

Making resilience count: The economic value of climate readiness

September 2026

The UK has just experienced one of its hottest ever summers. Records broken include the hottest June day in the UK and the driest July in England and Wales, leaving many regions in drought and causing exceptional wildfires. In a sign of greater extremes, this summer of intense heat followed an exceptionally wet autumn and winter.¹

These events are becoming more commonplace and are expected to worsen in the decades ahead. Despite the growing and visible impact of climate change on people's health and well-being, economic productivity and the natural world, investment in adapting to those changes to manage and minimise their impact remains well below the levels required.

In part, that underinvestment is a symptom of the fracturing of the political consensus around the response to climate change, both in the UK and elsewhere.

Why underinvestment in infrastructure resilience matters

In our 2023 paper *How can the UK's infrastructure system be made more climate resilient?*, the ICE recommended the UK government should undertake a national review of the economics of adaptation to help close the investment gap.² One of the barriers to prioritising investment in climate resilience and adaptation is that the actions required often do not have a market value – they are not measured or rewarded commensurate with their value.

Infrastructure systems present a huge opportunity to create a more climate-resilient future. They are where adaptation value can most clearly be demonstrated because the services resilient infrastructure enables create economy-wide benefits. The failure to quantify the value of infrastructure adaptations means investment decisions are not well informed. The resulting underinvestment means critical systems are not as resilient as they could or need to be, with more assets failing or at growing risk of doing so. Engineers are increasingly required to make difficult decisions about restrictions or closures that affect key services on which people and businesses depend.

An economic review of infrastructure climate resilience and adaptation

The ICE policy programme has explored how an economic review should be undertaken and what issues it should examine to embed climate resilience and adaptation into government decision-making, including strategic planning and spending priorities. Its findings draw on a literature review, and interviews and submissions from ICE members and other expert stakeholders. Our work was also supported by the economics consultancy Frontier Economics.

Despite significant progress being made in understanding the risks arising from climate change, and the possible solutions, since the ICE's 2023 paper, action remains lacking. The need to strengthen the economic case for timely, long-term investment in climate readiness is urgent. This paper makes the following recommendations:

¹ Met Office (2026) [Deep dive: July's remarkable weather and what comes next](#); Met Office (2026) [Warmest UK summer on record 'increasingly likely' as temperatures stay well above average](#)

² ICE (2023) [How can the UK's infrastructure system be made more climate resilient?](#)

- **The government should commission a review of the economic value of climate adaptation and resilience.** This would focus the debate around economic choices and value created to address the systemic undervaluing of climate readiness in investment and regulatory decisions.
- **The review should adopt a whole-system, cross-sector approach and cover multiple timescales.** Infrastructure is an interdependent system of systems. Understanding the interdependencies and the potential for cascading risks between sectors will improve the economic case for adaptation and resilience. Delivering adaptation and resilience depends on coherent frameworks across all sectors and levels of government.
- **The review should map who owns relevant datasets, how accessible they are and what would be required to make them useful for resilience planning.** While a lot of data already exists, much of it is fragmented across multiple bodies and there are gaps in understanding climate impacts and interdependencies. Data users need the skills and tools to apply data effectively in decision-making.
- **The review should explore innovative methods to assess the value of climate adaptation and resilience.** This should draw on existing tools, methodologies and guidance, developed by the Climate Change Committee and others, for valuing adaptation, assessing the cost of inaction and managing uncertainty and complex scenarios.
- **The review should evaluate the role of regulators in embedding climate adaptation into infrastructure decisions.** This includes how well regulators currently value and incentivise adaptation, what role they should play and whether they have the remit, tools and incentives to carry out this role.

The future climate

The Climate Change Committee (CCC) has warned the UK should prepare for the weather extremes that will be experienced under a 2°C global warming level by 2050.³ The government has already indicated that it is planning the Fourth National Adaptation Programme (NAP4), due in 2028, on this basis.⁴

The CCC expects that by 2050 the UK will face warmer, wetter winters, hotter, drier summers and sea-level rises which could put a third of England's coastline at significant risk of flooding.⁵ It further warns the government should consider the impact of 4°C global warming by 2100 in its future planning.

The economics of adaptation

Climate change is already having an economic impact on the UK in myriad ways: in 2022, one in five hospitals cancelled operations during the heatwave, extending waiting lists. In 2024, buckled rails due to hot weather in southern England caused the equivalent of 64 days of delays for passengers.⁶ The heatwave in June 2026 is estimated to have led to 24 million lost hours of working and a £1.15-billion hit to the UK economy.⁷ These are not one-off impacts but are likely to recur in future years.

The CCC has forecast that without additional adaptation, the cost of climate change could rise to the equivalent of around

³ Climate Change Committee (2026) [A Well-Adapted UK](#)

⁴ Defra (2026) [Building a more resilient UK: Our investment in climate adaptation](#)

⁵ Climate Change Committee (2025) [Progress in Adapting to Climate Change: 2025 report to Parliament](#)

⁶ Institute for Public Policy Research (2026) [Adapt or Die: Why progressives need to deal with extreme weather](#); Network Rail (2025) [Network Rail Southern region prepares the railway for hot weather](#)

⁷ Grantham Research Institute on Climate Change and the Environment (2026) [Climate change's heat tax on the UK's labour force and economy](#)

1–5% of GDP per year by 2050.⁸ In 2025, the Office for Budget Responsibility (OBR) forecast that the potential fiscal costs of climate-related damage, while highly uncertain, would be higher than it previously estimated due to lower productivity.⁹

Much of the UK's future infrastructure system already exists, but it was designed for a country facing different and less severe weather events.¹⁰ In last year's 10 Year Infrastructure Strategy the government also set out its plans to invest

£725 billion in infrastructure across all sectors.¹¹ Those new infrastructure assets, and the 1.5 million new homes in England the government has targeted for this Parliament, will also need to last well into the future and be fit for purpose to withstand future weather extremes. While the impacts of flooding are well understood, those of other climate change-induced weather events, including heatwaves and wildfires, are less well known.

The costs of maintaining, adapting and reconstructing infrastructure will only rise with climate change – acting early will cost less in the long run.¹² In the context of public spending constraints and competing demands for investment, such as in health and social care and defence, an economic review of the value of adaptation and resilience is needed to inform spending decisions. It will ensure that investment is targeted in the right areas to address climate risks at the best value for taxpayers.

Defining climate resilience and adaptation

The Intergovernmental Panel on Climate Change (IPCC) defines climate adaptation as 'the process of adjusting to actual or expected climate change and its effects, in order to moderate harm or exploit beneficial opportunities'. It defines climate resilience as 'the capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure'.¹³

As the ICE noted in our 2021 State of the Nation report: 'Infrastructure systems have several qualities that make them a priority for climate adaptation. Such networks provide vital services for society and the economy. They reach across borders. They provide protection against climate hazards. They operate as an interdependent "system of systems". Infrastructure investment locks in patterns for decades to come. [Infrastructure systems] are essential to public services and institutional capacity.

'One of the challenges that the infrastructure sector faces is the interconnected nature of its assets. For example, our mobility networks are becoming increasingly electrified, so a power outage will not only affect the electricity grid but also transport. A greater dependence on renewable energy may mean more offshore wind exposed to storm damage.

'These systems need to be adapted so that they are more resilient even in an increasingly severe climate. An infrastructure system is resilient when it can resist the impacts of climate change and when, if conditions occur that exceed the strength of an asset, the system is still able to cope, respond, recover and learn from the experience.'¹⁴

⁸ Climate Change Committee (2026) [A Well-Adapted UK](#)

⁹ Office for Budget Responsibility (2025) [Fiscal risks and sustainability](#)

¹⁰ For example, the National Infrastructure Commission suggested that 88% of existing water mains and 85% of rail assets could still be in place by 2055. National Infrastructure Commission (2023) [Second National Infrastructure Assessment](#)

¹¹ HM Treasury (2025) [UK Infrastructure: A 10 Year Strategy](#)

¹² National Engineering Policy Centre (2025) [Reviving our Ageing Infrastructure](#)

¹³ IPCC (2023) [Sixth Assessment Report Annexes](#)

¹⁴ ICE (2021) [State of the Nation 2021: Six ways for civil engineers to act on climate change](#)

Building public and political support

Constraints on public investment will also necessitate a proportionate response to climate threats, targeting investment where it will have the greatest impact. Not every part of the infrastructure system can realistically be adapted to withstand extremes, and no service can deliver 100% resilience at a cost likely to be acceptable to the public.¹⁵

In some cases, the question may be whether to adapt, accommodate, relocate or abandon assets. A review of the value of adaptation and resilience should not only be a technical exercise, but should also help support honest debate and legitimate decisions about priorities and acceptable risk, projected costs and trade-offs.

Promoting a better understanding of the benefits, or value, of investment in resilience could help build public and political support. The Economics Advisory Group for the UK's Fourth Climate Change Risk Assessment (CCRA4) highlights approaches to making the case for adaptation investment that focus on the benefits, including:¹⁶

- combining quantitative and qualitative information about the costs of action and inaction to drive compelling storylines about the benefits of adaptation
- focusing on co-benefits, no-regrets opportunities and win-win investments that are realised soon after any investment to reframe long-term risk reduction into immediate and tangible benefits.

The government has recognised the need for 'a people-centred approach to climate adaptation'.¹⁷ An economic review could be a valuable tool to support this work, provided it is accessible and easy to understand for the public. It can help reframe the debate from one focused on cost, risk and uncertainty to one that encompasses the tangible benefits of infrastructure adaptation and resilience.

That said, the Institute for Public Policy Research (IPPR) has cautioned that 'searching for too many co-benefits' risks diluting credibility and public understanding that investment is solving the primary problem of reducing the risks from extreme weather and can also lead to political fractures. It argues that the public already sees reducing the severity of impacts – by decreasing the length of time that critical assets are out of action and reducing the number of people affected – as sensible economic management.¹⁸

The IPPR's polling suggests that using the language of insurance and prudence raises support for adaptation by 20% and increases climate issue salience by 6%. The priorities for engagement should be clarifying the risks, the link between increased expenditure and resolving the actual problem, and the need to insure against higher costs later. To help bring clarity, the government could hold a 'single truth' of climate risk.¹⁹

The scope and governance of an economic review

- **Recommendation:** The government should commission a review of the economic value of climate adaptation and resilience.

¹⁵ National Infrastructure Commission (2023) [Second National Infrastructure Assessment](#)

¹⁶ CCRA4 Economics Advisory Group (2026) [Economics of systemic risk](#)

¹⁷ Government Office for Science (2026) [Putting people at the centre of UK climate adaptation and resilience](#)

¹⁸ Institute for Public Policy Research (2026) [Adapt or Die: Why progressives need to deal with extreme weather](#)

¹⁹ Institute for Public Policy Research (2026) [Adapt or Die: Why progressives need to deal with extreme weather](#)

- **Recommendation: The review should adopt a whole-system, cross-sector approach and cover multiple timescales.**

The purpose of the review should be to ensure that climate adaptation and resilience are fully embedded into core government economic decision-making frameworks (such as spending reviews, Green Book appraisals and infrastructure planning and prioritisation frameworks), rather than being treated as a standalone policy issue.

The review's governance should combine three elements: (1) strategic ownership at the centre of government; (2) independent analytical challenge; and (3) be system-wide in scope.

Strategic ownership at the centre of government

Models to draw on include the centrally commissioned Stern Review on the economics of climate change (2006) or the HM Treasury-commissioned Dasgupta Review on the economics of biodiversity (2021). Both have been noted for having had a 'catalytic' impact in stirring public and private action.²⁰ Given the thematic links, using these reports as models would also help ensure this review builds on and is cogent with their work and findings.

Overall ownership should sit with a senior minister with the background, authority and accountability to oversee the review and implement its findings. The Office for the Prime Minister and Cabinet would ensure cross-governmental integration and delivery. The designated lead minister should be supported by a small group of senior officials from relevant government departments, particularly HM Treasury (HMT), Defra, the Department for Transport, the Department for Energy Security and Net Zero and the Ministry of Housing, Communities and Local Government.

This oversight would also ensure the review complements other ongoing cross-governmental work, including HMT's Thematic Value-for-Money Review on the Maintenance of Public Sector Assets (which is supported by the National Infrastructure and Service Transformation Authority (NISTA) and others). The OBR has also announced that next year's Fiscal Risks and Sustainability report will assess the costs and potential fiscal benefits of public investment in the means of adapting to climate change.²¹

Independent analytical challenge

At the same time, building in independent challenge, for example through an expert advisory group, should ensure that the review is focused on outcomes for people, nature and the economy, not only on asset protection. This can draw in evidence from international best practice, and gather insights from a wide range of stakeholders and experts.

A systems approach

Infrastructure is an interdependent system of systems. Understanding the interdependencies and cascading risks between sectors will therefore strengthen the economic case for adaptation, whereas looking at sectors in isolation will underestimate the impacts and costs/benefits of adaptation.

The review would therefore provide the most benefit by adopting a whole-system, cross-sector approach. It must be able to convene and meaningfully engage all bodies which own, regulate, finance, deliver, maintain and use infrastructure systems at national and subnational levels. More broadly, it must also take into account that the management of infrastructure significantly impacts the risks to and performance of assets (for example, poorly managed farmland which encourages flooding).

²⁰ Emma Howard Boyd et al. (2024) [The London Climate Resilience Review](#)

²¹ HM Treasury (2026) [Terms of Reference for Thematic VfM Review on the Maintenance of Public Sector Assets](#); Office for Budget Responsibility (2026) [Fiscal Risks and Sustainability](#)

Multiple timescales

The review should cover multiple timescales that align with policy, regulatory and investment decision-making while also incorporating the CCC's advice to consider a 2°C global warming level at 2050 and 4°C at 2100. This could encompass near/short-term (2030–2040), medium-term (2050) and long-term (2100) timescales. The longer outlook would also help ensure the review carries weight beyond short-term political cycles.

Immediate and short-term risks include current exposure, known vulnerabilities, maintenance backlogs and emergency preparedness. Long-term risks over the lifetime of infrastructure assets, land-use decisions and natural systems include heat, water stress, flooding, coastal change, sea-level rise and strategic choices about protection, adaptation, renewal, relocation or managed change.

Assessing adaptation and resilience frameworks

As the CCC recently noted, UK adaptation 'has suffered from a national approach and a framework that is not fit for purpose'.²² Across government, resilience and adaptation policy, standards, regulation, governance and guidance portfolios are anything but joined up. Resilience and adaptation are two sides of the same coin yet are essentially treated as separate things.

This lack of systems thinking is particularly problematic for a domain that is an interdependent system of systems. The review should consider what must happen to strengthen alignment and reduce friction and structural barriers to enable delivery.

For example, adaptation and resilience need to be delivered at a range of scales from national to local, but there is a disconnect in governance between those levels which impedes effective subnational action. It is evident that under the current Burnham government, devolution will accelerate and mayoral authorities will become ever more important in the delivery of national priorities, including climate action, but they will require clearer mandates and sufficient powers and funding to do so.

Given the wealth of work already undertaken on climate adaptation and resilience, a review might also consider what existing recommendations have been developed and should be implemented. To support a systems approach to infrastructure adaptation and resilience, it could also ask whether setting a common definition and valuation methodology for resilience would be beneficial and whether and how infrastructure providers should use a consistent set of climate scenarios in their planning.

Closing data gaps

- **Recommendation:** The review should map who owns relevant datasets, how accessible they are and what would be required to make them useful for resilience planning.

Better understanding the economic value of adaptation and resilience depends on the quality and availability of relevant data. This encompasses how much data costs to collect and curate and whether it can be accessed, connected, trusted and used.

The review could examine factors such as the benefits of and need for common data standards, secure sharing protocols, incentives for data owners and safeguards for commercial, security and privacy concerns. Data accessibility and usage are both a tools issue and a skills issue and expected users must have access to both.

²² Climate Change Committee (2026) [A Well-Adapted UK](#)

While a lot of data already exists, much of it is fragmented across multiple bodies and there are some significant gaps. These include:

- **Climate impacts:** There is no systemic collection or central database on the operational and financial impacts of current weather events on infrastructure assets and services and the adaptive capacity of infrastructure organisations. Multi-hazard or compound effects are also not yet adequately considered in risk assessments. This data is needed, along with climate projections, to understand potential impacts of future climate conditions.
- **Interdependencies and cascading risks:** Companies may have their own risk assessments to understand their infrastructure assets' vulnerabilities to climate risks within their own commercial time horizons, but when attempting to understand system risk it is crucial to connect those datasets so as to see the 'system of systems'. Development and rollout of a consistent approach would allow a better understanding of risks and adaptive capacity across infrastructure systems, and therefore the economic benefits of closing gaps where they are found.

This approach would have to address concerns about the mosaic risk, whereby malicious actors could piece together an understanding of the UK system of systems. For example, the review could consider where regulators could provide clearer guidance for owners and operators on data security and what can be shared.

- **Outcome data:** Resilience benefits can be difficult to measure as success is often reflected in avoided disruption and losses, rather than positive outcomes for people, nature, public services and the economy. The review could examine how to better quantify the services infrastructure provides and the outcomes it delivers. For example, better understanding agency-at-risk – i.e. mapping who depends on each asset for which functions – could help reframe 'losses avoided' into 'agency protected'.
- **Engineering adaptation:** More data-driven, bottom-up methods to assess costs, rather than basing them on previous projects, would provide more credible estimates. The effectiveness of engineered adaptation and resilience measures is also uncertain, in part because there has been insufficient time for them to deliver a benefit, but also due to limited monitoring and evaluation processes being in place.²³

Harnessing AI and existing data tools

Important advances have been made in data collation, interoperability and sharing. Advances in real-time monitoring, AI and machine-learning can help asset owners understand what is happening now and how it might evolve.

Where asset-condition and system-performance data exist but are fragmented across owners, CReDo-style digital twins can be used to connect them to support cross-sector dependency analysis and decision-making. CReDo, the Climate Resilience Demonstrator led by Connected Places Catapult, focuses on the impact of flooding on energy, water and telecoms networks. It shows that digital tools are most useful when they reveal dependencies, shared risks and possible failure pathways, not simply when they create more asset-level data.

²³ Emma Ferranti et al. (2026) [CCRA4-IA Technical Report Chapter 6: Infrastructure](#)

This work would benefit from being better aligned, facilitated and connected. For example, programmes set up to develop a system of systems approach have been constrained by uncertain or limited funding commitments and too many stop-start projects (for example, the Centre for Digital Built Britain was limited to a five-year mission).

The Adaptation Reporting Power

The ICE has previously recommended making the Adaptation Reporting Power (ARP) of the UK Climate Change Act 2008 mandatory for infrastructure owners and operators.²⁴ The ARP remains an essential mechanism to closing data gaps, but the data gathered is not in a format that is accessible, comparable or can be analysed numerically. Future rounds could also place greater focus on addressing specific known data gaps.

Task Force on Climate-related Financial Disclosures (TCFD)

The government is implementing new annual climate-related reporting requirements, aligned with the Task Force on Climate-related Financial Disclosures (TCFD). The National Audit Office (NAO) notes that this has the potential to strengthen public sector transparency about climate-related risks and accountability for how the government is managing them. One benefit could be better quantification of financial risks.²⁵

The NAO has identified enablers which have supported bodies to make a good start on TCFD-aligned reporting, including senior ownership, collaborative working, considering a broad range of risks and building capability. Its recommendations for HMT and other central departments include aligning and simplifying reporting requirements and agreeing priorities for ongoing monitoring and support for the development of high-quality TCFD-aligned reporting.

The review might also consider the role of the Taskforce on Nature-related Financial Disclosures (TNFD) in understanding climate risks and resilience, for example, by examining whether regulators should set consistent expectations on TNFD reporting with a view to aggregating and reviewing the results.

Methodologies

- **Recommendation: The review should explore innovative methods to assess the value of climate adaptation and resilience.**

Many methodologies have been developed to enable economic analysis of adaptation and resilience by the CCC and others. The review should learn from and build on existing methodologies, tools, guidance and best practices and foster innovation where it is needed, for example, in relation to multi-asset, multi-hazard or compounding events.

A high-level review to strengthen the case for adaptation investment at the macro-economic scale will require a different assessment methodology to an infrastructure organisation determining whether to invest in adaptation and resilience. However, it may be of additional benefit for the review to consider the approaches or methodologies that infrastructure organisations can apply, for example to estimate the cost of inaction on their operations and services or assess the trade-offs between undertaking climate- and non-climate-related maintenance.

Benefits could include:

²⁴ ICE (2023) [How can the UK's infrastructure system be made more climate resilient?](#)

²⁵ National Audit Office (2025) [Implementation of climate-related reporting in central government annual reports](#)

- methodologies that support decision-making at different levels of detail to help filter options – recognising that government departments and other public bodies have limited resources for detailed analysis
- better cross-sectoral analysis to reconcile the different methodologies of different sectors and regulators, for example to help assess relative value and avoid pouring money into bad solutions
- for regulated sectors, agreed approaches between regulators and regulated on the methods to apply to determine the benefits of adaptation²⁶
- a mechanism that enables infrastructure operators to show how adaptation would provide societal benefits beyond the immediate scope of their services
- methodologies that better factor in natural capital consistent with the findings of the Dasgupta Review.

Managing uncertainty

Climate change and its impacts are uncertain, probabilistic and unevenly distributed. Adaptation economic appraisal therefore requires more emphasis on managing uncertainty and risk, and on accounting for the temporal difference between current and future costs and benefits, than typical economic appraisal.²⁷

As uncertainty cannot be eliminated, a combination of quantitative and qualitative methods will be needed. Valuation should also consider a range of plausible futures, drawing on recognised climate scenarios, noting that infrastructure decisions often have long lifetimes, high lock-in effects and consequences that are difficult to reverse.

New approaches to tackling uncertainty are available that combine AI and real-time evidence to provide insight. The review should examine how developments in modelling and gathering evidence should be incorporated into adaptation planning.

Defining value

The starting point for valuing adaptation should be to define what value is to be assessed. The review should pick up from the latest Green Book edition to consider 'economic value' inclusively, taking account of the effects of climate change, adaptation measures and infrastructure performance on people, places and nature. These are inextricably linked to economic performance and productivity and fiscal sustainability.

For adaptation projects, this means assessing not only direct asset damage avoided, but also service continuity, co-benefits for people and nature, whole-life value, avoided disruption and avoiding long-term lock-in of inappropriate or expensive solutions.

For example, the Triple Dividend of Resilience framework works on the basis that adaptation investments can generate a triple dividend of: (1) avoided losses; (2) additional economic benefits; and (3) non-market social and environmental benefits. Accounting for all three dividends should boost the benefit–cost ratios (BCRs) for adaptation investments because the second and third dividends are less dependent on uncertainty as they include benefits that accrue regardless of whether a climate shock occurs.²⁸

Impacts should be expressed in monetary terms where robust appraisal methods exist, but monetary valuation should not be forced where it would create false precision. Where monetary valuation is uncertain, impacts could be

²⁶ For example: PA Consulting (2026) [Economic Appraisal of Resilience in Transport](#)

²⁷ European Investment Advisory Hub (2022) [Climate Change Adaptation and Economics and Investment Decision Making in the Cities](#)

²⁸ World Resources Institute (2025) [Strengthening the Investment Case for Climate Adaptation: A Triple Dividend Approach](#)

quantified in physical, service or outcome terms, and described qualitatively where important effects cannot yet be reliably valued.

The outcome should be a funding regime that treats adaptation and resilience not as a sunk cost but as a purchased option on continued performance or accelerated recovery and prices the rate of recovery, not only the size of the initial loss. Measured against money, an averted disaster is an absence. Measured against factors like human agency, it is a presence, making benefits visible: the days of school not lost, the operations not cancelled, the businesses still trading.

Understanding the cost of inaction

Estimating the cost of inaction requires integrated methodologies that reflect both direct and systemic impacts. Key components of assessing the cost of inaction include:

- scenario-based climate modelling, reflecting plausible future climate conditions
- probabilistic risk assessment, capturing uncertainty and the likelihood of events
- system-level modelling, including cascading impacts across sectors
- defining the outcomes (environmental, social and economic) against which the cost of inaction will be assessed
- counterfactual analysis, comparing adaptation and non-adaptation pathways.

Traditional cost-benefit approaches can underestimate the cost of permanent losses, so any methodology must weight irreversibility explicitly. Nor is the cost of inaction just the initial damage but the full disruption caused and the time it takes to recover. Two weather events causing identical initial damage can differ significantly in total cost according to the speed at which they are recovered from, so methods that price the initial loss but not the pace of recovery will underestimate the cost.

Approaches highlighted in the CCRA4-Independent Assessment demonstrate how the costs of inaction could be assessed under various climate change scenarios.

For example, hindcasting explores the costs of inaction linked to systemic risks that have already occurred to make the benefits of prevention visible and quantifiable. It can illustrate the benefits of adaptation in comparable situations to justify proactive investment, provided there are suitable case studies. The Thames Barrier, for example, cost £535 million (approximately £2.4 billion in 2024 money) and the savings on residential property alone are estimated to have already been approximately £321 billion. In 2023, the cost of futureproofing London against flooding, including replacing the Thames Barrier by 2070, was estimated to be around £16 billion. Numbers from the benefits of avoided loss from the first barrier can be used as a lower bound for the benefits of the proposed new barrier.²⁹

The review could also define the monitoring, evaluation and feedback arrangements needed to improve how the cost of inaction is assessed over time. For example, setting out how expected impacts should be compared with actual events, how assumptions should be tested, how models should be updated and how evidence should inform future appraisal, investment, regulation and delivery decisions.

Valuing the benefit of investment

Where costs and probabilities are known, cost-benefit analysis (CBA) is relatively straightforward. In the UK, the Environment Agency's Flood and Coastal Erosion Risk Management scheme, which uses the Multi-coloured Manual's

²⁹ CCRA4 Economics Advisory Group (2026) [Economics of Systemic Risk](#)

methodologies, is the gold standard for CBA. However, it is single-hazard and prescribes which adaptation approaches are allowed.³⁰

The CCRA4 Economics Advisory Group (EAG) notes several limitations of CBA in relation to systemic risks, including the difficulty of determining the probability of systemic risks occurring in highly interconnected systems. It also cites a report that found 'a shift away from infrastructure based hard resilience to preparedness and systemic interventions, with a much greater focus on soft resilience [which is] much more difficult to assess using CBA'.³¹

More applied analysis and decision-making under uncertainty can be used to overcome these limitations, but these are often complex to apply, are data, time and resource intensive and require a much greater expert knowledge.

Cost analyses, as opposed to cost-benefit analyses, allow decision-makers to focus on what is known with more certainty, which is generally the costs of action to increase adaptation and resilience.³² Multi-criteria or multidimensional analysis, for benefits that resist monetisation, allow for a wider view by assessing projects against other weighted criteria, such as safety, resilience, carbon, biodiversity, deliverability and social value, lending more transparency to valuation.

Other techniques for aiding 'decision-making under deep uncertainty' (DMDU) include Real Options Analysis or Robust Decision Making. Real Options Analysis (ROA) is used to prioritise adaptation interventions while considering the possibility to adjust them in the future to respond to new climate risk information. Robust Decision Making (RDM) prioritises 'robustness' rather than 'optimality' to identify adaptation options or strategies which can perform well over a wider range of possible futures.³³

Applying the Green Book

The Green Book is the government's guidance on appraisal and the process of assessing the costs, benefits and risks of different options for achieving government objectives. There is guidance in the Green Book covering when cost-benefit analysis is not appropriate, for example for large-scale uncertain decisions relating to structural change.

However, the guidance is too often not fully applied or civil servants lack the time or resources to apply different models.³⁴ This can reinforce the undervaluation of resilience and adaptation because many avoided losses and wider benefits are not captured well in conventional appraisal.

It is essential that users of the Green Book have the tools and skills to follow the guidance and develop strong business cases. The EAG has noted there might be scope for additional guidance on addressing systemic risk in the Green Book.³⁵ The review could also consider where existing guidance for the Green Book and other tools for appraisal and business case development could be updated.

The discount rate used in the Green Book for long-term investment has also been criticised for undervaluing benefits that are realised over longer time periods. This is particularly the case for adaptation measures and further undermines the case for resilience investment.³⁶ A recent review of the Green Book's approach to discounting

³⁰ Flood Hazard Research Centre et al. (2013) [Flood and Coastal Erosion Risk Management: A Manual for Economic Appraisal](#)

³¹ CCRA4 Economics Advisory Group (2026) [Economics of Systemic Risk](#)

³² CCRA4 Economics Advisory Group (2026) [Economics of Systemic Risk](#)

³³ European Investment Advisory Hub (2022) [Climate Change Adaptation and Economics and Investment Decision Making in the Cities](#)

³⁴ House of Commons (2026) [Oral evidence: HM Treasury and the economics of climate and nature, HC 23](#)

³⁵ CCRA4 Economics Advisory Group (2026) [Economics of Systemic Risk](#)

³⁶ See, for example, National Preparedness Commission (2026) [Written Evidence \(NLR0004\)](#); National Preparedness Commission (2024) [Making it Happen: Encouraging government action on preparedness and resilience](#)

recommended changes to the discount rate and a new concept of ‘social insurance’ projects. These could mean the benefits of long-term schemes that mitigate severe systemic risks to society would be valued more highly.³⁷ HMT is currently considering the review’s findings.

Existing tools and best practice

Valuing resilience and adaptation has been examined in detail across various sectors and worldwide. For example:

- The Physical Climate Risk Appraisal Method (PCRAM), developed by the Coalition for Climate Resilient Investment, Mott MacDonald and the Institutional Investors Group on Climate Change, provides practical guidance on understanding the damage and disruption climate change can cause and on strategically investing towards improved resilience. It aims to quantitatively reflect the range of financial and other benefits of resilience, helping investors evaluate whether adjusted cashflow projections which integrate resilience measures justify incremental increases in upfront expenditure.³⁸
- The water industry has developed collaborative work on valuing impacts, including the Common Value Framework to capture and value the benefits of nature-based solutions in a robust, consistent and comparable way.³⁹
- Concepts and tools used by the insurance sector could be applied more broadly to assess the financial costs of inaction and the potential financial returns on investments in adaptation. Allianz Commercial’s Climate Adaptation and Resilience Services (CAREs) is one example.⁴⁰

Other jurisdictions have developed tools to help policymakers and investors measure the value of those investments in climate resilience and adaptation. The EU-wide collaborative ICARIA project (Improving climate resilience of critical assets) provides impact metrics and benefits measures.⁴¹

In Australia, the Queensland Reconstruction Authority (QRA), which manages infrastructure renewal and recovery in disaster-affected communities, introduced a Value for Money Strategy to evaluate projects not only on cost but also on resilience, effectiveness and community outcomes. It developed the Sustainable Asset Valuation initiative (SAVi), to pilot quantifying the long-term social and economic value of climate-resilient infrastructure investment using 15 indicators, including road disruption, market access for crops, fruit and livestock, and mental health, to explore the full benefits of the investment.⁴²

Regulation

- **Recommendation:** The review should evaluate the role of regulators in embedding climate adaptation into infrastructure decisions.

The purpose of infrastructure governance and regulation is to keep systems operating to meet the needs of society. But, as the ICE highlighted in our 2023 report, it is not clear how regulatory frameworks value resilience. The CCC

³⁷ Mark C. Freeman and Ben Groom (2026) [Green Book Discount Rate Review: Summary of findings and recommendations](#)

³⁸ Mott MacDonald [PCRAM 2.0](#); IIGCC (2024) [PCRAM in Practice](#)

³⁹ Mainstreaming Nature-based Solutions (n.d.) [Common Value Framework Consultation – Capturing and valuing the benefits of NbS in a robust, consistent and comparable way](#)

⁴⁰ Allianz (n.d.) [Climate Adaptation and Resilience Services \(CAREs\)](#)

⁴¹ ICARIA (n.d.) [Improving climate resilience of critical assets](#)

⁴² Queensland Reconstruction Authority (2025) [Resilience Valuation](#)

has pointed to a lack of ownership, accountability and clarity on ambition across government departments, which has meant that other parts of government, including regulators, ‘struggle to give climate adaptation priority within their overall responsibilities’.⁴³

One consequence may be a structural bias towards minimum current cost rather than long-term investment. Resolving the tension between the desire to keep customer bills low and the need to maintain, renew and adapt infrastructure for the future requires more holistic, systems-level thinking.⁴⁴

Other factors linked to valuing adaptation and resilience that a review could examine include how regulators and regulatory frameworks:

- Incentivise proactive adaptation and long-term outcomes or unintentionally discourage adaptation – and the extent to which progress in adaptation has been catalysed by regulatory pressure.
- Consider interdependencies and cascading impacts. Where adaptation risks fall between regulatory regimes, regulation should enable coordination between sectors to prioritise funding where it will have the greatest societal benefit.
- Give sufficient weight to regional and geographic variation in climate risk and use geography as a key driver in decision-making (for example, in Ofwat’s determination of water companies’ expenditure allowances). Both the costs of adaptation and the most appropriate delivery approaches will differ across geographies.
- Co-develop regulations with industry and minimise restrictions that stifle innovation.

Improvements could include:

- Agreed mechanisms for valuing the benefit of adaptation between regulators and the regulated in funding frameworks.
- Price controls and allowed returns that price the resilience dividend, so that adaptation and maintenance are funded as value created rather than cost incurred. Stable, long-horizon frameworks with embedded resilience funding should follow naturally once the dividend is measurable.
- Clear responsibilities for regulators to help their sectors to work together to manage interdependencies and cascading risks and fund the necessary action. In the 10 Year Infrastructure Strategy (10YIS) the government committed to a review of economic infrastructure regulators to ensure regulation met the aims of growth, investment, clean energy and maintenance, which should encompass co-ordination across sectors.⁴⁵
- Introducing defined resilience standards for regulated sectors, the absence of which ‘limits the universal application of cost-effectiveness approaches’.⁴⁶ In the 10YIS, the government also committed to mapping existing resilience standards, identifying gaps and strengthening or introducing standards where necessary, but no timetable has been set.⁴⁷

⁴³ Climate Change Committee (2026) [A Well-Adapted UK](#)

⁴⁴ National Preparedness Commission (2026) [National Preparedness: The New Strategic Issues](#)

⁴⁵ HM Treasury (2025) [UK Infrastructure: A 10 Year Strategy](#)

⁴⁶ PA Consulting (2026) [Economic Appraisal of Resilience in Transport](#)

⁴⁷ HM Treasury (2025) [UK Infrastructure: A 10 Year Strategy](#)

Regulators should be treated as critical enablers of climate readiness, but not as substitutes for policy. It is for the government to define the public outcomes and acceptable risk envelope. Regulators should then ensure that infrastructure owners and operators understand system risks, choose effective interventions, invest efficiently in resilience, report transparently, manage interdependencies and learn over time.

Conclusion

A wealth of work has already been undertaken making the case for action and proposing the way forward. Yet accelerating adaptation action to ensure critical infrastructure systems are resilient to new weather extremes is still not the political or spending priority it needs to be.

An economic review of the value of adaptation and resilience led from the centre of government could be the catalyst needed to drive action. The Stern and Dasgupta reviews have shown what is possible when the appropriate level of focus and expertise are brought to an issue.

Reframing the discussion about adaptation and resilience from one focused solely on costs to one that highlights value creation would help build the public and political support needed to drive it up the agenda. Understanding the benefits of investing in infrastructure adaptation and resilience would help government departments make the case for appropriate funding and embed climate risk management in spending reviews. It would ensure regulators understand and incentivise adaptation investment for the long-term value it creates.

The impacts of climate change on people, places, the economy and nature are becoming ever more apparent in the UK and worldwide. The summer of 2026 has shown that the UK cannot afford to delay taking the necessary action. Gaining a fuller understanding of the value of adaptation and resilience is a necessary step the government should take.

About the ICE

The Institution of Civil Engineers (ICE) is a 95,000-strong global membership organisation with over 200 years of history.

It is a centre of engineering excellence, qualifying engineers and helping them maintain lifelong competence, assuring society that the infrastructure they create is safe, dependable and well designed.

Its network of experts offers trusted, impartial advice to politicians and decision-makers on how to build and adapt infrastructure to create a more sustainable world.

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