programme. As our recent report also emphasised the Treasury responds to political signalling from its ministers[107] – and Treasury ministers have not seen adaptation as a political priority.

Unless and until that mentality changes at both top official and ministerial level at the Treasury this would not make government take adaptation more seriously – indeed it might mean the loss of the existing adaptation advocate in the shape of the Defra secretary of state (weak and marginalised though they are) at the cabinet table.

Moreover, infrastructure spending is one important dimension of the need for adaptation action. While the Treasury does have leverage over public sector or publicly financed building, it does not have the levers that impact building in the private sector – whether building regulation or planning. Nor does it have any direct link with local government, which needs to lead on local resilience.

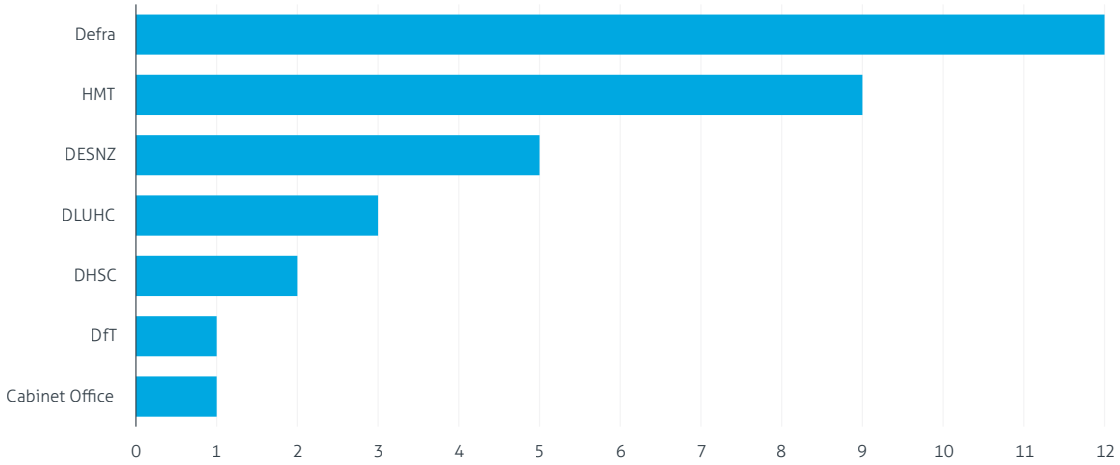
4. Enhance the role of the Department for Levelling Up, Housing and Communities – and, through it, local government

DLUHC has direct responsibility for local resilience forums, the front-line responders to many climate impacts, and owns two of the most critical levers that affect the resilience of the built environment in the future – planning and building regulations. Climate impacts will be geographically specific even within the UK and there may be some difficult choices to be made, making local authorities crucial in determining appropriate adaptation measures and engaging with local communities. They will need support from central government to do that.

Local adaptation has so far been ad hoc, with limited capabilities and resources.[108] This is a major barrier to effective adaptation – as the lead department for local government and housing, DLUHC has a key role.

This does not mean that DLUHC is the right department to lead overall on adaptation – as with DESNZ, it is not clear that adaptation would necessarily be far enough up the departmental list of priorities, or that it would have significantly more clout than Defra when it came to driving action from other departments. But it does mean that it has a potentially vital role to play in ensuring that good local plans are in place and that building now avoids the need for future protection or retrofitting to withstand the impacts of future climate change.

Figure 6 **Responsibility for CCC progress report recommendations referencing adaptation, 2023**



Source: Institute for Government analysis of Climate Change Committee, Progress in adapting to climate change – 2023 Report to Parliament, 2023.

5. Leave responsibility in Defra but look at ways of giving it more cross-government clout

As set out above, there is no magical machinery of government change that will solve the problem of lack of attention to adaptation. The lack of an obvious alternative may point to leaving the formal lead with Defra. But the current arrangements have not worked well enough, so if that decision were made then it is essential to put in place arrangements to give Defra more clout with other key departments and to enhance the role of the Treasury in adaptation – particularly in ensuring that capital spend presents long-run value for money. We look at how this could be achieved below.

There may be a case for a cross-cutting adaptation minister

The interim review of London's resilience commissioned by the London mayor, Sadiq Khan, proposed that there should be a minister in the Cabinet Office charged with resilience and adaptation.[109] Similarly, the EAC's recent report makes the case for a "heat resilience minister", though without making clear where that post should sit in government.[110]

A Cabinet Office minister makes sense if the lead responsibility lies with the Cabinet Office but, as we argue above, the case for that is not clear cut, and there is always a risk that an issue that is not a prime ministerial priority becomes orphaned in the Cabinet Office. In any case it is clear that several departments have key roles to play.

At times prime ministers have been keen on ministers who serve in more than one department to 'join up' key issues, while at other points it has fallen out of fashion. When mitigation and adaptation were first separated in 2008 a Lords minister, Lord Hunt of Kings Heath, became the junior Defra/DECC minister with responsibility for both mitigation and adaptation.[111]

While Defra officials appreciated having someone who could keep them in touch with the new department to whom they had lost responsibility, Hunt himself was clear that the arrangement did not work. As well as the many logistical challenges, he felt that

> **"departments don't really work together so even if you have a joint minister, what effectively you are is a minister in one department and then a minister in another department and there isn't, I think, a mechanism whereby you are treated differently because you straddle both".**

In his view cross-cutting public service agreements were a much more effective mechanism to get departments working together.[112]

But not all cross-cutting ministers have bad experiences. Some have argued that where there were real synergies in the agenda it helped. It is possible to imagine that a minister in Defra and DLUHC, with a direct relationship as well with the Treasury, DESNZ and Cabinet Office, could act as a useful focal point to bring together adaptation if that was their sole focus. One of the advantages of having a cross-cutting minister is that it is a way of breaking out of the 'silo mentality' that characterises much of central government.[113] So having a cross-cutting minister could help – but that cannot be taken for granted and on its own is not a panacea.

There could be a joint unit to support adaptation

Government has in the past used joint units to encourage cross-government working – recent examples include the joint Department for Transport (DfT)/DESNZ (formerly BEIS) Office for Zero Emissions Vehicles, designed to manage the transition to electric vehicles and the roll-out of the charging network. An early example, before the creation of a freestanding climate change department, was the Office of Climate Change, which was housed within Defra (then the lead department) but had cross-departmental governance and a degree of cross-departmental funding.

A shared unit could be used to lead on adaptation planning and delivery, reporting to an adaptation minister. But unless that minister were very senior, their ability to force reluctant departments to prioritise adaptation would be limited.

The new unit – or another body – could help build capability on adaptation

That unit could have a significant role in capability and capacity building inside government – but also work with local government to help develop local plans. But it may be that that function sits best outside government itself. The government could task and resource the CCC to do this – though it would require a significant increase in capacity and would present problems when it comes to its core independent assessment role. An alternative would be to establish a unit outside both government and the CCC to do this or ask the UK Infrastructure Bank, which already has a function advising local government on net zero. But for that capability to be in demand, wherever it sits, departments have to be incentivised to take adaptation seriously. And that is where the Treasury and its financial management mechanisms have a vital role to play.

The government should seek to embed adaptation and resilience in core financial control mechanisms

There is already an annex dealing with adaptation and resilience in the Treasury's Green Book, which sets out the approach departments should take to project appraisal. But awareness of how to assess adaptation risks properly is patchy, and cash-strapped departments may choose to take lower-cost options now even at the risk of incurring future expenditure. Use of the Green Book guidance is seen as a 'nice to have' rather than essential.

At the moment much of the focus of adaptation will be on capital spending. Large projects that find their way into the major projects portfolio have to go through a specific gateway review process before they get the go-ahead. As part of this they are asked whether the project is compliant with and will contribute to climate resilience.[114] That could provide an opportunity to ensure that all major investment projects have anticipated the need for future adaptation to relevant climate risks and are resilient enough to ensure they represent value for money. However, we heard that the extent to which these questions are asked and answered in gateway reviews is mixed in practice.

There is clearly a case for looking at other mechanisms to bolster these underused processes. Every department (and public body) has an accounting officer who is personally accountable for ensuring that public money is spent in a way that ensures value for money and can be held to account for that by the Public Accounts Committee. The Treasury sets out the duties of accounting officers in its 'Managing Public Money' guidance, supplemented by 'Dear Accounting Officer' letters.[115,116]

The Treasury could make clear through these documents that ensuring that future spending was value for money after taking account of potential climate change impacts was a core part of accounting officer responsibilities. That should force internal discipline – and open the possibility of parliamentary scrutiny via the NAO. This would also apply to the accounting officers for key arm's-length bodies such

as Highways England. It would be a mechanism for ensuring that departmental management boards were alerted to the key adaptation issues for their departments – and could prompt some to undertake a more in-depth audit of what they need to know.

Adaptation should be a cross-cutting theme in the next spending review

There is no point in producing plans for adaptation if they are not adequately funded. Spending reviews offer an opportunity to prompt departments to consider adaptation and this could be encouraged through updated spending review guidance, in the same way that bids are asked for assessments of climate and environmental impacts. However, this requires departments to have the capacity and capability to make those assessments and departments will still have to prioritise adaptation in bids against other pressures, so this approach is not clear-cut.

There is, however, a strong case for ensuring that the National Adaptation Plan is properly aligned with the timings and outcomes of the next spending review, which will come after the upcoming general election, so that it does not contain actions that departments then lack the resources to fund. A multi-year spending review is clearly the best time to look at adaptation funding, which only works on a long-term basis.

Adaptation also needs to be taken into account when designing regulations

Labour has said that it wants to apply a "net zero and nature test" to all policy proposals and that every department "must be a climate and nature department". But both that, and the 'mission' around clean energy, omit any mention of adaptation.[117]

At the moment any proposal for new regulation has to contain an assessment of its impact on greenhouse gas emissions. It would be easy to add a requirement to say whether the proposal was also robust against likely future climate change scenarios. That at least would serve as a prompt to consider those implications.

Previous Institute for Government research looked at the possibility of applying a 'net zero test' of the sort now proposed by Labour to all major policy proposals but warned that – as with other 'tests' – this risked simply provoking 'gaming' by ministers and civil servants determined to see their policy idea through.[118] Nonetheless, if such a test is developed, it should include adaptation – not least because in so many areas mitigation and adaptation are bound together and in others – building regulations, for example – it is possible that measures that reduce emissions such as increasing air tightness, may actually make it harder to withstand future climate impacts.

Auditable metrics of risk reduction need to be part of any future adaptation plan

The UK has had explicit emissions reduction targets since the 1990s. In 2019 parliament approved the government's proposal to put into law a target that the UK would be a net zero greenhouse gas emitter. In 2020 we were told by government officials that – even though the government had a legally binding target before – the commitment to net zero had a "galvanising effect".[119]

The path to net zero is underpinned by a series of five-year carbon budgets. These are agreed by government, but recommended by the CCC. There is also an international process of submitting and reporting against shorter term targets (currently for 2030) that was initiated by the agreement at COP21 in Paris.

Emissions reductions are a (relatively) easy metric to track. One of the advantages is that – like money – they can be reduced to a single number. Adaptation has always suffered from the lack of any comparable compelling metric. Early on, the key focus in government was on 'raising awareness' of climate risks and ensuring that departments and, in particular, local government had plans to cope. But as successive assessments by the CCC have shown, that has not been enough to drive action.

The CCC assesses progress through a comprehensive monitoring framework that looks both at progress on tangible outcomes but also whether the right steps are being taken to deliver in the longer term.[120] It notes that none of the governments of the UK has set out a clear vision of what a well-adapted UK looks like. A further complexity compared to GHG emissions is that adaptation is very location-specific, which means that progress in some areas could still leave vulnerable people, or less prepared places, exposed to unacceptable risks.

The CCC has committed to improve the monitoring framework in the period to 2026, when it will advise on the next Climate Change Risk Assessment. It wants to increase the number of quantitative indicators to provide more concrete measures of progress. Other governments, like Canada and Germany, for example, are also exploring metrics. Since the aim of adaptation is to reduce future risks to manageable proportions, the best metrics (at whatever is the appropriate spatial level) would be measures that focus on risk containment or risk reduction, with a transparent calculation lying underneath the measure of what actions had been taken or would be taken to reduce the risk.

NAP3 commits to the development of indicators of both what it terms impacts as well as outcomes.[121] Those indicators should enable governments, parliament and the public to monitor whether government action is helping to reduce future risk to acceptable levels. They need to be in place in time for the 2025 progress report – otherwise they will have little impact before the end of the decade and the next NAP. Ideally these metrics would be developed jointly by the governments of the UK, Scotland, Wales and Northern Ireland, who all are grappling with similar risks and face similar data challenges.

Parliament should scrutinise departmental activity on adaptation properly

Over the past few years parliament has started to scrutinise departmental activity on net zero more closely. The Environment Audit Committee has played an important convening role, inviting chairs of other select committees to attend (a practice that has become much more common in recent years). Meanwhile, the NAO and the Public Accounts Committee have been focusing more on government's management of risks and its preparedness for contingencies. The NAO has looked at resilience to extreme weather and flooding, as well as preparedness for the pandemic.[122,123,124]

In recent years, the EAC has looked at heat resilience and the impact of climate change on food security, while the Joint Committee on the National Security Strategy (JNCSS) has examined how well adapted critical national infrastructure (CNI) sectors are, and the Science and Technology Committee is currently investigating CNI cyber resilience.[125,126,127] The Environment, Food and Rural Affairs Committee (EFRA) looked at adaptation and flooding in 2019 and the EAC looked at heatwaves in 2018.[128,129]

However, the last examination of adaptation as a whole was by the EAC in 2015.[130] Adaptation to climate change should feature on the agenda of the first Liaison Committee (the committee drawn from chairs of all the Commons select committees) session with the prime minister after the publication of the latest CCC assessment .

Although scrutiny of adaptation would – as a Defra lead issue – logically fall to EFRA, so many of the actions required lie in other departments. It was confirmed that the EAC would look at policy and the PAC would follow up on value for money. In the Lords the lead would fall (in the current committee structure) to the Environment and Climate Change Committee. But it would be good if individual departmental select committees also looked at the approaches departments were taking in their regular sessions on the 'work of the department' or have dedicated adaptation sessions a couple of times a parliamentary session, linked to the CCC's assessment of progress.

Conclusion

Reaching net zero looks set to remain a preoccupation of governments, with big cross-government efforts pursued to transform the economy to achieve it. But however successful and rapid that change is, in the near to medium term climate change will increasingly affect day-to-day life, disrupting livelihoods and imposing costs on the economy and society. This is where adaptation comes in.

Governments have been promising to take adaptation seriously for years. In the immediate aftermath of floods or heatwaves there is often a renewed impetus to take action, and new investment. But consistent planning and policy have been lacking, harming adaptation efforts.

Climate change impacts should no longer be regarded as a possible future contingency but as a near inevitability that needs to be factored into all future plans. Our research suggests the quickest way to move adaptation up the agenda would be for the Treasury to build it into its core financial mechanisms – to recognise that future spend that does not take adequate account of future climate change is quite simply poor value for money.

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