

# ANTICIPATE, REACT, RECOVER

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Technical annex: Impact and costing note

## Introduction

This note reviews the recommendations in **Anticipate, React, Recover: Resilient infrastructure systems** that could have significant spending implications.

It assesses:

- the impact of the recommendations on the Commission's objectives to support sustainable economic growth across all regions of the UK, improve competitiveness and improve quality of life
- the expected costs of the recommendations, and their impact on the Commission's fiscal and economic remits
- uncertainty, distributional effects and risks around these estimates and the balance of evidence behind recommendations, as far as it has been possible to make these assessments.

The impact and costing note records the Commission's assessment of these factors in a standard format.

The core of each impact and costing note is how the cost of the recommendation affects the Commission's fiscal and economic remits. These were set out by government in its remit letter to the National Infrastructure Commission.<sup>1</sup>

## Assessing the impact of the recommendations in *Anticipate, React, Recover: Resilient infrastructure systems*

In *Anticipate, React, Recover: Resilient infrastructure systems*, the Commission makes three recommendations to improve the resilience of infrastructure services, both in the face of immediate shocks and longer term risks and opportunities.

These recommendations are:

1. government should publish a full set of resilience standards every five years
2. infrastructure operators should carry out regular and proportionate stress tests
3. infrastructure operators should develop and maintain long term resilience strategies.

The Commission expects that, in the longer term, any additional administrative costs of following these recommendations will be far outweighed by the benefits of having resilient infrastructure in the face of future shocks and stresses. The marginal impact of these recommendations on the resilience of economic infrastructure is difficult to estimate, especially as the benefits of good resilience governance are a lack of disruptions, and continuation of everyday service.

In the immediate term, the direct costs of these recommendations are administrative costs. However, in the longer term, these recommendations could result in different investments being made. Again, the scale of this impact is difficult to estimate, not least because any impacts on future investment from these recommendations are indirect.

To satisfy its obligations to the fiscal and economic remits, the Commission has assessed how the potential direct costs of the recommendations weigh up against the potential benefits. This note assesses the scale of potential costs and benefits through looking at previous events and interventions. This is because the benefits of resilience are mostly avoided damages and costs of future events, and the direct costs of the recommendations are difficult to estimate.

## Objectives

The table below reviews how the Commission’s recommendations contribute towards its objectives: to support sustainable economic growth across all regions of the UK; improve competitiveness; and improve quality of life.

<b>Sustainable growth</b>	<p>Reliable and affordable energy, water, transport and telecoms are all enablers of economic growth.<sup>2</sup> Enhanced resilience will ensure that these remain enablers and reduce economic shocks caused by infrastructure failures.</p> <p>Reliable utilities and transport networks are also critical to businesses and supply chains, and major disruptions to these result in lost output and revenue for businesses.</p> <p>Recommendation 1, and the accompanying principles for setting levels of service, also ensure that government appropriately considers the balance of costs and benefits when addressing resilience, meaning that there is likely to be a net positive impact on growth.</p>
<b>Balance across regions</b>	<p>The recommendations aim to improve the performance of energy, water, transport and telecoms networks across all countries and regions for which the UK government has reserved powers.</p>
<b>Competitiveness</b>	<p>The recommendations aim to secure appropriate resilience of economic infrastructure. There is a risk that without proper framework, some infrastructure operators could be incentivised to increase the resilience of systems beyond that which is justified, and others would under-invest.</p> <p>Recommendation 2 allows operators to better understand risks across economic infrastructure. Recommendation 1 ensures that government sets out its tolerance to that risk, which makes it easier for businesses to plan and understand these impacts. Together with recommendation 3 it also provides a clear signal to investors on the level of spend that might be required to mitigate hazards across economic infrastructure sectors.</p>
<b>Quality of Life</b>	<p>All the recommendations aim to ensure appropriate resilience of economic infrastructure over the long term.</p> <p>The reliability of economic infrastructure and protection from hazards is one of the most critical ways that economic infrastructure impacts quality of life. This is most salient with major events, such large power outages, which have a considerable impact on the wellbeing of individuals affected.<sup>3</sup> However, everyday issues with resilience and reliability, such as congestion, also have a large impact on quality of life.<sup>4</sup></p> <p>Multiple consumer surveys also show that reliability of transport, and of electricity and water are critical issues for many consumers, and consumers often place reliability at a higher priority than the quality of infrastructure services.<sup>5</sup></p>

## Fiscal and economic remit

### The costs and benefits of resilience

Whilst there are likely to be administrative and research costs as a direct result of the recommendations, any benefits of enhanced resilience governance are likely to far outweigh these costs. For example, regional water resources management plans were estimated to cost approximately £250,000 per year, per plan – but the benefits of better joining up plans and strategies were seen to far outweigh these administrative costs, given that wholesale water expenditure was £20 billion in the 2014 price review.<sup>6</sup> A similar argument applies to the administrative costs associated with the recommendations in *Anticipate, React, Recover - Resilient infrastructure systems*.

To give a sense of the order of magnitude of the damages when events and hazards occur:

- The summer 2007 floods were estimated to cause £3.0 -4.6 billion (2018/19 prices) in damages<sup>7,8</sup>
- The widespread power outages in Italy in 2003 are estimated to have exceeded €1.15 billion euros, or 1 per cent of Italian GDP.<sup>9</sup> This is roughly £880 million in today's prices and using today's exchange rate<sup>10</sup>
- The economic impacts of drought in 2011-2012 were between £80 million and £190 million (2018/19 prices).<sup>9,11</sup>

Whilst the recommendations do not eradicate the risk of incidents like these, they do ensure that:

- The costs of resilience are weighed up appropriately against the damages, and that trade-off is clear and transparent (recommendation 1)
- The risks and damages of future events are better understood, and eventually, better mitigated against (recommendation 2 and 3)

In weighing up the direct costs of the recommendations and their potential to reduce the economic damages of future events, the benefits are expected to far exceed the fiscal and economic costs of action.

### Fiscal remit

There are no direct fiscal remit impacts of the recommendations. Whilst recommendation 1 and 3 might involve some administrative costs to government, and recommendation 2 might involve developing new models, these costs are not included in the Commission's fiscal remit or will be too small to have a significant impact.<sup>12</sup>

### Economic remit

Recommendations 2 and 3 will impose some small costs for infrastructure operators. Recommendation 1 also imposes some small costs to government and regulators. As outlined above, benefits of these are likely to far outweigh the costs. Furthermore, the additional costs to operators are likely to be a very small fraction of regulatory and policy costs that are already passed on to consumers.

## Regulatory costs

Previous analysis for the Commission's recommendations in **Strategic investment and public confidence** demonstrated that, for the cost of funding Ofwat, Ofgem and Ofcom's activities for domestic consumers equates to £3-4 per year per household.<sup>13</sup>

Whilst following the recommendations set out in *Anticipate, React, Recover: Resilient infrastructure systems* will mean an increase in some activities by regulators and infrastructure operators, including potentially developing new or better information and analysis for stress testing – the scale of these costs and these operations is unlikely to change.

In transport regulation, the costs of the recommendations would be passed through to consumers differently. In rail, these are reflected in both ticket prices and direct government funding, and strategic roads are funded by government spending. However, it is still likely that the recommendation costs are a very small portion of total transport costs passed to households through ticketing or taxation.

## Infrastructure operator costs

Recommendations 2 and 3 have a larger impact on the activities of infrastructure operators. In energy, rail and strategic roads, much of the administrative costs, such as undertaking stress testing and collecting asset-level data, will be borne by the system operator. In water and the telecoms sectors, the costs will be borne by suppliers and, given the need for coordination, potentially the regulators. As set out in *Anticipate, React, Recover: Resilient infrastructure systems*, it is not expected that the requirements will be consistent across all operators: many will develop bespoke tests to assess their unique systems. Regulators will need to ensure the requirements are proportionate and maintain fair competition.

Again, the recommendations may involve some initial spend on modelling and some small additional resource, but these costs are likely to be far outweighed by the benefits of securing appropriate resilience to future events. For a sense of scale, the activities of the National Grid Electricity System Operator were estimated to be 0.2 per cent of the average electricity bill.<sup>14</sup>

## Uncertainty

The impacts estimated above are illustrative. The actual impacts of the study's recommendations are uncertain and difficult to quantify.

## Distributional Impacts

<b>Regional</b>	The recommendations aim to improve the performance of energy, water, telecoms, rail and strategic road networks across all countries and regions for which the UK government has reserved powers.
<b>Winners and losers</b>	<p>Whilst lower income households spend a higher proportion of their expenditure on water, energy and telecoms bills than higher income households, any direct impacts on bills are small.</p> <p>There is evidence to suggest that lower income groups are more impacted by infrastructure failures than other income groups. This usually stems from lower income groups being less able to ‘self-insure’ from infrastructure failures, and being more vulnerable in the first place. For example, over 90 per cent of households own a van or car in the highest 30 per cent income deciles, but only 50 per cent of households in the lowest 30 per cent income deciles own a car.<sup>15</sup> This, for example, often means these groups are more reliant on public transport, and do not have an alternative when public transport is not running.</p>
<b>Vulnerable/protected groups</b>	The Commission’s recommendations are also likely to indirectly impact other groups who may be less able to ‘self insure’ from infrastructure failures, and are more reliant on networked infrastructure. This could include people with disabilities.

### Indirect effects

There are likely to be indirect effects as a result of all three recommendations, however it is difficult to estimate the scale of the indirect effects, as these encompass a range of actions that could be taken to improve resilience. For example, recommendation 2 could lead to increased investment in certain technologies which reduce the risk of infrastructure failures, or it could lead to organisational or governance changes.

### Risks

**Low** = the recommendation is “no regrets” and is robust to a range of future scenarios.

**Medium** = some future scenarios could affect the optimal choice of variant or timing.

**High** = some future scenarios could make the recommendation unviable or obsolete.

<b>Driver</b>	<b>Risk</b>	<b>Description</b>
<b>Economic growth</b>	<b>Low</b>	The Commission's recommendations are robust to economic growth being higher or lower than expected.
<b>Climate change</b>	<b>Low</b>	The Commission's recommendations are robust to a range of climate change scenarios, and recommendation 3 should enable better planning in light of climate change.
<b>Technology</b>	<b>Medium</b>	Technological change, and new technologies in infrastructure systems could both increase and decrease the risk of infrastructure failure. The Commission's recommendations aim to be robust to this by focusing on processes which improve understanding of the resilience of economic infrastructure (recommendation 2), and improving how we plan for the future (recommendation 3).
<b>Population and demography</b>	<b>Low</b>	The Commission's recommendations are robust to a range of future population and demographic scenarios.
<b>Behaviour change</b>	<b>Low</b>	The Commission's recommendations are robust to behavioural change.

## Endnotes

- 1 HM Treasury (23 November 2016), **Remit letter to the National Infrastructure Commission**
- 2 National Infrastructure Commission (2017), **Economic growth and demand for infrastructure services**
- 3 For example, Ghanem, D et al. (2016), **“I think we need to get a better generator”**: Household resilience to disruption to power supply during storm events, *Energy Policy* 92 (171 – 180)
- 4 For example, Ghazali, W. (2019), **The effect of traffic congestion on quality of community life**. Open access article
- 5 Multiple sources, including **Transport Focus Rail Passenger Survey (2019)** and the Commission’s social research by BritainThinks on **Public views of regulation and resilience (2019)**
- 6 Defra (2019), **Improving our management of water in the environment: consultation proposals**
- 7 Defra & The Environment Agency (2010), **Delivering benefits through evidence: the costs of the summer 2007 floods in England**
- 8 Converted from original price years to £2018/19 for consistency using HM Treasury (March 2020), **GDP Deflator Index**
- 9 Schmindthaler, M, Johannes, R (2016), Special Issue paper: **Assessing the socio-economic effects of power outages ad-hoc**
- 10 Original price year assumed to be 2016 (the date the research was published). Exchange rate used is **2016 annual spot exchange rate**
- 11 Defra (March 2013), **The impacts of drought in England**, R&D Technical Report WT0987/TR
- 12 HM Treasury (23 November 2016), **Remit letter to the National Infrastructure Commission**
- 13 National Infrastructure Commission (2019), **Strategic investment and public confidence: Impact and costing note**
- 14 National Grid (2017), **Breaking down your bill**
- 15 Office for National Statistics (2018), **Percentage of households with cars by income group, tenure and household composition: Table A47**.



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