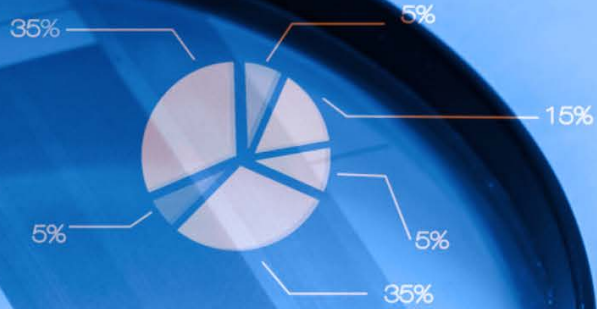
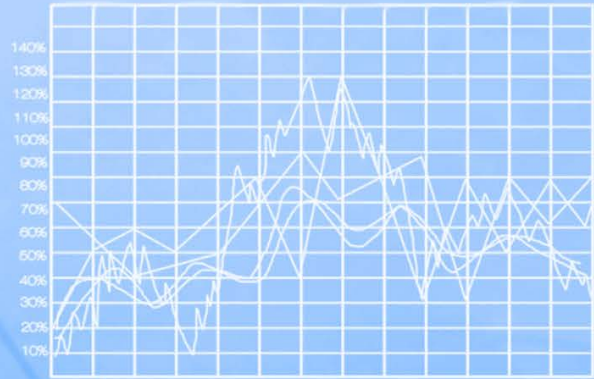
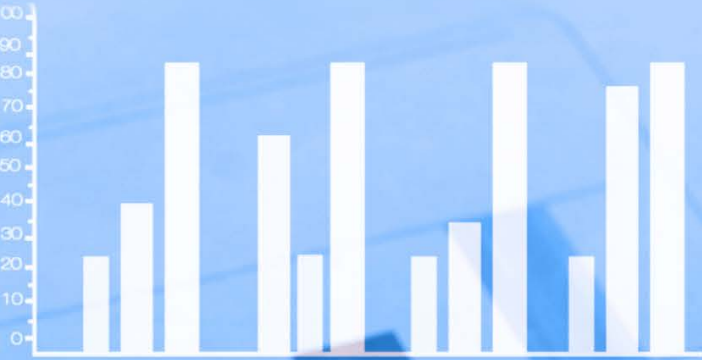




Committee on  
Climate Change

# Adaptation Reporting Power: second round review

March 2017



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# Acknowledgements

## **The Adaptation Sub-Committee would like to thank:**

Members of the Secretariat that prepared the analysis and contributed to this report: Gemma Holmes, Kathryn Brown, Manuela Di Mauro, Steve Westlake and Jo Barrett led by Matthew Bell and Daniel Johns.

Defra, and all of the organisations that provided reports under Round 2 of the Adaptation Reporting Power.

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# Executive Summary

The Adaptation Reporting Power (ARP) is an important aspect of the Climate Change Act 2008. The ARP aims to ensure that organisations of a public nature with climate-sensitive responsibilities are taking appropriate action to adapt to the impacts of climate change. It does this both directly, through engaging organisations in reporting, and indirectly, through raising awareness, building capacity in organisations, and making examples of good practice publically available.

Since 2009 there have been two rounds of reporting. Ahead of a decision on the approach to the third round of ARP reporting, which is expected to begin in 2018, Defra is undertaking a review of the second round of ARP (ARP2). The Adaptation Sub-Committee (ASC) was asked to assist in the review, in particular to consider how the ARP2 reports have helped the committee to fulfil its statutory roles under the Act. This report summarises our findings.

The ASC supports the ARP process because it yields important evidence that would not otherwise be available; information which is of value to the Government, and to Parliament, as well as the ASC. The process of producing the reports and the insights they generate are also of significant value to the organisations themselves, to other reporters, and to other relevant organisations such as regulators. The ASC therefore strongly supports the implementation of a third round of reporting from 2018. The reports in the second round demonstrate that effort has been invested in assessing risks and in taking appropriate adaptation actions, although the extent of this varies across organisations and sectors. Numerous case studies have been provided, including some data on the costs and benefits of different approaches. This is useful for evaluating the Government's National Adaptation Programme (NAP) and informing the ASC's statutory report to Parliament.

However, there is more work to do to ensure future ARP rounds provide a reliable picture of climate change risks and the impact of adaptation actions taking place. This is particularly important for future UK Climate Change Risk Assessments but also for the ASC's biennial statutory progress reports on the National Adaptation Programme. Improvements can be achieved through more consistent ARP reporting, including improved quantification of risks, standardised stress testing, and closer monitoring of actions and their benefits. Defra should develop and encourage the use of simple templates to collect the core set of information needed by the Government and the ASC to build a consistent picture of risks and to monitor the progress being made by reporting authorities. There can then be more flexibility over the format of the remainder of the ARP reports to allow each organisation to meet its own needs and to maximise alignment with its other regulatory requirements, thus helping to avoid duplication and additional workload.

The timing of ARP3 also needs careful thought, as in ARP2 only around half of reports were submitted in time to inform the second UK Climate Change Risk Assessment (CCRA2).

The first round of reporting was mandatory for most organisations but not the second round, and this led to some organisations declining to take part. Nearly a quarter of those invited to report as part of ARP2 have not done so, and the voluntary nature of Round 2 may have also affected the quality of the reports that were submitted. The ASC is in favour of mandatory reporting in the third round.

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The ASC recommends for the third round of ARP:

**1. Timing.** The next round of reporting should be complete in time for reports to inform the third UK Climate Change Risk Assessment (CCRA3) and the ASC's 2021 progress report to Parliament. This means organisations should report by December 2019. Subsequent rounds should be complete at least two years ahead of the deadline for presenting the CCRA to Parliament. The timing of other considerations, such as other statutory business planning and reporting milestones within the regulated sectors, should also be taken into account.

**2. Mandatory reporting.** Following ARP2's voluntary round, ARP3 should be made mandatory to ensure that all relevant organisations take part, and that senior executives within these organisations are routinely engaged in the process of managing climate change risks.

**3. Updated Guidance.** Defra should review and improve its guidance for ARP3 to elicit more uniform, meaningful and quantified results and conclusions, including in relation to risks from interdependencies, whilst ensuring any additional burden is minimised if organisations report along similar lines as part of other processes.

**4. Widened scope.** Defra should consider widening the scope of ARP reporting to encourage those sectors that have yet to report to provide evidence of their approach to climate change risk management. Priorities would be additional organisations within the telecommunications sector (such as internet and mobile network operators), wider aspects of the financial services sector, and to promote climate change adaptation amongst local authorities. Defra should also investigate how best to collect data, raise awareness and encourage action in the health and social care sector before considering which bodies should report in ARP3.

Further details on these recommendations can be found in the last section of this report.

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## Introduction

### The Adaptation Reporting Power

Ensuring that infrastructure in the UK is resilient to the impacts of climate change is critical to supporting people's security and wellbeing, as well as economic growth and competitiveness over the longer term. To this end, the Adaptation Reporting Power (ARP) is an important aspect of the Climate Change Act 2008 whereby the Secretary of State can request organisations with functions of a public nature and relevant statutory duties to produce reports detailing:

- the current and future predicted effects of climate change on their organisation;
- their proposals for adapting to climate change; and
- an assessment of progress towards implementing the plans and actions set out in their previous ARP reports.

Since the ARP process was established in law there has been a general trend internationally towards disclosure of climate change risks by companies and other organisations.<sup>1</sup>

The first round of ARP reporting took place between 2009 and 2012 and was mandatory for the 91 organisations directed to report, with an additional 13 invited to report on a voluntary basis. For the second round of reporting between 2013 and 2016, Defra asked first round reporting organisations to provide progress updates, and invited a further 11 organisations to report for the first time (Table 1, Figure 1). Participation in the second round was voluntary with organisations under no obligation to report.

Defra's strategy for the second round<sup>2</sup> of reporting states that the ARP aims to:

- ensure climate change risk management is systematically undertaken by reporting authorities;
- help ensure public services and infrastructure are resilient to climate change; and
- monitor the level of preparedness of key sectors to climate change.

### Lessons from Round 1

Cranfield University published a review of ARP<sup>1</sup> in January 2012 (Box 1). As part of this review, the Centre for Environmental Risks and Futures (CERF) at Cranfield considered whether the assessment of risks by organisations fulfilled the requirements within the Direction to report. The review also identified the benefits of the first round of ARP, and possible improvements to be considered for the second round.

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<sup>1</sup> The Task Force on Climate Related Financial Disclosures, for example, aims to develop voluntary, consistent climate-related financial risk disclosures for use by companies internationally in providing information to investors, lenders, insurers and other stakeholders. We will discuss this further in our next progress report to Parliament due to be published in June 2017. <https://www.fsb-tcfd.org/>

<sup>2</sup> Defra (2013) *Adapting to Climate change: Ensuring Progress in Key Sectors*, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/209875/pb13945-arp-climate-change-20130701.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209875/pb13945-arp-climate-change-20130701.pdf)

### Box 1. Cranfield Review of ARP1

Cranfield found that one of the main benefits of ARP1 was that it acted as a catalyst for many organisations to consider climate change risks and possible adaptation responses for the first time. In addition, the review found that the process appeared to have provided an incentive for a number of reporting authorities to develop further their work to assess climate change risks and for some, to improve monitoring of climate change vulnerabilities.

The summary of the Cranfield review highlighted a number of areas to focus on for future reporting rounds:

- **Report length:** a suggestion that future guidance may wish to encourage shorter reports, perhaps aided through the identification and highlighting of good practice within reports from the first round.
- **Structure:** the open reporting format and a lack of example reports meant that some of the reports in ARP1 were poorly structured, which made evaluation more difficult.
- **Transparency:** prior to receipt of reports there was some concern among reporting authorities regarding confidentiality issues, and an option to submit redacted reports was put in place. Some reporters did provide redacted reports; others provided only limited details of some risks and issues. It is possible that this was due to commercial sensitivities.

Defra considered the Cranfield report in establishing their approach to ARP2, in particular to propose that those reporting in Round 1 could provide a light-touch update in Round 2. This resulted in most organisations submitting shorter reports for Round 2. Cranfield's findings in relation to the structure and transparency of reporting remain unaddressed.

**Source:** Cranfield University (2012) *Evaluating the Risk Assessment of Adaptation Reports under the Adaptation Reporting Power Final Summary*,  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/82751/annex-b-cranfield-uni-report-arp.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82751/annex-b-cranfield-uni-report-arp.pdf)

The ASC also provided advice<sup>3</sup> to Defra in 2012 following ARP1, ahead of the Government's consultation on ARP2. The ASC advice identified three broad principles to help ensure that future ARP rounds make a positive contribution to the national adaptation effort:

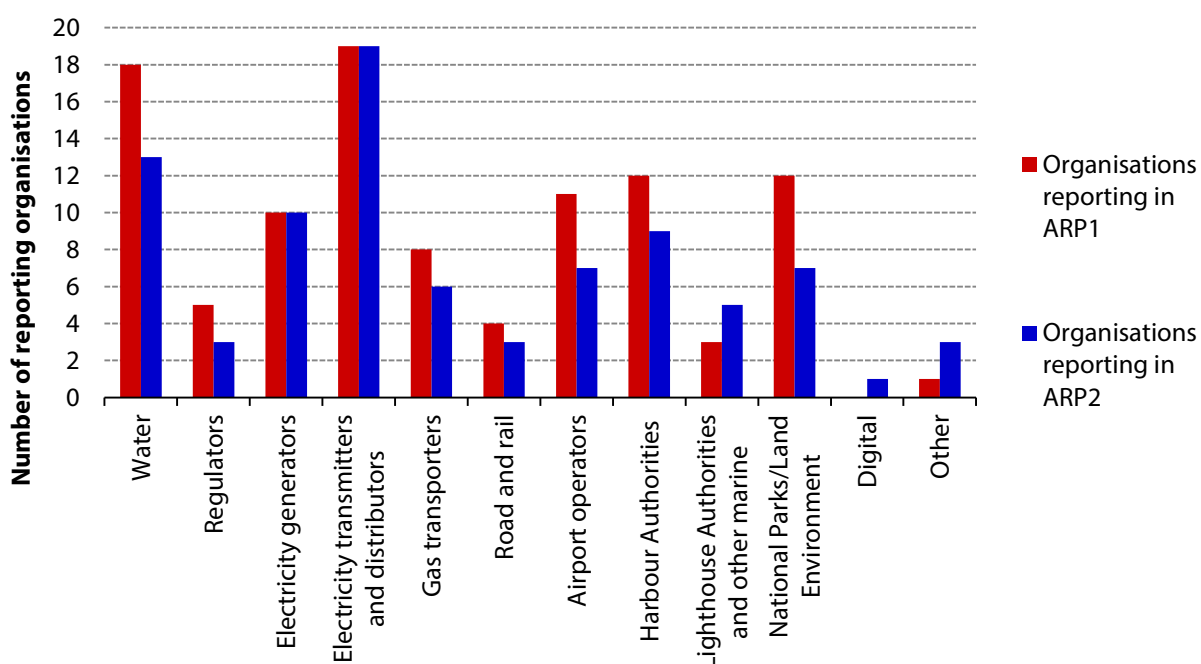
- **Usefulness:** reporting should encourage authorities to identify and address their climate risks, particularly those who previously had little awareness of adaptation. The outputs should also help to inform the Government's adaptation policy.
- **Robustness:** the reports should be based on quantitative assessments of risk where possible and put in place clear and measurable actions to manage risks identified. There should be a clear quality assurance process in place, including independent evaluation.
- **Cost-effectiveness:** The ARP should produce useful outputs at lowest possible cost. Reporting should be focussed on organisations making decisions that are priorities for adaptation, but avoiding duplication with existing regulatory requirements.

<sup>3</sup> ASC (2012) *Letter to Lord de Mauley*,  
[https://www.theccc.org.uk/archive/aws/ASC/Lord%20de%20Mauley%20\(05Nov12\).pdf](https://www.theccc.org.uk/archive/aws/ASC/Lord%20de%20Mauley%20(05Nov12).pdf)

## Participation in Round 2

Defra's focus for ARP2 was to ensure that the reporting process was more flexible, light touch and responsive to the needs of reporting authorities. There was therefore greater flexibility in how organisations reported in Round 2, as well as the option to not report at all. Table 1 shows that a number of water companies, national parks, airports, ports and other organisations decided not to report in Round 2. In the majority of cases these organisations provided reasons for not reporting. Reasons included a lack of resources and overlap and duplication with other reporting requirements.

**Figure 1.** Number of organisations reporting from each sector, compared to ARP1



**Source:** Defra

**Notes:** As at end of February 2017. ARP1 was mandatory for most organisations, whereas ARP2 was voluntary.

**Table 1.** Overview of reports in ARP1 and ARP2

	Organisations
Number reported in ARP1	105
Number invited and reported in ARP2	114 in scope in total, 111 were invited to report, 86 have reported Of the original 114, three declined at consultation time, 18 declined after being invited, and seven may still report. Four of those not reporting were due to take part in ARP2 for the first time (shown below in <i>italics</i> ).



<b>Table 1. Overview of reports in ARP1 and ARP2</b>	
	<b>Organisations</b>
Declined to participate in ARP2 at consultation time (3)	Harwich Port, NATS, Office of Rail and Road (was Office of Rail Regulation at the time of consultation)
Declined after ministerial letter (11)	Sheerness Port, Mersey Docks, Eurotunnel, ES Pipelines, Bristol Water, Exmoor National Park, Dartmoor National Park, Yorkshire Dales National Park, Canal and River Trust, Cardiff Airport, Edinburgh Airport
Withdrew after initially saying they would report (7)	Brookfield Asset Management, Luton Airport, Northumbrian National Park, North York Moors National Park, <i>Chief Fire Officer's Association, Church of England, New Forest National Park</i>
Organisations that may still report (7)	Essex and Suffolk Water, Northumbrian Water, <i>BT</i> , South West Water, Sutton and East Surrey Water, Ofcom, Greater London Authority.  Of these Essex and Suffolk Water, and Northumbrian Water, are due to report later in 2017.
<p><b>Source:</b> Defra.</p> <p><b>Notes:</b> Numbers are based on organisations reporting and not the number of reports, as some organisations reported jointly. Organisations in italics were invited to report for the first time as part of ARP2. Correct at the end of February 2017.</p>	

## Purpose and structure of this report

This report has been prepared at Defra's request, as part of a wider review in order to inform decisions and approaches to the third round of ARP reporting. The ASC's role in the review is to consider whether the ARP2 reports have helped the committee to fulfil its statutory duties under the Climate Change Act, specifically<sup>4</sup>:

- Whether ARP2 reports support the Climate Change Act policy cycle:
  - Did the reports provide reliable, quantified evidence on climate change risks and adaptation actions at national/regional/sector level to feed into the second Climate Change Risk Assessment (CCRA2)?
  - Did reporting provide sufficiently robust/comprehensive evidence to inform the ASC's evaluation of the National Adaptation Programme (NAP) in its 2017 progress report?
- Were the climate change risk assessments in the ARP reports based on credible evidence and did they enable evidence-based decisions on adapting to climate change?
- Whether the climate change risk assessments in the ARP reports generated priorities for action?
- Whether the ARP reports include monitoring and evaluation of the impact of adaptation actions?

<sup>4</sup> Commissioning letter from Defra, September 2016.

- 
- Were there any gaps that reporting could have covered?
    - Were there particular risks or vulnerabilities that could have been included?
    - What has been the impact on coverage of actions from taking a voluntary approach?

This report is structured as follows in order to answer these questions:

1. Assessment of climate change risks and opportunities in ARP2 reports.
2. Actions, monitoring and evaluation.
3. Overall assessment of ARP2.
4. Recommendations.

It is important to note that this review is from the perspective of the ASC and assesses how useful the reports have been in informing our duties under the Climate Change Act. However, we recognise that reports achieve a wider value for the organisations themselves, for economic regulators, for Government and Parliament, for academia, and in the wider public interest. Defra should be mindful of the full value of ARP reporting and the range of users in making decisions on Round 3.

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## 1. Assessment of climate change risks and opportunities

Has the ARP second round supported the Climate Change Act policy cycle?

Did the reports provide reliable, quantified evidence on climate change risks and adaptation actions at national/regional/sector level to feed into CCRA2?

The ASC intended to use the risk assessment sections of the ARP2 reports to feed into the CCRA2 evidence report. We wrote to reporters in February 2014 to explain what we needed in order for us to build a national, cross-sectoral picture of risks. In this section we consider to what extent the ARP2 reports allowed us to do this.

Almost all reports identified and described the nature of risks (Figure 2); some usefully aligned to overall corporate objectives and risk management processes. Organisations appear to be learning from past adverse weather events and re-assessing risks.

Water companies in particular contained relatively well thought out assessments of current and future threats and opportunities, for example in relation to the potential for water supply-demand deficits as rainfall patterns change. However, these had not necessarily been updated from ARP1. There was also evidence from some organisations of more detailed studies being conducted between ARP reports, such as TFL's assessment of flood risks to their network of tube lines, tunnels, platforms and stations.<sup>5</sup>

Reporters ideally should present their assessment of current and future climate change risks, and opportunities, in a standard format, together with the magnitude of potential impacts on the organisation and time series data showing weather-related impacts on their assets and services.

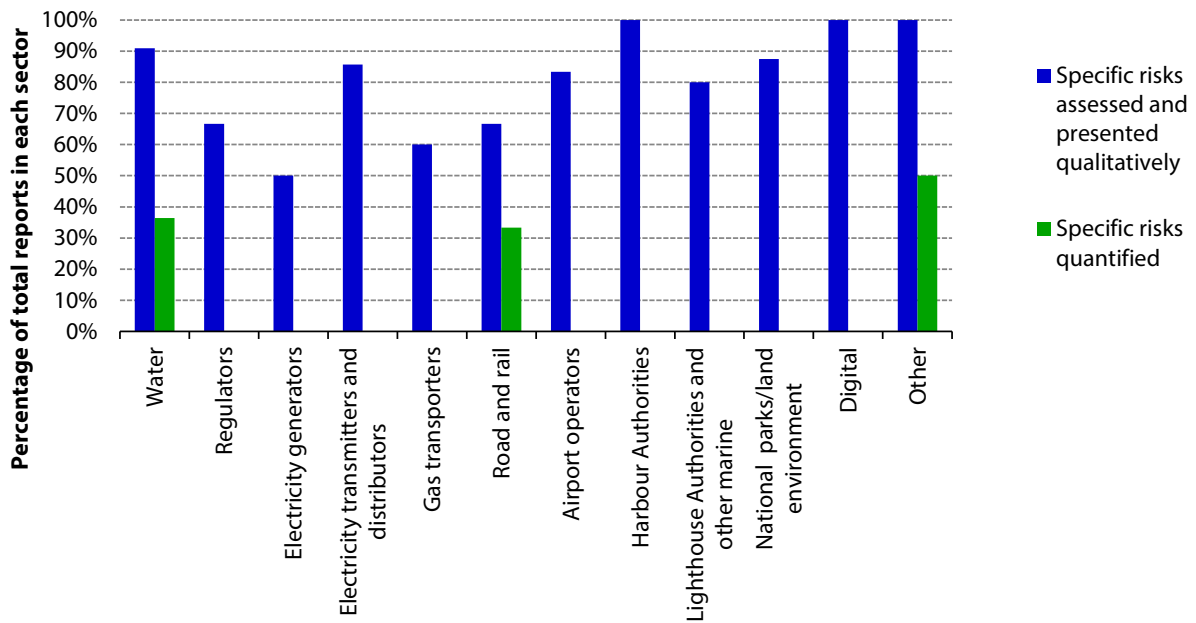
Risks created by dependencies on other organisations and service providers, such as transportation, ICT, electricity and other utilities, should be included. Whilst it is recognised that this is a non-trivial task, across organisations and sectors there was a wide variation in the approaches taken. Many of them will have to disclose material risks (and mitigating actions) under their own corporate reporting requirements, so it should be possible to present appropriate extracts of existing documents. Box 2 provides examples of good practice.

Overall, however, it was not possible to build a picture of climate change risks and opportunities at the national, regional and sector level to feed into our CCRA2 work. There were a number of reasons for this which we discuss in the sections below.

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<sup>5</sup> TFL (2015) *Providing Transport Services Resilient to Extreme Weather and Climate Change*, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/466602/climate-adrep-tfl.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/466602/climate-adrep-tfl.pdf)

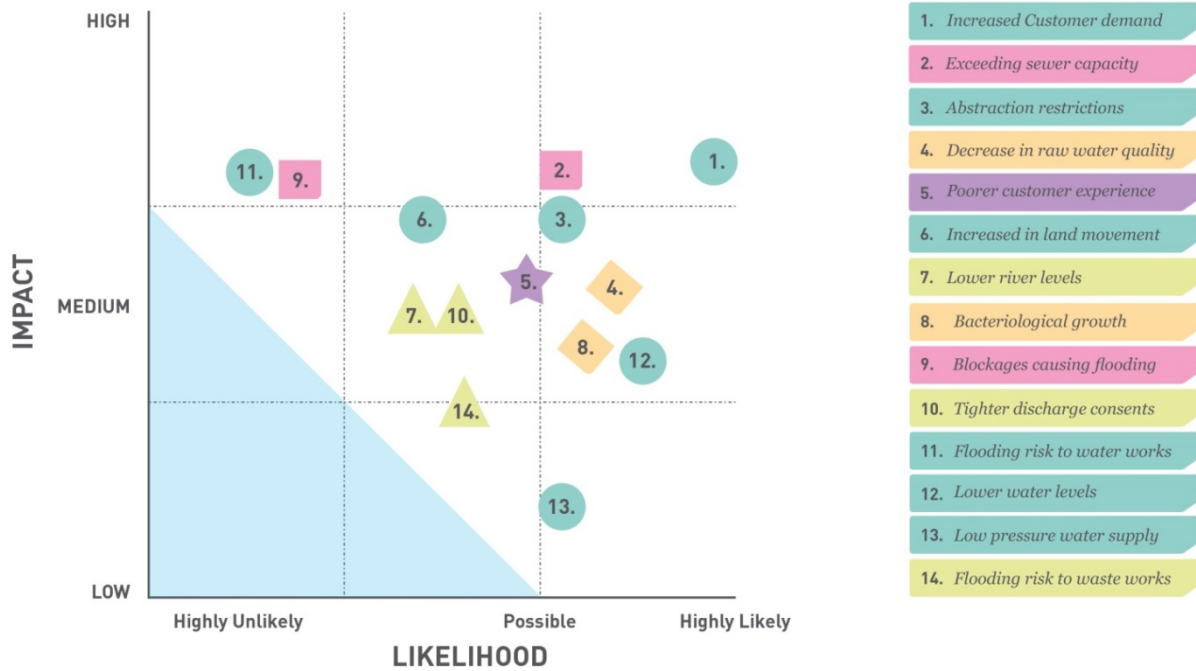
**Figure 2.** Percentage of reports that presented and quantified climate change risks



**Source:** ASC analysis of 84 ARP2 reports received by January 2017.

**Box 2.** Examples of good practice in conducting risk assessments

**1. Severn Trent Water risk matrix and time series of rainfall**



**Box 2.** Examples of good practice in conducting risk assessments

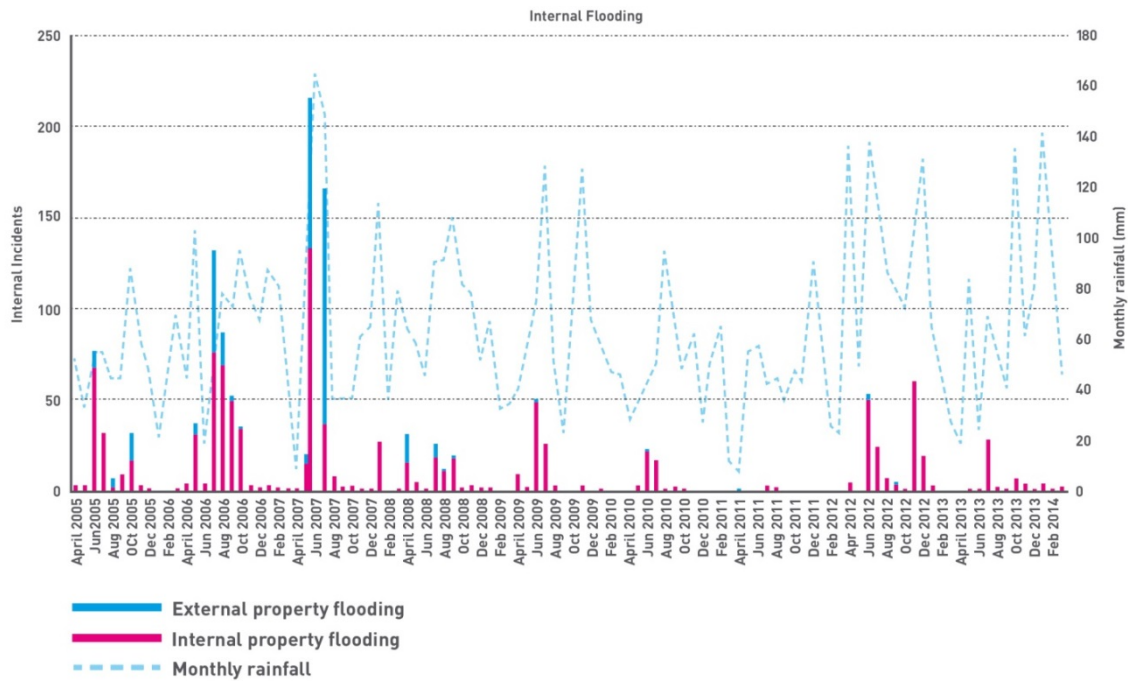


Figure 11: Timeseries of rainfall related sewer flooding incidents.

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**2. Network Rail**

Network Rail used regional climate change projections from UKCP09, together with information on asset safety risks, to prioritise weather resilience and adaptation actions across routes. An extract from the Western route is below.

Weather- related impact	Schedule 8 costs <sup>1</sup>	Projected future impacts for South West and South East England	Prioritisation
Flooding	£4.3m	21-25 per cent increase in February mean daily precipitation <sup>2</sup>	High
Earthslips	£0.9m	21-25 per cent increase in February mean daily precipitation <sup>2</sup>	High
Heat	£0.3m	>3°C increase in July mean daily maximum temperature <sup>2</sup>	Medium
Sea level rise	Not recorded	0.27m increase in sea level rise <sup>3</sup>	Medium
Wind	£1.1m	Wind changes difficult to project however generally projected to increase	High
Snow	£0.7m	2.7°C increase in January mean daily minimum temperature <sup>2</sup>	Low

**Source:** Severn Trent Water (2015), *Future Proofing: Severn Trent Water's climate change adaptation report*; Network Rail (2015) *Climate Change Adaptation Report*.

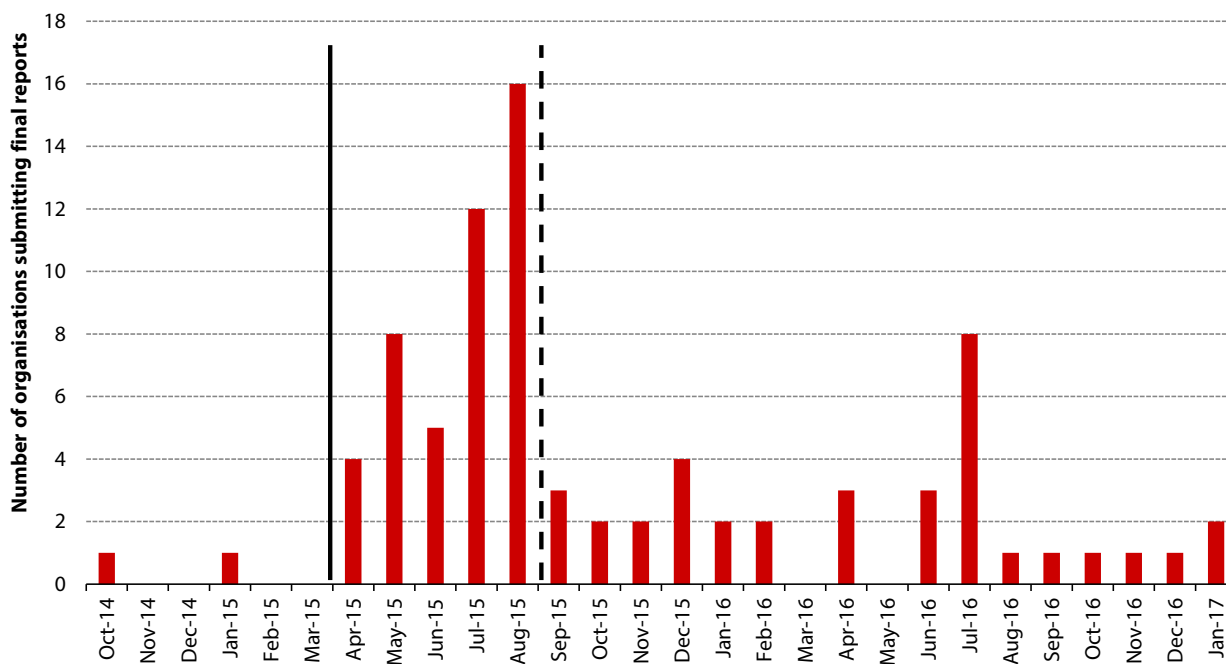
**Notes:** Severn Trent Water's risk matrix shows the 14 highest priority risks from a total of 36 that were identified. Details on all 36 risks were included in appendices to Severn Trent's ARP report. The colours and symbols in the chart are linked to Severn Trent's company objectives as follows: Green circles, 'we will ensure water is always there when you need it'; pink squares, 'we will safely take your wastewater away'; orange diamonds, 'we will provide water that is good to drink'; green triangles, 'we will protect our local environment'; purple stars, 'we will provide you with an excellent customer service'.

## Timing

Of the 86 organisations that have reported in ARP2 to date, only two produced a report before the official CCRA2 cut-off date of March 2015 (Figure 3). In practice, reports were still considered for inclusion in CCRA2 if they were submitted (even in draft form) before the end of August 2015. This allowed around half of the reporting organisations' reports to be considered. The majority of these were produced by water companies, although there was at least one report from each of the key sectors.

For some regulated sectors (specifically the water and energy sectors), the ARP reports make it clear that significant investment in climate change adaptation is closely related to investment cycles and levels set by their regulators. In order to ensure the ARP process works for all parties, Defra could consider how these timetables of investment, adaptation action and ARP reporting coincide with the CCRA3 and NAP timelines.

**Figure 3.** Timings of ARP2 report submission



**Source:** ASC analysis of the 84 ARP2 reports received before the end of January 2017.

**Note:** Black solid line denotes official CCRA2 cut off and dashed line denotes the extended cut-off date for reports to be considered in CCRA2.

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## Quantification

Were the climate change risk assessments in the ARP reports based on credible evidence and did they enable evidence-based decisions on adapting to climate change?

Most (80%) of the reports mentioned the use of projections to explore future climate scenarios and as a basis for conducting risk assessments. Amongst these there was universal use of the Met Office's UKCP09 scenarios, with occasional additional use of other data sources such as CMIP5 models. However, most reports provided a qualitative summary of risk, as was also generally the case in the first round of ARP reporting (Figure 2). Where the reports did provide some quantification, it was still difficult to gauge the scale of the risk compared to other pressures the organisations might face in the normal course of business.

In some instances reporters had categorised risks according to their magnitude (e.g. high/medium/low) and deliberately tested extreme scenarios and impacts. However this was not widespread across the reports and it was not always clear what the risk categories meant in terms of the magnitude of costs and impacts. Reporting against a standardised set of risk magnitude categories could be useful as part of Round 3, as would basing internal stress-tests on a standardised set of extreme weather scenarios.

## Risk assessment gaps

Were there any gaps that reporting could have covered?

Were there particular risk or vulnerabilities that could have been included?

Our assessment of the reports highlighted the following common issues:

- **Understanding risks from interdependencies.** Strategic interdependencies were often stated in reports (such as within water, electricity generation and distribution sector reports) but with little detail included. Many operators have considered their interdependencies, and continue to take part in cross-sector forums such as the Infrastructure Operators Adaptation Forum, but the results of this work was not evident in the reports. We recommend that for ARP3 more advice and support is given to organisations to help them assess, describe and present the risks from interdependencies. This is challenging and there could be a role here for the new National Infrastructure Resilience Council or the Cabinet Office to propose studies, oversee the management of interdependencies, and to report on the progress being made.
- **Incomplete sector-level coverage.** Gaps in some organisations reporting meant a sector-level picture of risks and actions would have been difficult to build even if evidence were presented consistently. To address this in ARP3, Defra could explore the potential benefits in encouraging organisations to report together at the sector level, if this would help develop closer working and data sharing, and the consistent presentation of risks and adaptation actions. Industry organisations and trade bodies have shown an appetite to support this. However, there is a risk that sector-level reporting will not be useful if competitive pressures mean organisations are unwilling to share and present data in a way that allows their relative exposure to risks to be assessed. An alternative could be a common reporting format developed on behalf of, and applied by all organisations within, specific sectors.

- **Opportunities.** Within the reports, less than half included any mention of opportunities, and only two quantified opportunities that could occur from climate change. This again could be a consequence of Defra's direction towards 'light touch' reporting. Examples of opportunities that were identified ranged from greater visitor numbers in some national parks due to longer visiting seasons, less dredging for ports as sea levels rise, positive impacts on fish stocks and distribution, and fewer fog days for airports.
- **Impacts on buildings and staff.** Only a few organisations described how they had considered the risks of climate change to their staff and to office buildings. It would be valuable to see further exploration of this as it links with interdependencies, such as the impact on staff travelling to and from work when there is disruption to the road and rail networks. There are also potential threats to staff working conditions, making the internal office environment uncomfortable or even unsafe to work in, for example during periods of high temperatures.

## 2. Actions, monitoring and evaluation

Did reporting provide sufficiently robust/comprehensive evidence to inform the ASC's evaluation of the NAP in its 2017 progress report?

The maturity of the action planning, and the monitoring and evaluation of actions, differed greatly within and between sectors. Action to improve resilience was more apparent in the economically-regulated sectors, in particular water, road and rail.

Reports are proving useful in conducting our second statutory assessment of the NAP, particularly as they provide a range of case studies of actions taking place and details of how organisations across sectors are considering climate change adaptation. However, the lack of quantified evidence describing how the actions taken have helped to reduce future vulnerability was a common issue across reports.

### Actions

Whether the climate change risk assessments in the ARP reports generated priorities for action.

Over 80% of reports included information on the risk management actions being taken by organisations. There was wide variation among the reports in the level of detail provided, with some providing only a high level description of actions, perhaps with timescales, and with others also including evidence on the costs and benefits. This variation affects the extent to which sector- and national-level progress in reducing vulnerability to the impacts of climate change can be assessed.

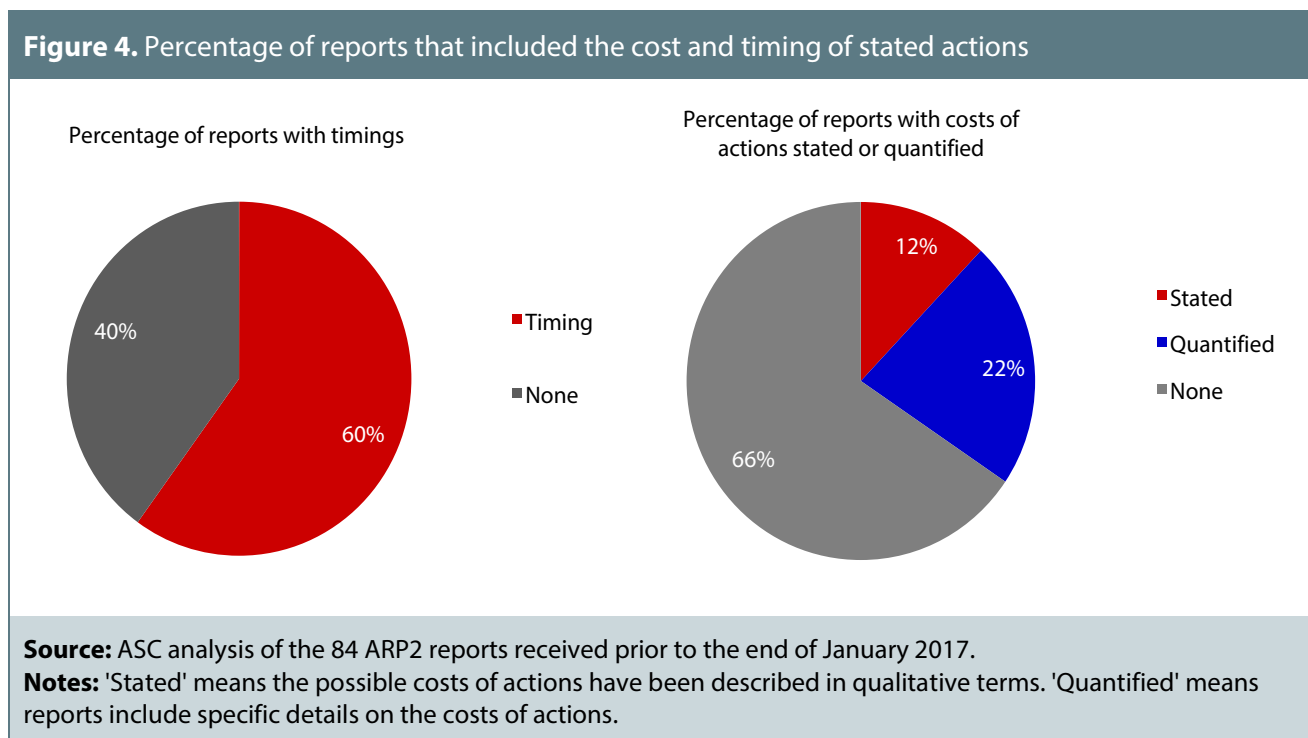
The most useful reports for determining progress presented actions as part of an overall risk management plan, with details outlining:

- status of actions;
- timescales for completion;
- costs of actions;
- reduction in vulnerability associated with actions; and
- benefits and cost avoidance achieved by actions.



Around half of the reports provided details on the timing of actions (Figure 4). The water and energy sectors appear to have the best planning and monitoring, perhaps reflecting how long these sectors have been active on climate change adaptation. Action planning by airports, ports and national parks was in general not as well developed. Between ARP1 and ARP2 the maturity of action planning has remained about the same.

Box 3 below provides examples of using risk management approaches to presenting the actions being taken in response to risks. Whilst this is useful, the examples also illustrate the variation and the general lack of quantification in the evidence presented in support of risk assessments and the actions being taken.



**Box 3. Examples of taking a risk management approach to adaptation planning**

**Northern Lighthouse Board**

Business function Table Item Number	Climate variable (e.g. increase in temperature)	Primary impact of climate variable (e.g. health)	Threshold(s) above which this will affect your organisation	Likelihood of threshold(s) being exceeded in the future and confidence in the assessment	Resultant Business Risk Potential impacts on organisation and stakeholders	Proposed action to mitigate impact	Timescale over which risks are expected to materialise and action is planned
ENGINEERING MAINTENANCE  1	Increase in average wind speed each year	Increased inability to access marginal sites by sea or air  Severity = 2	Sustained increase above current average wind speeds	Very likely over longer term with 80% confidence rating  Likelihood = 1	Increase in standby time. Possible reduction in availability of AtoN  Risk Factor = 2	Consider wind speed patterns and plan maintenance visits to marginal sites in low wind speed periods.  Data being collected by marine and engineering personnel when visiting lighthouse sites to record any weather conditions which disrupt or prevent scheduled activities	Risk Period = Long term  Action Plan = Present to 2020

Progress is easy to determine because the same table layout as ARP1 has been used, with updated action in a highlighted colour

**Anglian Water**

Row	Original risk	Action	Benefit	Residual risk
1	20 water sites at risk of fluvial and coastal flooding	Flood proofing at 20 water sites against 1:100 year fluvial and 1:200 year coastal flood events adjusted by 20% for high emissions scenario climate change to 2055 <sup>(1)</sup>	Risk of supply loss reduced for 1,424,230 customers	Supply loss risk still exists for flood events greater than the protection thresholds
2	300 properties on high risk register  324 properties on low risk register  1448 on external register	Alleviate flooding for 102 properties at high risk of internal flooding, 52 at low risk of internal and 246 at risk of external flooding  Mitigate flooding for 210 properties at risk of internal flooding and 100 at risk of external flooding  Two SuDS pilots completed	Alleviated 201, 53 and 309 respectively  Mitigated 216 and 140 respectively	197 properties on high risk register  377 on low risk register <sup>(2)</sup>  2597 on external register

This quantification of risks, actions, benefits and residual risks gives a rich set of data to assess progress and vulnerability

**Northern Gas Networks (NGN)**

This complete set of risk information, actions, timescales, monitoring, and benefits gives a valuable lifecycle overview of NGN's adaptation process

Business Function	Climate Variable	Predicted Impact of Climate Variable	Impact on NGN	Risk Ref	Likelihood of event occurring and confidence in assessment.	Potential Impact in NGN and its stakeholders	Proposed Action to Mitigate Impact	Timescales over which risks are expected to materialise and planned action	Timescale over which actions were planned	2014 review Progress on implementation of actions/ comments	Assessment of extent to which actions have mitigated risk	Benefits/ challenges experienced
Asset Management	Winter mean precipitation increase / Winter daily precipitation increase / Summer daily precipitation increase	Increase in peak water in rivers (Fluvial)	Pipelines in Bridge Structures / on pipe bridges are damaged	CCR3	Likelihood: Current 1 2020 1 2050 2  Confidence Rating: 2	Significant uncontrolled release of gas, increasing NGNs carbon footprint.  Major Gas Supply Emergency.	Pipelines generally cross rivers under the river bed or on purpose built pipe bridges. Regular maintenance and inspections are in place to confirm their integrity	Timescales will be assessed and remedial action undertaken based on ongoing maintenance and inspection regime	Risk Based Inspection Interval.	Ongoing inspection and maintenance schedule.  A number of bridge support structures repaired, due to fluvial erosion.	We have a better understanding of the condition of pipe bridges/structures.  Those bridges where bank erosion is a problem, have had physical upgrades to the support structure.  No pipeline supply interruptions attributed to fluvial flooding	Integrity of supply maintained and in some cases improved for the high risk locations.  Challenges have arisen from more extensive repairs required on some bridge crossings due to increasing frequency of high river levels.

**Source:** Northern Lighthouse ARP Report (2016); Anglian Water (2015); Northern Gas Networks (2015).

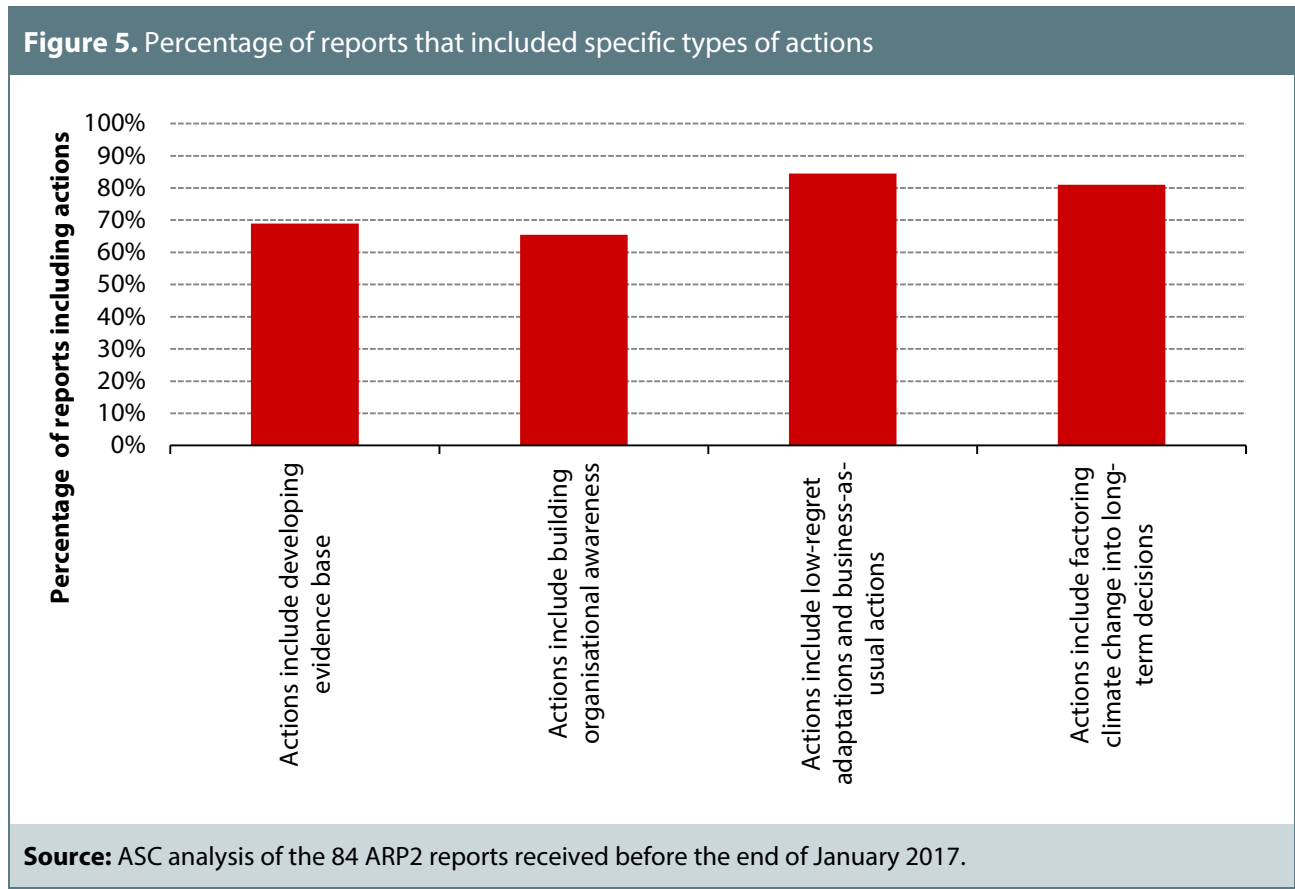
**Notes:** Example 1 (top) from the Northern Lighthouse Board shows actions with current status, allowing the progress of actions since the previous report to be tracked (extract from a table of 34 actions).

Example 2 (middle) from Anglian Water shows risks, actions, quantified benefits and residual risk. This information allows vulnerability to be quantitatively assessed (extract from a table of 26 actions).

Example 3 (bottom) from Northern Gas Network shows a comprehensive lifecycle of risks and actions (extract from a table of 14 actions).

The actions and adaptations being taken by organisations are wide ranging (Figure 5), with most of the focus of current activity on low-regret actions including in response to recent extreme weather events, such as the storms of winter 2013/14. There are examples of longer-term thinking such as factoring climate change allowances into asset renewals (Box 4). Case studies like these are useful for our progress report to Parliament, and were included in just under half of the reports reviewed.

Along with evidence of actions taking place, the organisations also discuss a number of barriers to implementing climate change adaptation. The key barriers stated are uncertainties in climate projections, the costs involved, and interdependencies and a reliance on others to increase resilience. Again, however, very few organisations have quantified, assessed or ranked these barriers.



**Box 4.** Examples of longer term actions and planning

**Severn Trent Water** has considered the impact of climate change on meeting their supply-demand balance in the future. They used statistical and hydrological modelling of temperature and precipitation which were used to create flow factors to apply to water resources models to understand the potential impacts of climate change. The modelling allowed them to plan investments to reduce demand, increase leakage control, and develop new water resources, in order to offset climate change impacts over the next 25 years. For example, a new leak detection system for plastic pipes could significantly improve the efficiency of spotting leaks, allowing them to be repaired more quickly and therefore minimise losses.

#### Box 4. Examples of longer term actions and planning

**The Environment Agency** is aiming to take a flexible approach to climate resilient investment, based on understanding in advance the adaptation options that may be needed and under what circumstances they would become necessary. This 'adaptive pathways' approach allows indicators of risk to be tracked and decisions to be taken in a timely way, especially where long lead times are involved.

**Drax Power** has implemented a multi-port strategy in order to maintain supplies of fuel, including considering the risk of climate change at local ports. During the severe storm surge of 2013, the port of Immingham in Lincolnshire lost power due to localised flooding of sub-stations, although the main coal and biomass terminal areas were not affected. To mitigate against potential impacts from a similar event, port operator ABP has installed new mains power to supply the main terminal operations area. The new biomass terminal at Immingham has been designed to withstand a similar event, and has sub-stations raised one metre above ground level. The underground conveyor tunnels below Phase I of the terminal development have had storm surge barriers fitted. For the Phase II development, the conveyor tunnels have been raised above ground level to achieve similar protection.

**Source:** Severn Trent Water (2015) Future proofing: Severn Trent Water's climate change adaptation report, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/477205/climate-adrep-severn-trent.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/477205/climate-adrep-severn-trent.pdf).

Environment Agency (2016) Adapting to a changing climate, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/526000/climate-adrep-environment-agency.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/526000/climate-adrep-environment-agency.pdf).

Part of Energy UK's report: Energy UK (2015) Climate change risks & adaptation responses for UK electricity generation A sector overview 2015, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/478938/clim-adrep-energy-uk-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478938/clim-adrep-energy-uk-2015.pdf)

## Monitoring and evaluation of actions

Do the ARP reports include monitoring and evaluation of the impact of adaptation actions?

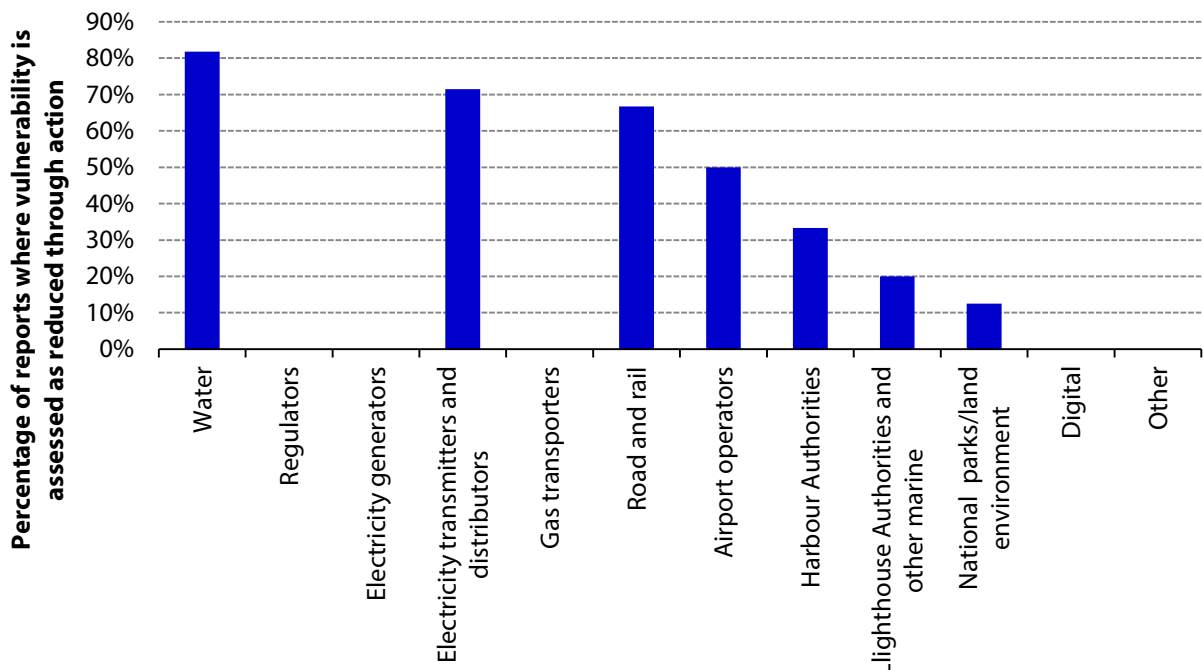
Where it was possible to tell, actions have been completed or are ongoing since the first round of reporting. However, many of the updates on actions involve general principles and statements regarding benefits and impacts, rather than specific evidence of the resultant reduction in future vulnerability. In many reports it proved difficult to track the progress of actions since ARP1, and it was unclear whether the actions were being tracked by the organisations themselves. This was for a number of reasons:

- A lack of consistency in content and format between ARP1 and ARP2 reports from the same organisations. Many reports provided tables of actions but often these were different between ARP1 and ARP2.
- Merging of reports. For example electricity generators reported individually in ARP1 but together through Energy UK in ARP2. Actions of the individual electricity sector organisations were not presented in the joint report.
- As noted earlier, around half of the reports did not include the planned timings of actions, making it difficult to assess whether plans are on track or have been delayed.

More could be done by reporters to identify and prioritise key actions, including how the impact of these actions will be measured in terms of their effect on reducing vulnerabilities (Figure 6).

Within the reports six<sup>6</sup> presented time series data showing weather-related impacts on their assets and services. These data are very useful in order to understand how impacts from extreme weather and vulnerabilities may be changing and this should be encouraged in the third round.

**Figure 6.** Percentage of reports where actions were linked to a reduction in vulnerability, by sector



**Source:** ASC analysis of the 84 ARP2 reports received before the end of January 2017.

### 3. Overall assessment of ARP2 compared to ARP1

What has been the impact on coverage of actions from taking a voluntary approach?

The second round of ARP reporting was voluntary for those organisations invited to take part. This differed from Round 1 which was mandatory for most organisations. The voluntary approach has led to some non-reporting as shown in Table 1. Of the original organisations that reported in ARP1, 24 (23%) did not report in ARP2. The majority of these were national parks, ports, airports and water companies (although two water companies have said they will report later in 2017). Feedback from the national parks suggests their non-reporting is due to a lack of resources. Some water companies have said that the ARP process duplicates what they already need to do for their regulators. This may be true for some areas of risk, such as on long-term water resources, but ARP reports should if done well present a more comprehensive assessment of climate change risks and opportunities, and the actions being taken, than is required by regulators.

<sup>6</sup> Bournemouth Water, Thames Water, Severn Trent, United utilities, SP Energy, Milford Haven and Network Rail.

This level of non-reporting does mean that there were significant gaps in coverage in Round 2, and it is not clear whether those deciding not to report have the greatest or least adaptation challenges. Alongside non-reporting there were also a number of sectors who were not invited to take part in ARP2 (Box 5).

#### **Box 5. Gaps in the coverage of ARP reporting**

Defra should consider widening the scope of ARP reporting to encourage those sectors that have yet to report to provide evidence of their approach to climate change risk management. Priorities would be other organisations within the telecommunications sector (such as internet and mobile network operators), wider aspects of the financial services sector, bodies within the health and social care sector, and local authorities.

##### **Telecoms**

The telecommunications sector is vital for the functioning of a modern economy. Whilst Tech UK (an ICT industry association with more than 900 members) was able to report in ARP2, it was disappointing that BT and Ofcom did not report, and that other telephone, mobile and internet companies were not invited to take part. The climate change adaptation efforts of the energy, water and transport authorities (all heavily reliant on telecommunications) that reported in the first round of ARP could be undermined if the networks on which they depend fail to embed resilience to the same extent. There were significant issues with telecoms and broadband services in the winter storms of 2015/16.

##### **Financial sector**

In the financial sector, the Bank of England should undertake research to understand better the potential systemic risks from climate change to the finance sector, building on the Prudential Regulatory Authority's ARP2 report. The risks to the financial sector from climate change are currently not well understood and there is little evidence that financial service companies have assessed the risks from climate change to their investments. The Prudential Regulatory Authority's ARP report focused mainly on the insurance sector. Expanding the scope of ARP reporting to include other parts of the finance sector, as recommended in ASC's 2015 progress report, would help to improve the evidence on actions being taken by financial institutions and where further guidance may be needed.

##### **Health and social care**

Climate change will alter the balance of risks within the health and social care sectors. Impacts to individuals will arise from changes to weather patterns, air pollution, UV exposure and pathogens. There are also direct risks from extreme weather to the NHS and wider public health and social care assets such as buildings, logistics, business continuity and transportation. Adaptation across the health and social care system and emergency services is important to minimise the current, as well as the potential future impacts on human health and socio-economic well-being from climate-related hazards. The Sustainable Development Unit for the NHS, public health and social care system reported for the first time in ARP2. However Defra should review whether it would be useful for other parts of the health and social care sector to report collectively or individually as part of ARP3.

##### **Local authorities**

Local councils have a critical role to play in adaptation. They have statutory responsibilities for a number of 'climate sensitive' functions ranging from land-use planning, local transport and flood risk management, to public health and social care. The National Indicator on climate change adaptation NI188 provided a useful focus for local authorities to assess their preparedness for dealing with weather-related emergencies and to consider actions that increase resilience. However, this was discontinued in 2011 and resource pressures mean adaptation has since declined in importance amongst local authorities. Reductions in budget also led to the Environment Agency's Climate Ready

### Box 5. Gaps in the coverage of ARP reporting

Support Service closing in April 2016, along with the LGA's Climate Local initiative and many of the regional climate change partnerships in England that operated as part of Climate UK. This means that the level of support and advice available to local authorities has reduced significantly in the last twelve months. Including local authorities within future ARP rounds would help ensure there is some continuing focus on the importance of managing climate change risks and local adaptation.

**Source:** ASC

Some organisations provided thorough, fully revised and standalone assessments in ARP2. Between ARP1 and ARP2, around half of the reports reviewed showed evidence of learning and improvement in the way in which assessments were conducted. This was more apparent amongst the water companies that did report, and in the transport sector. Areas of learning included more thorough assessments of risk, a fuller description of opportunities and barriers, and in addressing some of the areas for development identified by the Cranfield Review (Box 1). Defra's guidance for the third round of ARP reporting could provide examples of best practice, as first suggested by Cranfield in 2012.

Other reporters adopted Defra's suggestion of providing only a light-touch update. Some organisations reported in the form of short answers to the specific questions set in Defra's guidance, and in doing so presented little new or relevant evidence. For example:

- Companies in the electricity generation sector provided good assessments of risk and proposed adaptation actions in ARP1, however progress is not easy to judge from the second round of ARP due to the generalised nature of the sector-level report produced by Energy UK.
- Most of the reports from electricity transmission organisations were based upon a report produced by the Energy Networks Association (ENA). While this is a sensible approach because these organisations have common risks and adaptation actions, it meant that some of the reports produced in ARP2 did not provide a full update of progress from ARP1, and instead focused on answering the specific questions set by Defra for Round 2.

In order to gain an understanding of the risks and actions taking place, ARP1 reports, and in some cases other documentation, needed to be read in conjunction with the ARP2 reports from some organisations. Furthermore, Defra's guidance posed questions about the process of conducting assessments that could be answered without reporting the results of the assessment and the conclusions reached. These factors compromised the value of ARP2 for the purposes of the second CCRA, and to a lesser extent the ASC's evaluation of the NAP.

The guidance for Round 3 needs to be improved if all three of the objectives for the ARP process are to be met whilst also keeping the burden of reporting low. Recommendations in this area are made in the next section.

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## 4. Recommendations

Based on the assessment above, the Government should consider the following points when consulting on the strategy for the third round of ARP reporting:

**1. Timing.** The timing of ARP3 should be set to feed into CCRA3 and the ASC's 2021 report to Parliament. This means organisations should report by December 2019. Subsequent rounds should be complete at least two years ahead of the deadline for presenting the CCRA to Parliament. The timing of other considerations, such as other statutory business planning and reporting milestones within the regulated sectors, should also be taken into account.

**2. Mandatory reporting.** Following this voluntary round, ARP3 should be mandatory to ensure that all relevant organisations take part, and that senior executives within all relevant organisations are routinely engaged in the process of managing climate change risks.

**3. Updated Guidance.** Defra should review and improve its guidance for ARP3 to elicit more uniform, meaningful and quantified results and conclusions, including in relation to risks from interdependencies, whilst ensuring any additional burden is minimised if organisations report along similar lines as part of other processes. In order to do this:

- Defra should work with sector-level bodies to develop and pilot simple templates that allow a core set of information to be collected and presented within ARP reports on a more consistent basis. This would allow risks to be assessed and quantified more robustly, and actions and their benefits to be tracked between ARP reporting cycles.
- Operators need further guidance on understanding and quantifying risks under plausible extreme scenarios. There is scope to develop a set of standard scenarios and stress tests and require operators to assess and report on the impacts of these to their organisations. Stress tests could be based on new evidence emerging from the 2018 UK Climate Projections (UKCP18).
- Within the guidance, operators should be encouraged to assess the materiality of climate change risks in comparison with other pressures the organisations might face as part of the normal course of business.
- Interdependencies and the potential for cascading failures need to be more thoroughly assessed with the results presented within ARP3 reports. Guidance should encourage operators to more widely share data. This is challenging but critical. It is important for someone to take the lead on this, and it could be appropriate for either the new National Infrastructure Resilience Council or the Cabinet Office to undertake studies, take an oversight role in relation to the management of interdependencies, and report on progress.
- Operators also need improved guidance on developing approaches to monitoring and evaluation. For example, the use of consistent incident reporting and indicators of network resilience and performance are needed to allow improvements to be measured over time (as recommended in the ASC's 2015 progress report to Parliament). Approaches should be developed in partnership with sector-level organisations, the Cabinet Office, the National Infrastructure Commission, and the new National Infrastructure Resilience Council.

**4. Widened scope.** Defra should consider widening the scope of ARP reporting to encourage those sectors that have yet to report to provide evidence of their approach to climate change risk management. Priorities would be other organisations within the telecommunications sector



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(such as internet and mobile network operators), wider aspects of the financial services sector (e.g. for the Bank of England to look beyond just the insurance sector) and to promote climate change adaptation amongst local authorities. Defra should also investigate how best to collect data, raise awareness and encourage action in the health and social care sector before considering which bodies should report in ARP3 (see Box 5 for more details).



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