



Options for a Sustainable Approach to Asset Maintenance and Replacement

A Report for Water UK



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1 Introduction and summary

In the context of the increased focus on operational resilience, Economic Insight has been commissioned by Water UK to consider whether, and how, the regulatory framework at PR24 (and beyond) could be updated to encourage a long-term sustainable level of asset maintenance and replacement.

A key challenge for the regulatory framework is balancing the objectives of promoting investment and incentivising efficiency. This is especially the case in the context of asset health, as: (i) it is hard to precisely identify the long-term sustainable level of asset maintenance and replacement; and (ii) it is also difficult to establish whether the industry is delivering the desired level of asset maintenance and replacement. This is because there can be long lags between investment spend and any impact on asset performance – and, hence, impacts on observable service levels. Consequently, whilst Ofwat can observe overall totex spend, it cannot easily identify whether any underspend reflects ‘efficiency’ or ‘cuts’ (or, indeed, whether overspend represents ‘inefficiency’ or ‘increased output / outcomes’).

Nonetheless, the available evidence suggests that there is a need for a step-change in the level of asset maintenance and replacement at PR24 (and beyond) to ensure it is on a long-term sustainable path. In turn, this requires a step-change in the level of funding available for this through future price controls. We consider that there are two options to reform the regulatory framework at PR24 (and over the longer-term), which can appropriately balance the objectives of promoting this investment, alongside ensuring efficiency: (i) introducing price control deliverables to deliver specific asset maintenance and replacement projects identified by companies; and/or (ii) having a dedicated cost allowance for asset maintenance and replacement activities, with a specific under/outperformance sharing rate.

1A. Context

The long-term successful delivery of high quality and reliable water services requires resilient assets (including below-ground assets such as mains, but also above-ground assets such as reservoirs). Consistent with its ambition to “*focus on the long-term*,”¹ in its recently published discussion paper on operational resilience, Ofwat noted: “*it is critical that water companies have assets that are well maintained and operate as intended so that they meet the requirements of their statutory obligations and the expectations and needs of customers, the environment and wider society.*”²

The failure to maintain the required level of investment risks the long-term successful delivery of high quality and reliable water services.

Most assets in the water industry have relatively long asset lives, so ensuring the resilience of these assets primarily requires investment to undertake: (i) regular maintenance (to ensure assets can serve their useful asset lives); and (ii) replacement (when their useful asset lives have been exhausted). The failure to maintain this required level of investment risks the long-term successful delivery of high quality and reliable water services and, at the extreme, can have severe impacts on customers; the environment; and wider society.³

Water UK considers that, although the industry has delivered strong performance against many of its service outcomes (e.g. leakage), some of this performance has been achieved through very efficient, innovative and intensive use of ageing assets. It is conscious that the industry may not be able to continue to operate the system in this way indefinitely. In particular, this is becoming increasingly challenging as a result of: more volatile weather patterns; uneven population growth; and rising expectations from customers and society.

In this context, Water UK commissioned Economic Insight to consider whether, and how, the regulatory framework at PR24 (and beyond) could be updated to encourage a long-term sustainable level of asset maintenance and replacement.⁴ This report sets out the results of our findings, which are summarised below, where we:

- first, explain the key challenges for the regulatory framework in balancing the twin objectives of promoting investment and efficiency;
- second, summarise the available evidence relating to the need for a step-change in asset maintenance and replacement;
- third, consider the possible explanations for the prevailing evidence; and
- finally, present the options we consider can best deliver a long-term sustainable level of asset maintenance and replacement.

¹ *‘PR24 and beyond: Creating tomorrow, together.’ Ofwat (2021).*

² *‘Operational resilience discussion paper.’ Ofwat (2022).*

³ *‘Water main floods sunset strip.’ USA Today (2014).*

⁴ *In this report, unless otherwise stated, we use ‘asset maintenance and replacement’ to refer to the relevant activities undertaken by water companies.*

1B. Summary of assessment

The key challenges for the regulatory framework

A KEY CHALLENGE WITH ANY REGULATORY FRAMEWORK IS BALANCING THE TWIN OBJECTIVES OF PROMOTING EFFICIENCY ALONGSIDE PROMOTING INVESTMENT.

A key challenge with any regulatory framework is balancing the twin objectives of promoting efficiency alongside promoting investment (such that it is consistent with a long-term optimal / sustainable level). This issue can be especially challenging in relation to the funding of assets in the water industry, for the following reasons.

Firstly, **it is difficult to precisely define or identify the long-term sustainable level of asset maintenance and replacement.** Conceptually, the regulatory model should deliver asset maintenance and replacement up to the point where the (marginal) benefits it delivers (for customers, the environment and wider society) are equal to its (marginal) costs. However, this raises difficult questions regarding ‘*over what time horizon*’ one should be optimising investment; ‘*which benefits and costs*’ should be considered; and ‘*how to measure*’ these benefits and costs. In practice, there are no easy answers to these issues. That is to say, whilst we might consider that: (a) in the event of asset failure, the adverse consequences are such that we can safely conclude costs and benefits have not been appropriately balanced; and (b) the industry has a good understanding of how long assets might last, it is nonetheless not possible to *precisely* measure costs and benefits over multiple price controls to identify the optimal level of asset maintenance and replacement.

Secondly, **it is hard to establish whether the industry is delivering the desired level of asset maintenance and replacement.** Specifically, the long-lived nature of the assets in question means there can be significant lags between changes in investment expenditure and asset performance and, in due course, service levels. This implies that Ofwat cannot precisely observe the outcomes (at least not until it is too late) and, while Ofwat can observe totex spend, it cannot easily say whether any underspend is because of ‘efficiency’ (i.e. companies being able to better manage assets so that they can operate, maintain and replace them at lower costs) or ‘cuts’ (i.e. asset maintenance and replacement being reduced below its long-term sustainable level).

Related to the above, when balancing the objectives of efficiency and promoting investment, it is further challenging to quantify the harms arising from investment being below its long-term sustainable level. This is because the impact is not directly observable now; but rather, arises at some future point. In other words, although it is understood that the costs of failure of assets can be very high (as is evident from multiple examples of failures of critical assets in other countries),⁵ it is not straightforward to quantify the benefits of investing (or, the harms from not investing) in asset maintenance and replacement now (i.e. unless asset failure is already occurring, or is imminent).

Further to the above, to the extent that one considered that there was some evidence of asset maintenance and replacement being below its long-term sustainable level, one would need to assess the extent to which this was a function of: (i) companies benefitting from the associated savings, in order to generate returns (i.e. reflecting

⁵ [‘Water main floods sunset strip.’ USA Today \(2014\).](#)

wider inefficiencies); versus (ii) companies undertaking the maximum possible asset maintenance and replacement within the overall price determinations, and also reflecting trade-offs against other targets and priorities within the regulatory framework (i.e. reflecting a need for increased funding going forward).

Given the above, **it is vital for the regulatory framework to encourage the long-term sustainable level of asset maintenance and replacement**, while recognising the challenges in doing so. Most obviously, identifying the appropriate solution and incentives for PR24 (and beyond) means addressing the challenges associated with the inherent uncertainty in determining: (a) the long-term sustainable level; and (b) the reasons why investment may be below this.

The evidence suggests that there is a need for a step-change in the level of asset maintenance and replacement

Notwithstanding the issues in identifying the long-term sustainable level of asset maintenance and replacement, the available evidence suggests that there is a need for a step-change in the level of asset maintenance and replacement at this time. In particular:

- **The rate of replacement of mains in England and Wales is significantly below the European average.** Specifically, evidence suggests that the rate of replacement of drinking water assets in the water industry in England and Wales (of 0.1%)⁶ was 10 times lower than the European mean (of 1%) in 2021. Likewise, the rate of replacement of wastewater assets in the water industry in England and Wales (of 0.2%)⁷ was significantly lower than the European mean (of 0.6%) in 2021.
- **The age of mains in the water industry in England and Wales is, on average, around 60 years.**⁸ Although there is no ideal measure of asset health available, the data suggests that the age of mains in the water industry in England and Wales is, on average, around 60 years. Furthermore, there is a long tail of assets that are considerably older than this, with nearly 25% of assets being more than 80 years old; and over 13% of assets being more than 100 years old.
- **The depreciation rate for assets is falling over time, which means that assets are assumed to last longer.** In particular, the annual depreciation rate for water assets in the industry has fallen from 4.7% in 2006 to 4.0% in 2019 (i.e. a 15%

⁶ *The rate of replacement of drinking water assets is calculated as the 'Total length of potable mains renewed' in 2020-21 divided by the 'Total length of potable mains' at the start of the 2020-21 reporting year.*

⁷ *The rate of replacement of wastewater assets is calculated as the 'Total length of rising mains replaced or structurally refurbished' in 2020-21 divided by the 'Total length of rising mains' at the start of the 2020-21 reporting year.*

⁸ *The average age of mains has been calculated using the total length of mains in the industry that were built in different periods (as reported by companies in their Annual Performance Reports for 2021).*

decline). Similarly, the annual depreciation rate for wastewater assets in the industry has fallen from 4.8% in 2006 to 3.6% in 2019 (i.e. a 25% decline).⁹

There are multiple reasons that might explain the trend in depreciation rate, and the relative position of the water industry in England and Wales in relation to asset maintenance and replacement, and asset age. For example, to some degree this might reflect the water industry in England and Wales being able to successfully manage its assets, such that their useful (optimal) lives have been extended. However, the *extent* to which the water industry in England and Wales is an outlier relative to other European countries (and the *rate of change* in depreciation) is such that the data appears consistent with investment now being below the long-term sustainable level. Moreover, to the extent that innovation in asset management somewhat explains the data (i.e. companies have managed assets efficiently), one would need to consider *‘how long’* into the future they could continue to adopt approaches to maintain, or further extend, asset lives that appear much longer than in other countries.

A step-change in regulatory action [and] water company investment...is urgently required.
– EAC

Importantly, from a more dynamic perspective, climate change and population growth are likely to create *additional* future pressures on water assets. For instance, Sir James Bevan (CEO of the Environment Agency) has highlighted that we are at an important moment for encouraging a step-change in infrastructure renewal to address climate and growth challenges.¹⁰ Similarly, the Environment Audit Committee (EAC) recently noted that *“a step-change in regulatory action [and] water company investment...is urgently required.”*¹¹

A step-change in the funding for asset maintenance and replacement is required in future price controls

If the evidence suggests that asset maintenance and replacement is below its long-term sustainable level (which appears to be the case), one next needs to assess the extent to which this might be due to companies: (i) benefitting from the associated savings in order to generate returns; versus (ii) undertaking the maximum possible asset maintenance and replacement within the overall regulatory allowances (i.e. potentially reflecting a need for increased funding in this area going forward).

To consider this, we have examined data on totex spend and company returns across multiple price controls. From this analysis **we find no evidence that the industry (as a whole) is making ‘cuts’ in order to generate returns.** In particular:

- **There is no evidence the industry has made ‘cuts’ in investment on asset maintenance and replacement by underspending its totex allowances.** Since PR99, there has only been a modest overall totex underspend of 2%. In fact, in the period where this information is available, evidence indicates that the industry (on

⁹ *The annual depreciation rate for water assets has been calculated using the ‘Depreciation Charge for year’ for ‘Water Service’ reported in the Annual Performance Reports (APRs) divided by the ‘Average RCV’ for water assets for the year. The average RCV for water assets is calculated using the average RCV split between water and wastewater assets reported for PR14. The calculation for the depreciation rate for wastewater assets is the same. The depreciation rate for the industry has been calculated using the aggregate ‘Depreciation Charge for year’ and the ‘Average RCV’ across the industry.*

¹⁰ *‘Water quality in rivers, Fourth Report of Session 2021–22.’ Environmental Audit Committee (2022); page 5.*

¹¹ *‘Water quality in rivers, Fourth Report of Session 2021–22.’ Environmental Audit Committee (2022); page 5.*

average) overspent its capital maintenance allowance. In other words, the industry has actually prioritised capital maintenance (i.e. asset maintenance and replacement activities) whilst staying (just) within its overall funding allowance.

- **There does not appear to be a link between the available asset health measures and companies' totex spend.** In particular, there appears to be no relationship between the average age of companies' mains in 2021 and their totex over/underspend. Likewise, there appears to be no relationship between companies' average depreciation rate between 2006 and 2019 and their totex over/underspend. Put simply, the totex spend in the industry does not appear to reflect a systematic strategy of companies 'cutting back.'
- **There does not appear to be a link between the available asset health measures and companies' returns.** In particular, there appears to be no relationship between the average age of companies' mains in 2021 and their return on capital employed (ROCE). Similarly, there appears to be no relationship between companies' average depreciation rate between 2006 and 2019 and their ROCE. Hence, consistent with the above, there does not seem to be evidence of any strategy to 'boost returns' through approaches to asset management.

THE STEP-CHANGE IN ASSET MAINTENANCE AND REPLACEMENT REQUIRED REFLECTS THE NEED FOR A STEP-CHANGE IN THE FUNDING AVAILABLE FOR THIS THROUGH FUTURE PRICE CONTROLS.

In summary, taking the evidence 'in the round', it suggests that: (a) asset maintenance and replacement is below its long-term sustainable level; and (b) this is not due to companies making cuts to support overall returns. Hence, the step-change in asset maintenance and replacement required also reflects the need for a step-change in the funding available for this through future price controls.

We have developed five options for increasing the level of asset maintenance and replacement at PR24 and beyond

Following from the above, we have developed five options for increasing the level of asset maintenance and replacement through increased funding at PR24 and beyond. These options are on a spectrum that reflects the inherent trade-off between meeting the regulatory objectives of: (a) ensuring that the necessary investment takes place; and (b) ensuring efficiency.

- Option 1: Dedicated cost allowance for asset maintenance and replacement. Whereas currently, asset maintenance and replacement is implicitly funded through base costs, in this approach Ofwat would extract (i.e. separately identify) asset maintenance and replacement costs from wider base allowances; and instead create a ring-fenced sum that is purely intended for asset maintenance and replacement. To incentivise companies to make this investment (i.e. to undertake asset maintenance and replacement activities), there would be no underspend rewards; but there would be a minor overspend penalty to maintain some efficiency incentive. Logically, since the historical level of funding would be expected to only result in historical levels of asset maintenance and replacement, *a step-change in asset maintenance and replacement would require a commensurate step-change in funding.* Therefore, we would expect the dedicated cost allowance for asset maintenance and replacement for the industry to be materially higher than the implicit level of asset maintenance and replacement costs identified in the

base costs. To achieve this, the size of the dedicated cost allowance would be based on: (i) the level of asset maintenance and replacement that has historically been delivered from the expenditure that would be extracted from the base costs; *plus* (ii) an uplift for the additional asset maintenance and replacement that needs to occur, relative to previous levels.

- b. Option 2: Specific totex under/outperformance sharing rate for asset maintenance and replacement costs. In this approach, Ofwat would exclude asset maintenance and replacement costs from the overall totex under/outperformance sharing rate, and instead, apply a specific sharing rate for these costs to encourage greater investment. Specifically, the reward for underspending on asset maintenance and replacement costs would be *conditional on also meeting a certain output level of asset maintenance and replacement*. This ensures that companies deliver the sufficient level of asset maintenance and replacement, and do not ostensibly achieve efficiency by making ‘cuts.’ This option does not, in and of itself, address the need for a step-change in funding identified above. However, as we recommend below, this could be combined with Option 1 to improve its effectiveness. The advantage of this option is that, by creating incentives around the ‘activities’ associated with asset maintenance and replacement, one has an approach that **simultaneously retains an efficiency incentive, whilst giving some security that this is not being conflated with ‘cuts’** (i.e. there is also a clear incentive for the investment to occur, because the financial under/overspend incentive only applies if the relevant asset maintenance and replacement activity is undertaken).
- c. Option 3: Price control deliverables for additional asset maintenance and replacement activities. Ofwat has proposed to use price control deliverables (PCDs) at PR24 as a way of creating additional funding for *specific projects* or outputs. We propose that PCDs could be used by companies to fund specific asset maintenance and replacement activities *over and above* the volume of asset maintenance and replacement activities that have historically been achieved (and implicitly funded) through base costs.
- d. Option 4: No regrets cost allowance for asset maintenance and replacement. Under this approach, Ofwat would set a long-term, industry-wide target level of asset maintenance and replacement. In order to meet this, companies would be permitted to spend as much as they require on asset maintenance and replacement, with costs being ‘passed-through’ to customers. This approach would be akin to adopting a ‘rate of return’ regulatory model *specifically for asset maintenance and replacement expenditure*. The underlying perspective for this solution is that, if one considers that the future costs of not intervening in this area are so great, then any level of expenditure in the short-to-medium-term is justified (i.e. the investment is essential to avoid significant future harms). A ‘softer’ version of this option would involve Ofwat giving more scrutiny to company proposals, including setting more stringent evidence thresholds and efficiency requirements. At the end of the target period, companies would share underspend rewards with customers (conditional on still achieving the specified target), to ensure an efficiency incentive applies.

- e. Option 5: Update existing asset health outcome delivery incentives (ODIs). Under this option, Ofwat would integrate targets for the level of asset maintenance and replacement into the existing asset health ODIs. For instance, one way of doing this would be that companies would only benefit from the ODI reward if they also meet a certain level of asset maintenance and replacement activity or expenditure. Similarly to Option 2, this would make the rewards/penalties contingent on *outputs* (as well as *outcomes*).

To reach a recommendation, we have evaluated these options against the following criteria:

- the extent to which the option results in increase in funding
- the extent to which the option provides incentives to invest
- the extent to which the option provides incentives to maintain efficiency
- the extent to which the option allows flexibility to future changes
- the extent to which the option results in impact on bills
- the extent to which the option ensures delivery of well-prioritised investment
- the extent to which the option is aligned with Ofwat PR24 proposals
- the extent to which the option ensures company accountability
- the extent to which the option increases regulatory burden
- the extent to which the option is practical for companies

Table 1 summarises the results of our evaluation (where **red** reflects the lowest score of 0, **amber** reflects a medium score of 5, and **green** reflects the highest score of 10).

Table 1: Evaluation of options

Criterion	Option 1	Option 2	Option 3	Option 4	Option 5	Combined: Option 1 and Option 2
Increase in funding	Green	Red	Yellow	Green	Red	Green
Incentives to invest	Yellow	Green	Green	Green, Yellow	Green	Green
Incentives to maintain efficiency	Yellow	Green	Green	Red	Yellow, Red	Green
Flexibility to future changes	Green	Yellow	Red	Green	Yellow	Yellow
Impact on bills	Yellow	Green	Yellow	Red	Green	Yellow
Delivery of well-prioritised investment	Yellow	Yellow, Red	Yellow	Green, Yellow	Red	Yellow
Alignment with Ofwat PR24 proposals	Green	Red	Green	Yellow	Red	Yellow
Company accountability	Red	Yellow	Green	Green, Yellow	Green	Green
Regulatory Burden	Yellow	Green	Green	Yellow	Green	Yellow
Practicality	Yellow	Green	Yellow	Yellow	Green	Green, Yellow
Average score	6.0	6.3	7.0	5.8	5.8	7.3

Source: Economic Insight.

Conclusions and recommendations

As noted above, the evidence indicates that: (a) there is a need for a step-change in the level of asset maintenance and replacement (i.e. both the investment and activity); and (b) this, in turn, requires a step-change in the funding available for this through future price controls.

Following from this, our assessment of the options indicates that the following two options would appropriately balance the objectives of promoting increased investment while ensuring efficiency:

- (i) introducing PCDs aimed to deliver specific asset maintenance and replacement projects (i.e. Option 3); and/or
- (ii) having a dedicated cost allowance for asset maintenance and replacement activities, combined with a specific under/outperformance sharing rate (i.e. a combined Option 1 and 2).

Option 3 would be best suited to incentivise specific asset maintenance and replacement projects identified by individual companies, while the combined Option 1 and 2 would be best suited to address the asset maintenance and replacement needs for the industry as a whole (i.e. moving the industry towards the long-term sustainable level of asset maintenance and replacement).

A DEDICATED COST ALLOWANCE FOR ASSET MAINTENANCE AND REPLACEMENT ACTIVITIES, COMBINED WITH A SPECIFIC UNDER/OUTPERFORMANCE SHARING RATE, WOULD BE BEST SUITED TO MOVE THE INDUSTRY TOWARDS THE LONG-TERM SUSTAINABLE LEVEL OF ASSET MAINTENANCE AND REPLACEMENT.



2 The challenges in ensuring long-term sustainable level of asset maintenance and replacement

A key challenge for the regulatory framework is balancing the objectives of promoting investment and incentivising efficiency. This is especially difficult in the context of asset health because there can be long lags between investment spend and any impact on asset performance (and, hence, impacts on observable service levels). Therefore, although Ofwat can observe overall totex spend, it cannot easily identify whether any underspend reflects ‘efficiency’ or ‘cuts.’ Nonetheless, the available evidence suggests that there is a need for a step-change in the level of asset maintenance and replacement at PR24 (and beyond) to ensure it is on a long-term sustainable path. In turn, this requires a step-change in the level of funding available for this through future price controls.

2A. Introduction

In this chapter, we consider the challenges for the regulatory framework in ensuring the long-term sustainable level of asset maintenance and replacement, and the available evidence on the scale and scope of the issue in the water industry in England and Wales. Specifically, this chapter is structured as follows:

- in section 2B, we first set out the need to ensure a long-term sustainable level of asset maintenance and replacement, and the consequences of not doing so;
- in section 2C, we explain the key challenges for the regulatory framework in balancing the twin objectives of promoting investment and efficiency;
- in section 2D, we summarise the available evidence relating to the need for a step-change in asset maintenance and replacement in the water industry in England and Wales; and
- in section 2E, we consider the possible explanations for the prevailing evidence, which helps us identify the key issues that the reform to the regulatory framework needs to address.

2B. The need for a long-term sustainable level of asset maintenance and replacement

The long-term successful delivery of high quality and reliable water services requires resilient assets (including below-ground assets such as mains, but also above-ground assets such as reservoirs). Consistent with its ambition to “*focus on the long-term*,”¹² in its recently published discussion paper on operational resilience, Ofwat noted: “*it is critical that water companies have assets that are well maintained and operate as intended so that they meet the requirements of their statutory obligations and the expectations and needs of customers, the environment and wider society.*”¹³

Most assets in the water industry have relatively long asset lives, so ensuring the resilience of these assets primarily requires investment to undertake: (i) regular maintenance (to ensure assets can serve their useful asset lives); and (ii) replacement (when their useful asset lives have been exhausted).

The failure to maintain this required level of investment risks the long-term successful delivery of high quality and reliable water services and, at the extreme, can have severe impacts on customers, the environment and wider society. The Department for Environment Food & Rural Affairs (DEFRA) also recognises: “*effective management of assets will support future resilience of service and provide benefits to the environment and society through, for example, reduced environmental harm and fewer flooding and pollution incidents.*”¹⁴ In fact, there have been multiple examples of the impacts of such failure in other countries, for instance in California in 2014 (please see box below).

In England and Wales, the UKWIR has projected that, if no action is taken to increase the level of asset maintenance and replacement, service quality will deteriorate significantly by 2050, such that: water mains bursts will increase by 20%; the number of interruptions to water supplies will increase by 25%; and sewer blockages and collapses, and the resulting flooding and pollution, will increase by 6%.¹⁵

¹² *‘PR24 and beyond: Creating tomorrow, together.’ Ofwat (2021).*

¹³ *‘Operational resilience discussion paper.’ Ofwat (2022).*

¹⁴ <https://www.gov.uk/government/publications/strategic-policy-statement-to-ofwat-incorporating-social-and-environmental-guidance/february-2022-the-governments-strategic-priorities-for-ofwat>

¹⁵ *‘Long Term Investment in Infrastructure.’ UKWIR (2017).*

Case study: Sunset strip, California, 2014

A break in a 36-inch steel pipe that was constructed in 1916, then coated with cement in 1957 to prolong its life, prompted a spillage of nearly 10,000 gallons per minute along sunset strip in West Hollywood, California.

This followed the closure of the same street just two months earlier when a rupture of a century-old water main ripped a 15-foot hole through the street and turned parts of the University of California, Los Angeles into a swamp.

These events sparked calls for an increase in the replacement of Los Angeles' ageing water network.¹⁶



2C. Key challenges for the regulatory framework in ensuring the long-term sustainable level of asset maintenance and replacement

A key challenge with any regulatory framework is balancing the twin objectives of promoting efficiency alongside promoting investment (such that it is consistent with a long-term optimal / sustainable level). This issue can be especially challenging in relation to the funding of assets in the water industry, for the following reasons.

Firstly, **it is difficult to precisely define or identify the long-term sustainable level of asset maintenance and replacement.** Conceptually, the regulatory model should deliver asset maintenance and replacement up to the point where the (marginal) benefits it delivers (for customers, the environment and wider society) are equal to its (marginal) costs. However, this raises difficult questions regarding 'over what time horizon' one should be optimising investment; 'which benefits and costs' should be considered; and 'how to measure' these benefits and costs. In practice, there are no easy answers to these issues. That is to say, whilst we might consider that: (a) in the event

¹⁶ ['Water main floods sunset strip.'](#) USA Today (2014)

of asset failure, the adverse consequences are such that we can safely conclude costs and benefits have not been appropriately balanced; and (b) the industry has a good understanding of how long assets might last, it is nonetheless not possible to *precisely* measure costs and benefits over multiple price controls to identify the optimal level of asset maintenance and replacement.

Secondly, **it is hard to establish whether the industry is delivering the desired level of asset maintenance and replacement.** Specifically, the long-lived nature of the assets in question means there can be significant lags between changes in investment expenditure and asset performance and, in due course, service levels. Consequently, Ofwat cannot easily observe the relevant outcomes (at least, not until it is too late). Further, while Ofwat can observe totex spend, it cannot easily say whether any underspend is because of ‘efficiency’ (i.e. companies being able to better manage assets so that they can operate, maintain and replace them at lower costs) or ‘cuts’ (i.e. maintenance and replacement activity being reduced below its long-term sustainable level).

Related to the above, when balancing the objectives of efficiency and promoting investment, it is further challenging to quantify the harms arising from investment being below its long-term sustainable level. This is because the adverse impact is not directly observable now; but rather, arises at some future point. In other words, although it is understood that the costs of failure of assets can be very high (as is evident from multiple examples of failures of critical assets in other countries),¹⁷ it is not straightforward to quantify the benefits of investing (or, the harms from not investing) in asset maintenance and replacement now (i.e. unless asset failure is already occurring, or is imminent).

Ofwat also recognises this in its recently published discussion paper on operational resilience: “*While the outcomes regime does capture a company's failure to mitigate risks when they have an impact on service, it focuses on performance at a point in time. Therefore, it may not always provide the breadth and depth of information needed to gain insight into the effectiveness of a company's approach to maintaining assets or managing current and future risks” (emphasis added).¹⁸*

Furthermore, to the extent that one considered that there was some evidence of asset maintenance and replacement being below its long-term sustainable level, one would then need to assess the extent to which this was a function of companies: (i) benefitting from the associated savings, in order to generate returns (i.e. reflecting wider inefficiencies); versus (ii) undertaking the maximum possible asset maintenance and replacement within the overall price determinations, and also reflecting trade-offs against other targets and priorities within the regulatory framework (i.e. reflecting a need for increased funding going forward).

Given the above, **it is vital for the regulatory framework to encourage the long-term sustainable level of asset maintenance and replacement**, while recognising the challenges in doing so. Most obviously, identifying the appropriate solution and incentives for PR24 (and beyond) means addressing the challenges associated with the

OFWAT ALSO RECOGNISES THAT THE OUTCOMES REGIME FOCUSES ON PERFORMANCE AT A POINT IN TIME BUT MAY NOT ALWAYS PROVIDE INFORMATION INTO A COMPANY'S APPROACH TO MANAGING FUTURE RISKS.

¹⁷ [‘Water main floods sunset strip.’ USA Today \(2014\).](#)

¹⁸ [‘Operational resilience discussion paper.’ Ofwat \(2022\).](#)

inherent uncertainty in determining: (a) the long-term sustainable level; and (b) the reasons why investment may be below this.

2D. Evidence on the long-term sustainable level of asset maintenance and replacement

Notwithstanding the issues in precisely identifying the *long-term sustainable level* of asset maintenance and replacement, we consider the evidence available on the level of asset maintenance and replacement *at this time*.

Evidence on asset health

In this section, we consider the available measures of asset health for the water industry in England and Wales.

In practice, there is no “perfect” measure of asset health available at this time. For instance, although the age of assets is a relevant indicator of asset health, it does not account for the volume of use (which may also affect the status of asset health).

Recognising the above, Ofwat has proposed to develop an integrated monitoring framework to provide a richer picture of asset health and operational resilience for customers and stakeholders. This work is expected to start in 2022-23; and the resultant framework is expected to be fully implemented from 2026 onwards.¹⁹

Therefore, here we use the measures of asset health currently available. This includes:

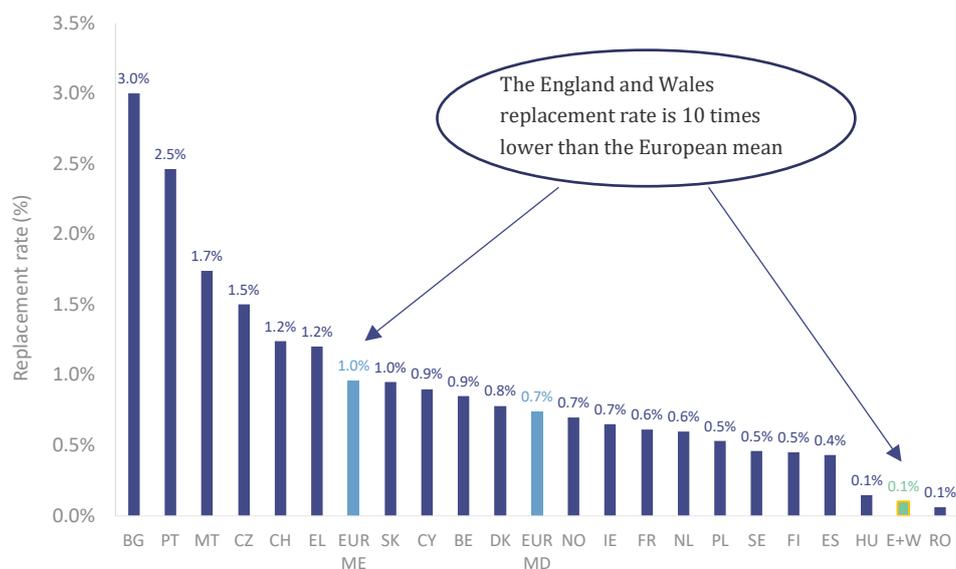
- the rates of replacement of mains (compared to other European countries);
- the average age of mains in the industry; and
- trends in depreciation since 2006.

¹⁹ *Operational resilience discussion paper.* Ofwat (2022).

Rates of replacement of mains

Figure 1 presents a comparison of the rate of replacement of water mains in England and Wales against the average asset renewal rate for water infrastructure in other European countries (as collected by EurEau for periods between 2017 and 2019 in their 'Europe's Water in Figures' report).²⁰

Figure 1: Rate of replacement of water mains (see notes for time period)



Sources: Economic Insight analysis of the following data sources: (i) 'Europe's Water in Figures.' EurEau (2021); and (ii) 2021 Annual Performance Reports.

Notes: The renewal rate of water assets for England and Wales is calculated as the 'Total length of potable mains renewed' in 2020-21 divided by the 'Total length of potable mains' at the start of the 2020-21 reporting year. European data relates to average asset renewal rate for drinking water infrastructure for periods 2017-2019 (depending on the country), while the data for England and Wales relates to 2021.

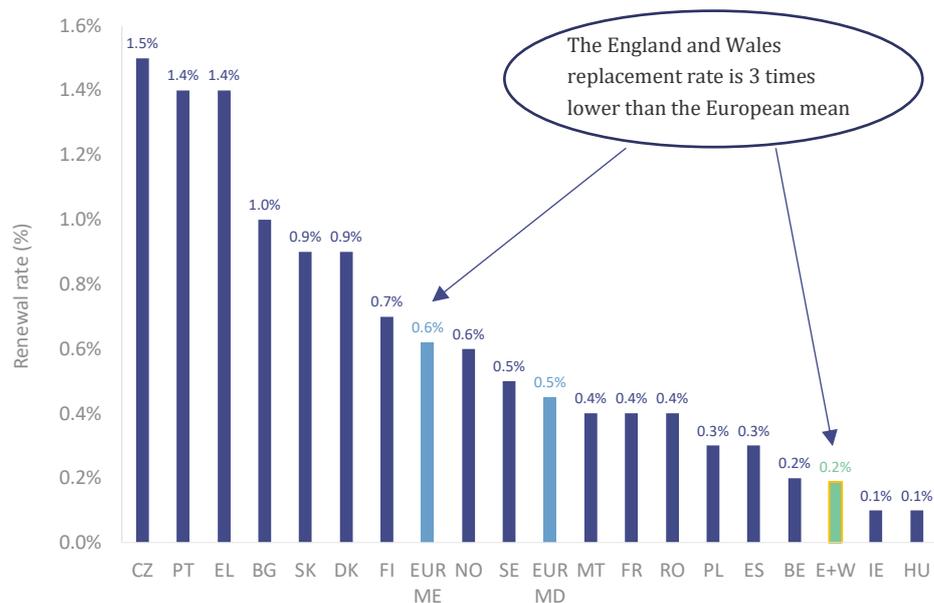
The above shows that **the rate of replacement of drinking water assets in England and Wales (of 0.1%) was 10 times lower than the European mean (of 1.0%) and 7 times lower than the European median (of 0.7%).**²¹

Similarly, Figure 2 presents a comparison of the rate of replacement of wastewater mains in England and Wales against the average asset renewal rate for wastewater infrastructure in other European countries. Again, this shows that **the rate of replacement of wastewater assets in England and Wales (of 0.2%) was lower than both the European mean (of 0.6%) and the European median (of 0.5%).**

²⁰ 'Europe's Water in Figures.' EurEau (2021).

²¹ We note that, in any given year, the needs for asset replacement in different countries might be different. Therefore, we place more focus on the comparison of the asset replacement rates in the water industry in England and Wales with representative averages of asset replacement rates across European countries (i.e. mean and median), as opposed to the comparison of asset replacement rates in specific countries,

Figure 2: Rate of replacement of wastewater mains (see notes for time period)



Sources: Economic Insight analysis of the following data sources: (i) *'Europe's Water in Figures.'* EurEau (2021); and (ii) 2021 Annual Performance Reports.

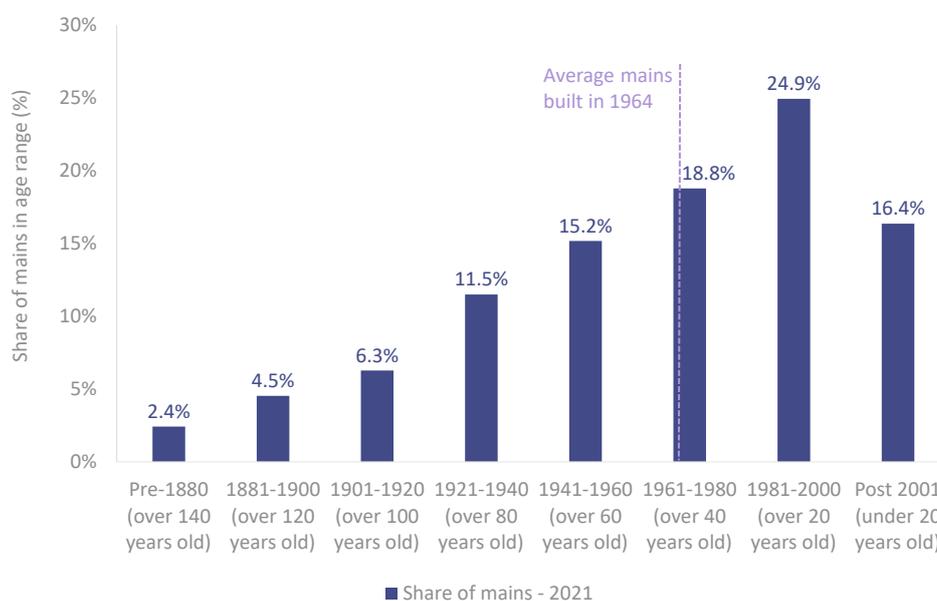
Notes: The renewal rate of wastewater assets for England and Wales is calculated as the "Total length of rising mains replaced or structurally refurbished" in 2020-21 divided by the "Total length of rising mains" at the start of the 2020-21 reporting year. European data relates to average asset renewal rate for wastewater infrastructure for periods 2017-2019 (depending on the country), while the data for England and Wales relates to 2021.

Age of mains

Figure 3 presents the percentage share of total mains length (as of 2021) in the water industry in England and Wales that was built (or, structurally refurbished) in a given time period. This shows that, as of 2021, **mains are (on average) 57 years old**. Furthermore, **there is a 'long tail' of assets that are older than this**, with:

- 24.7% of assets being over 80 years old; and
- 13.2% of assets being over 100 years old.

Figure 3: Share of mains length built or structurally refurbished in given time period (2021)

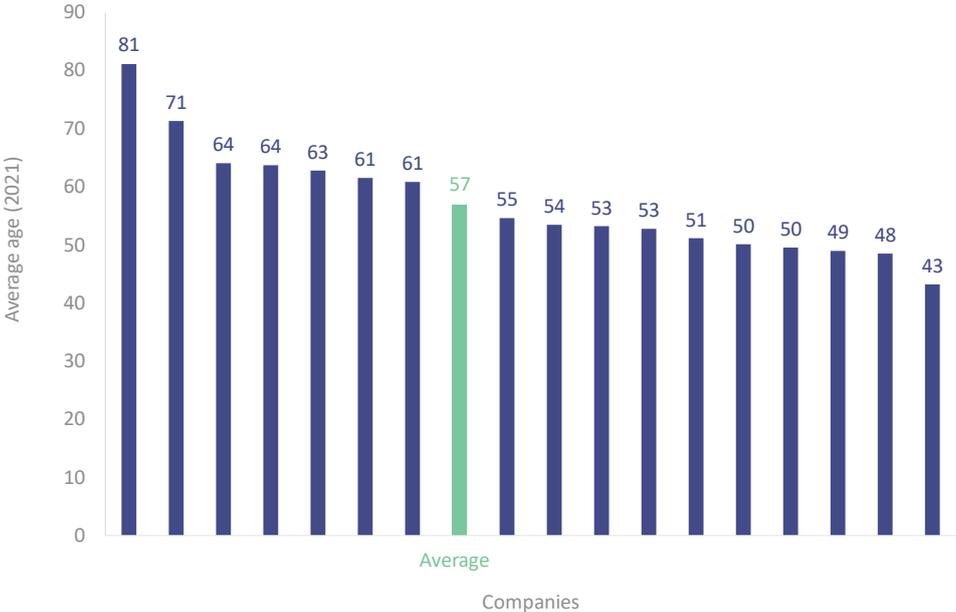


Sources: *Economic Insight analysis of 2021 Annual Performance Reports.*

Notes: *Midpoints of periods are used to calculate average age of mains. For instance, mains built in '1881-1900' period were assumed to be built in 1890. Mains built in 'Pre-1880' period were assumed to be built in 1870 and, similarly, mains built in the 'Post 2001' period were assumed to be built in 2010.*

Figure 4, which presents the average age of mains across companies, indicates that **this trend appears to be consistent across the industry**. Specifically, as of 2021, the average age of mains in the industry is 57 years; and only three companies deviate from the industry average by more than 10 years (in either direction).

Figure 4: Variation in average age of mains at company level (2021)

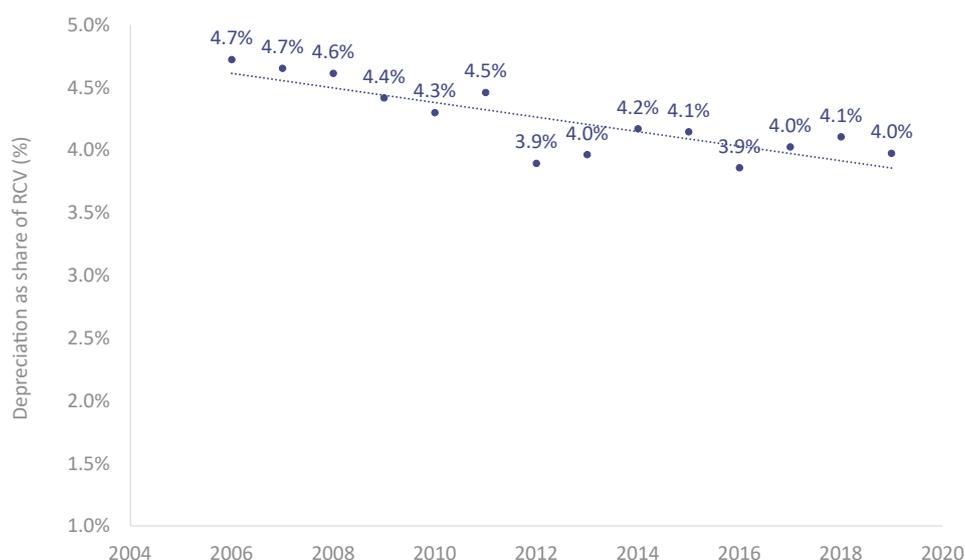


Sources: Economic Insight analysis of 2021 Annual Performance Reports.
Notes: Midpoints of periods are used to calculate average age of mains. For instance, mains built in '1881-1900' period were assumed to be built in 1890. Mains built in 'Pre-1880' period were assumed to be built in 1870 and, similarly, mains built in the 'Post 2001' period were assumed to be built in 2010.

Trend in depreciation rates

Figure 5 presents the industry-average annual depreciation rates for water assets reported by companies in their Annual Performance Reports (APRs) between 2006 and 2019. This shows that the **annual depreciation rate for water assets in the industry has fallen from 4.7% in 2006 to 4.0% in 2019** (i.e. a 15% decline). Looking at this comparison at the company level, we find the trend is broadly consistent across the industry.

Figure 5: Industry annual depreciation rate on water assets, 2006-2019



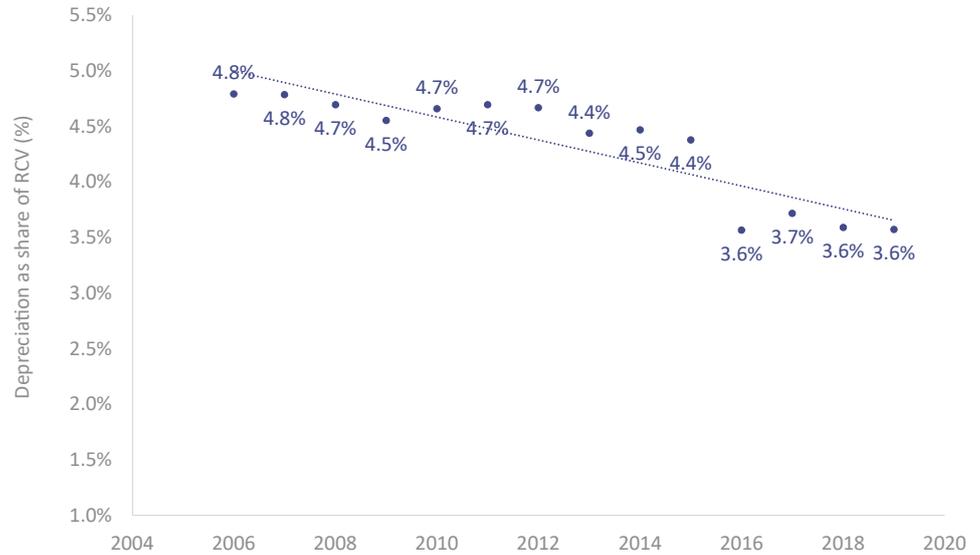
Sources: Economic Insight analysis of 2006-2019 Annual Performance Reports.

Notes: The depreciation rate has been calculated using the 'Depreciation Charge for year' for 'Water Service' divided by the 'Average RCV' for water assets for the year. The average RCV for water assets is calculated using the average RCV split between water and wastewater assets reported for PR14. The depreciation rate for the industry has been calculated using the aggregate 'Depreciation Charge for year' and the 'Average RCV' across the industry.

Similarly, Figure 6 presents the industry-average annual depreciation rates for wastewater assets reported by companies in their APRs between 2006 and 2019.

This shows that the **annual depreciation rate for wastewater assets in the industry has fallen from 4.8% in 2006 to 3.6% in 2019** (i.e. a 25% decline).

Figure 6: Industry depreciation rate on wastewater assets, 2006-2019



Sources: *Economic Insight analysis of 2006-2019 Annual Performance Reports.*

Notes: The depreciation rate has been calculated using the 'Depreciation Charge for year' for 'Wastewater' divided by the 'Average RCV' for wastewater assets for the year. The average RCV for wastewater assets is calculated using the average RCV split between water and wastewater assets reported for PR14. The depreciation rate for the industry has been calculated using the aggregate 'Depreciation Charge for year' and the 'Average RCV' across the industry.

Assessment of future challenges

Further to the existing data, from a more dynamic perspective, multiple stakeholders have indicated that **climate change and population growth are likely to create additional future pressures on water assets**. For instance:

- In a recent report, the Environment Audit Committee (EAC) noted that Ofwat had not sufficiently considered the investment necessary to ensure that the sewerage system was fit for 21st century issues – highlighting factors such as housing growth and the impact of climate change.²²
- DEFRA echoed these concerns; and in a recent press release, noted: “*climate change has led to increased rainfall and water infrastructure has not kept pace with development growth over decades.*”²³
- Similarly, Sir James Bevan (the Chief Executive of the Environment Agency) recently stated that “*too many parts of our sewage system are not fit for the 21st century and have not been upgraded since Victorian times.*”²⁴

²² *'Water quality in rivers, Fourth Report of Session 2021–22.'* Environmental Audit Committee (2022); page 74.

²³ *'Taskforce sets goal to end pollution from storm overflows.'* UK Government press release (2021). Available at: <https://www.gov.uk/government/news/taskforce-sets-goal-to-end-pollution-from-storm-overflows>

²⁴ *'Water: Myths, Facts and Inconvenient Truths.'* Speech by Sir James Bevan (2022). Available at: <https://www.gov.uk/government/speeches/water-myths-facts-and-inconvenient-truths>

As a result, a number of stakeholders have suggested that **there is a need for a step-change in asset maintenance and replacement** to address future challenges. In particular:

- In summarising the current position of asset maintenance and replacement in the water industry, the EAC has noted that *“a step-change in regulatory action [and] water company investment...is urgently required.”*²⁵
- In submissions to the EAC, Nick Measham (the CEO of Salmon & Trout Conservation) stated: *“[w]ithout a step-change in public policy – leading to significantly increased levels of investment in water infrastructure – the situation will only worsen, with dire economic and environmental consequences.”*²⁶
- In its recent consultation on storm overflows, DEFRA stated that long-term resilience and environmental enhancement were government commitments for the future of the water sector.²⁷

The box overleaf provides an example, based on work undertaken by Anglian Water of the likely impact of climate change on its network, and customers.

²⁵ *‘Water quality in rivers, Fourth Report of Session 2021–22.’ Environmental Audit Committee (2022); page 5.*

²⁶ *‘Time to Fix the Broken Water Sector.’ Angling Trust webpage. Available at: <https://anglingtrust.net/2021/09/27/time-to-fix-the-broken-water-sector/>*

²⁷ *‘Consultation on the Government’s Storm Overflows Discharge Reduction Plan.’ Defra (2022).*

Case study: Impact of climate change on Anglian Water's network

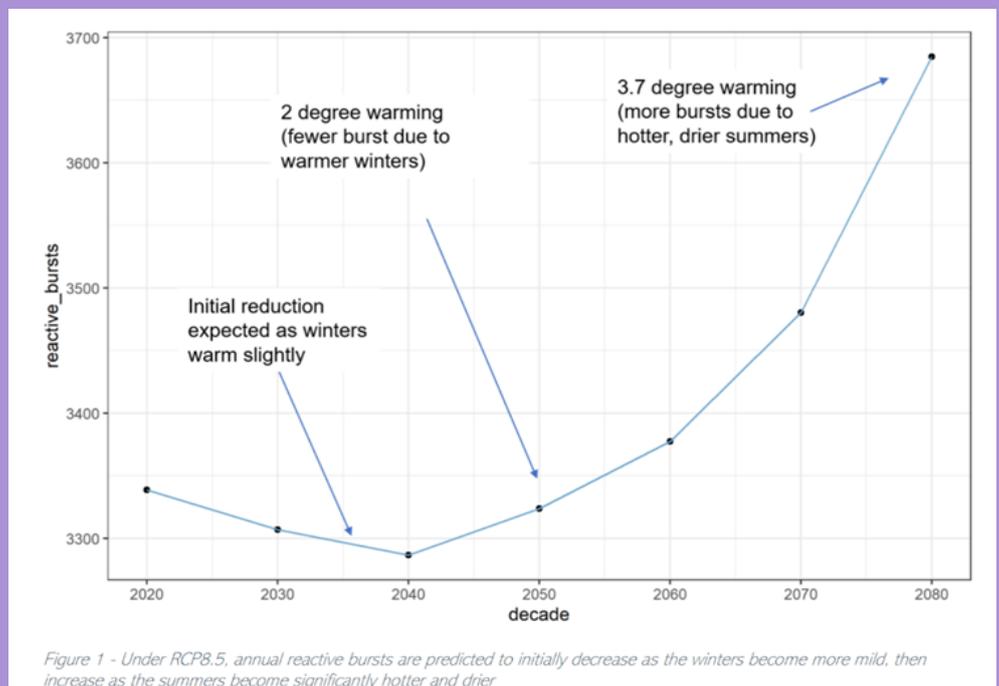
Anglian Water worked with Dr Tim Farewell from Cranfield University to understand the impact of climate change on its network assets.

Anglian Water's 39,000km network was broken into 50m segments, and the following details were captured for each segment: age; material; diameter; operating pressure; surface type; soil type; etc.

The research found that increasing temperatures would likely result in:

- a temporary marginal decrease in the frequency of winter bursts; but
- a larger **increase in bursts in the summer months**.

The graph below models the number of mains bursts expected under current conditions (i.e. absent any change in the level of asset maintenance and replacement).



This is expected to be a material issue for customers since **the demand for water is at its highest in the summer**, while the reservoirs are at their lowest.²⁸

²⁸ <https://www.youtube.com/watch?app=desktop&v=R0PncNDSQq4&feature=youtu.be>.

Conclusions

There are multiple reasons that might explain the trend in depreciation rate - and the relative position of the water industry in England and Wales in relation to asset maintenance and replacement; and asset age. For example, to some degree this might reflect the water industry in England and Wales being able to successfully manage its assets, such that their useful (optimal) lives have been extended. However, the *extent* to which the water industry in England and Wales is an outlier relative to other European countries (and the *rate of change* in depreciation) is such that the data appears consistent with investment now being below the long-term sustainable level. Moreover, to the extent that innovation in asset management somewhat explains the data (i.e. companies have managed assets efficiently), one would **need to consider 'how long' into the future they could continue to adopt approaches to maintain, or further extend, asset lives that appear much longer than in other countries.**

Importantly, from a more dynamic perspective, climate change and population growth are likely to create *additional* future pressures on water assets. Together, the evidence therefore suggests that **there is a need for a step-change in the level of asset maintenance and replacement going forward.**

2E. The implications of the need for investment for the regulatory framework

If the evidence suggests that asset maintenance and replacement is below its long-term sustainable level (which, based on the evidence above, appears to be the case), one next needs to assess the extent to which this might be a function of companies: (i) benefitting from the associated savings in order to generate returns; versus (ii) undertaking the maximum possible asset maintenance and replacement within the overall regulatory allowances (i.e. reflecting a need for increased funding in this area going forward).

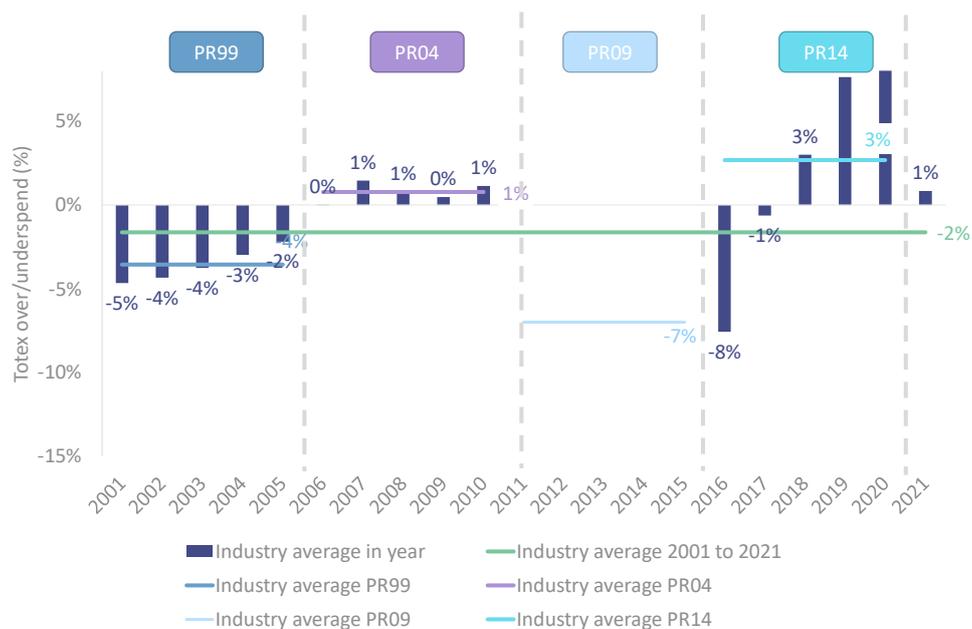
To consider this, we have looked at data on totex spend and company returns across multiple price controls, across the industry. In the round, the evidence does not indicate that companies are systematically making 'cuts' to asset maintenance and replacement to make savings (realise returns). Therefore, to the extent the evidence indicates a need for a step-change in asset maintenance and replacement and investment; the logical inference is that this also requires a step-change in the funding available for this through future price controls.

The extent to which the industry has underspent its allowance

Totex spend

In Figure 7, we present totex over/underspend by the industry (as a whole), between 2001 and 2021 (i.e. PR99 to PR14).

Figure 7: Totex over/underspend as a share of allowed totex (totex underspend (%)), 2001 to 2021



Sources: Economic Insight analysis of Ofwat Performance reports.

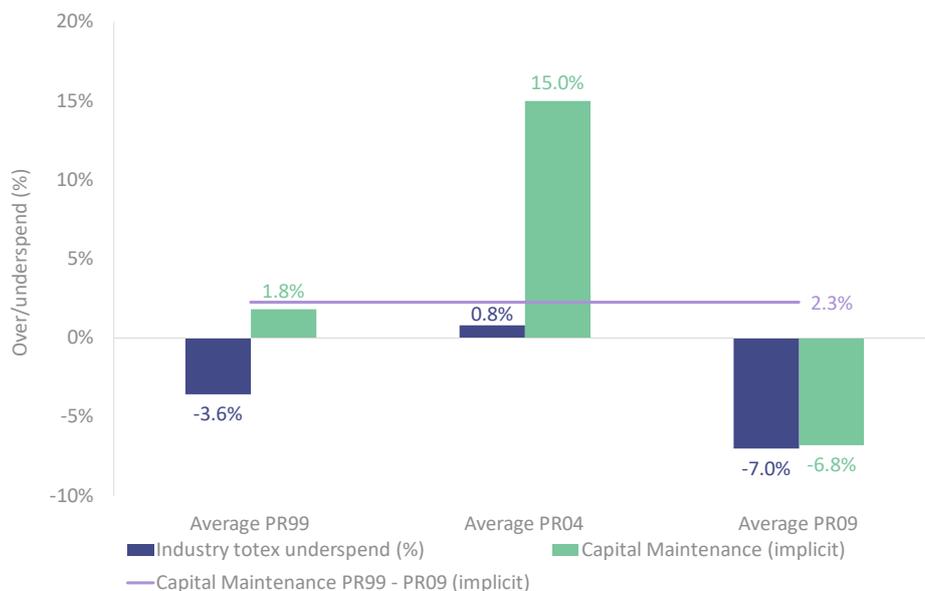
Notes: Individual year data is not available for PR09. Positive percentages indicate overspend, negative percentages indicate underspend.

This shows that, since PR99, there has only been a modest overall totex underspend of 2%. This modest level of underspend might be expected within the regulatory framework which incentivises companies to deliver services in a more efficient manner. Therefore, this low level of underspend in the last 20 years, in and of itself, suggests that **companies have not been systematically 'cutting back' on asset maintenance and replacement by underspending their totex allowances.**

Capital maintenance spend

In Figure 8, we compare overall totex over/underspend with the implicit over/underspend on capital maintenance (i.e. actual spend on capital maintenance compared to Ofwat's expectation when setting its final determination), for the price control periods that this information is available.

Figure 8: Totex underspend (%), and implicit underspend on capital maintenance (2001 to 2016)



Sources: Economic Insight analysis of: (i) Ofwat Final Determinations for PR99, PR04, PR09; and (ii) Ofwat performance reports.

Notes: Positive percentages indicate overspend; negative percentages indicate underspend.

This shows that, in the three price control periods where such a comparison is possible, companies have (on average) overspent on capital maintenance. This implies that **companies have actually prioritised capital maintenance (i.e. their asset maintenance and replacement activities)** whilst staying (just) within their overall funding allowance.

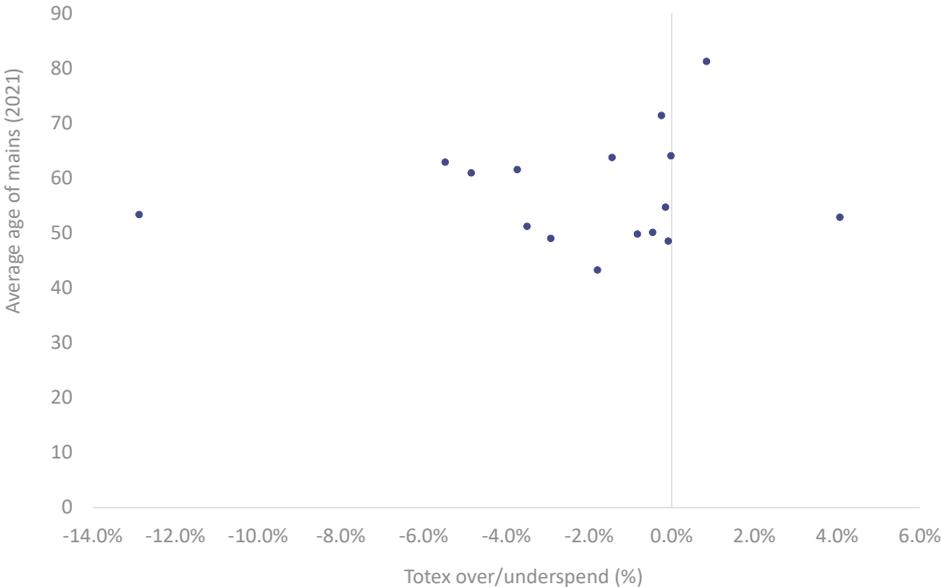
Relationship between asset health measures and totex spend

In this section, we assess the extent to which there is a relationship between the available asset health measures and totex spend. This is because, if companies were systematically adopting a strategy to facilitate overall performance through making 'cuts,' we would expect to see a strong correlation between totex underspend and asset health. However, in practice we find no such relationship.

Age of mains and totex spend

Figure 9 presents a scatter plot between the average age of companies' mains in 2021 and their totex over/underspend between 2001 and 2021.

Figure 9: Average age of mains in 2021 vs totex over/underspend (2001-2021)



Sources: Economic Insight analysis of: (i) 2001-2021 Annual Performance Reports; and (ii) Ofwat Performance reports.

Notes: Positive percentages indicate overspend; negative percentages indicate underspend.

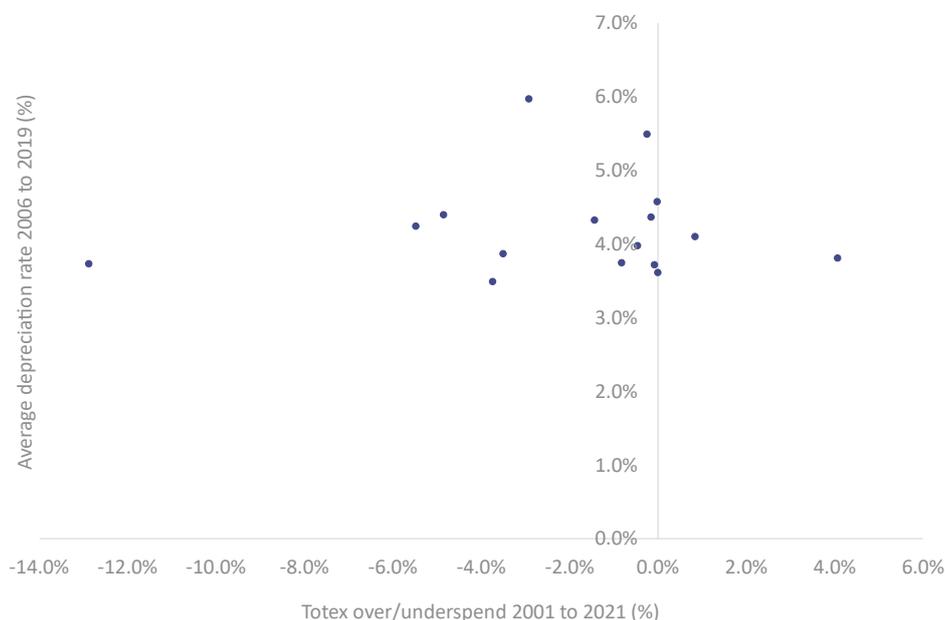
This shows that there is no apparent relationship between the extent to which a company over/underspent its totex and the age of its mains. Put simply, **the evidence is not consistent with companies systematically making 'cuts' (i.e. underspending their totex allowances) by not replacing their aged assets.**

Depreciation rate and totex spend

Figure 10 presents a scatter plot between companies' average depreciation rate between 2006 and 2019 and their totex over/underspend between 2001 and 2021.

Again, this shows that there is no apparent relationship between the extent to which a company over/underspent its totex and its depreciation rate. In other words, **the evidence again is not consistent with companies systematically making 'cuts' (i.e. underspending their totex allowances) by extending the assumed lives of their assets.**

Figure 10: Company depreciation (2006-2019) vs totex over/underspend (2001-2021)



Sources: *Economic Insight analysis of: (i) 2001-2021 Annual Performance Reports; and (ii) Ofwat Performance reports.*

Notes: Positive percentages indicate overspend; negative percentages indicate underspend.

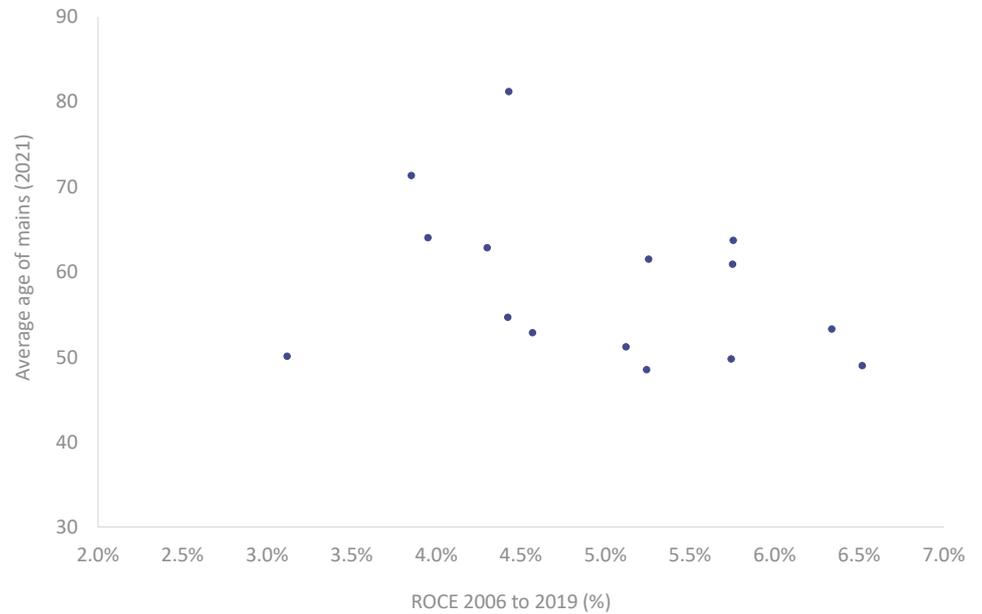
Relationship between asset health measures and returns

In this section, we assess the extent to which there is a relationship between the available asset health measures and company returns. Again, if there was a systematic strategy of making 'cuts' to 'boost returns,' it should be readily observable. However, we find no such relationship in the data.

Age of mains and returns

Figure 11 presents a scatter plot between the average age of companies' mains in 2021 and their return on capital employed (ROCE) between 2006 and 2019.

Figure 11: Average age of mains in 2021 vs ROCE (2006-2019)



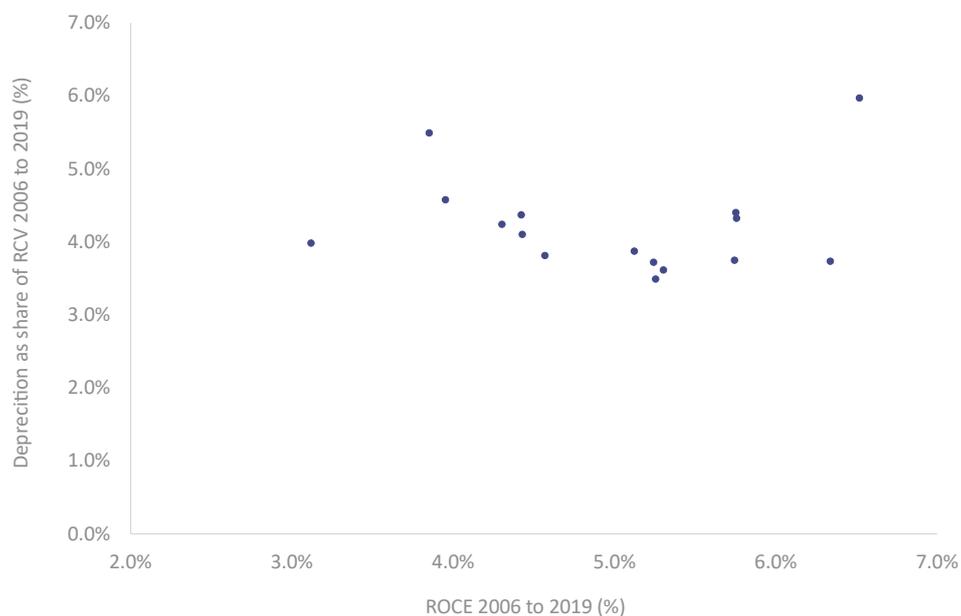
Sources: *Economic Insight analysis of 2006-2019 Annual Performance Reports.*

This shows that there is no apparent relationship between the returns earned across the industry and the age of mains. Put simply, **the evidence does not indicate that companies are systematically making 'cuts' by not replacing their aged assets, in order to earn higher returns overall.**

Depreciation rate and returns

Figure 12 presents a scatter plot between companies' average depreciation rate and their ROCE between 2006 and 2019.

Figure 12: Company depreciation and ROCE (2006-2019)



Sources: Economic Insight analysis of 2006-2019 Annual Performance Reports.

As can be seen, there is no apparent relationship between the returns earned and the depreciation rate. Thus, on this metric, **the evidence is also not consistent with companies systematically making 'cuts' by extending the lives of their assets to earn higher returns.**

Conclusions

In the round, the evidence above is most consistent with: (a) asset maintenance and replacement being below its long-term sustainable level (i.e. both the level of investment and the level of activity); and (b) this not being due to companies making cuts to support overall returns / wider performance. Hence, **the step-change in asset maintenance and replacement required also implies a need for a step-change in the funding available for this through future price controls.**



3 Options for ensuring the long-term sustainable level of asset maintenance and replacement

In this chapter, we consider the options available to reform the regulatory framework to deliver the step-change in asset maintenance and replacement required at PR24 (and beyond). In particular, following from the evidence in chapter 2, any valid option needs to: (a) deliver the commensurate step-change in funding required through the price control; and (b) appropriately balance the twin objectives of promoting investment, while ensuring efficiency. Our assessment indicates that the following options could appropriately balance these objectives: (i) introducing price control deliverables to deliver specific asset maintenance and replacement projects identified by individual companies; and/or (ii) having a dedicated cost allowance for asset maintenance and replacement activities, with a specific under/outperformance sharing rate.

3A. Introduction

This chapter is structured as follows:

- in section 3B, we set out the key considerations in identifying the options available to reform the regulatory framework;
- in section 3C, we develop the evaluation criteria we have used to assess each of the options available;
- in sections 3D to 3H, we detail each of our options, and our assessment of them against our evaluation criteria;
- in section **Error! Reference source not found.**, we finally set out the summary of our assessment, which then informs our conclusions and recommendations.

3B. The key considerations in identifying the options

In this section, we set out the key considerations we have kept in mind in designing the options to reform the regulatory framework to deliver the step-change in asset maintenance and replacement required at PR24 (and beyond).

Firstly, as discussed in chapter 2, the evidence suggests that the step-change in the level of asset maintenance and replacement also requires a step-change in the funding available for this in future price controls. Therefore, **the appropriate option must deliver the step-change in funding required.**

In practice, the options to balance the trade-off between promoting investment and ensuring efficiency exist on a spectrum.

Secondly, **the appropriate option must be able to balance the twin objectives of promoting investment while ensuring efficiency.** In practice, the options to balance the trade-off between promoting investment and ensuring efficiency exist on a spectrum. That is to say, there are options which prioritise promoting investment over ensuring the efficiency of that investment (and, vice-versa). Hence, the choice between the various options depends in part on how one prioritises one objective over the other. For example, at one extreme, the view may be that the pressures on asset health are so dire that large-scale investment in asset maintenance and replacement is needed immediately, at any cost. At the other end of the spectrum, if the efficiency of investment was considered a greater priority, investment in asset maintenance and replacement would be encouraged, but not at the expense of substantial cost and bill increases. Therefore, in considering the options to reform the regulatory framework to deliver the step-change in asset maintenance and replacement required at PR24 (and beyond), we have intentionally identified options that represent various points on this spectrum.

A COMMON FEATURE WHICH MAY HELP ENSURE THAT COMPANIES ARE DELIVERING THE DESIRED LEVEL OF ASSET MAINTENANCE AND REPLACEMENT IS TO INCENTIVISE ASSET REPLACEMENT ACTIVITIES RATHER THAN (OR IN ADDITION TO) OUTCOMES.

Thirdly, although it is hard to precisely identify the long-term sustainable level of asset maintenance and replacement, the option must ensure that companies take a sufficiently long-term view of asset maintenance and replacement to ensure long-term asset health. In this context, a common feature which may help ensure that companies are delivering the desired level of asset maintenance and replacement (i.e. to address the ambiguity around whether cost savings are due to actual efficiency or simply 'cuts'), is to incentivise asset replacement *activities* rather than (or in addition to) *outcomes*. Whilst (in general) there are strong in principle reasons to favour incentivising outcomes in any regulatory framework, in this context, incentivising both activities (outputs) and outcomes may provide greater reassurance that under (or over) spends are related to efficiency; and do not come at the expense of forgoing essential investment. Thus, **options that combine the incentivisation of activities alongside incentives to minimise costs have particular merit** in this context.

Finally, since there is no "perfect" measure of asset health available at this time, there is also an imperfect understanding of the current status of asset health (across the industry). In this context, Ofwat's proposal to develop an integrated monitoring framework may help address this gap to provide a richer picture of asset health and operational resilience in the future.²⁹ However, in the meantime, **any option to reform**

²⁹ *'Operational resilience discussion paper.'* Ofwat (2022).

the regulatory framework for PR24 needs to be practically implementable using the type and level of information available at present.

We have developed the following five options, which reflect the above considerations:

- (i) a dedicated cost allowance for asset maintenance and replacement;
- (ii) a specific totex under/outperformance sharing rate for asset maintenance and replacement costs;
- (iii) Price Control Deliverables for asset maintenance and replacement;
- (iv) a ‘no regrets’ allowance for asset maintenance and replacement; and
- (v) an update to the existing asset health ODIs to include conditions on asset maintenance and replacement.

3C. The evaluation criteria

We have evaluated each option against the following evaluation criteria, using a scoring system (where **red** reflects the lowest score of 0, **amber** reflects a medium score of 5, and **green** reflects the highest score of 10):

- **Increase in funding.** Whether, and to what degree, the option would provide companies the commensurate increase in funding required to make the investment in asset maintenance and replacement.
- **Incentives to invest.** How strongly the option encourages companies to make the appropriate investment in asset maintenance and replacement (i.e. incentives to undertake asset maintenance and replacement activities).
- **Incentives to maintain efficiency.** How strongly the option encourages companies to be efficient with their investment in asset maintenance and replacement.
- **Flexibility to future changes.** Whether the option is adaptable to changes in asset maintenance and replacement needs over time (i.e. whether the specific activities undertaken can be easily changed).
- **Impact on bills.** The extent to which the intervention will affect customer bills. This also includes considerations for the profile of bill impacts over time (i.e. if it particularly affects current customers over future customers, or vice-versa).
- **Delivery of well-prioritised investment.** Whether the option will incentivise companies to appropriately optimise and prioritise investment to achieve the goal of improving long-term asset health.
- **Alignment with Ofwat PR24 proposals.** The extent to which the option fits in with the existing regulatory framework, and proposed methodology for PR24, (both in a practical and ideological sense).

- **Company accountability.** The degree to which companies will be held accountable to meet a certain level of asset maintenance and replacement under the option.
- **Regulatory burden.** The additional regulatory burden introduced by the option (e.g. whether it creates more steps for Ofwat to go through).
- **Practicality.** Whether companies have the type and level of information required for the option to be implemented in practice (for instance whether companies have an understanding of the status of asset health to make the option work in practice).

3D. Option 1: Dedicated cost allowance

Under this option, companies would receive a ring-fenced lump sum to spend on asset maintenance and replacement at the price control (rather than it being funded out of base allowances as it currently is).

THE TOTAL VALUE OF THE DEDICATED ALLOWANCE WOULD BE GREATER THAN THE HISTORICAL LEVELS OF EXPENDITURE ON ASSET MAINTENANCE AND REPLACEMENT.

To deliver the step-change in funding required through the price control, we would expect that the total value of the dedicated allowance would be *greater* than the historical levels of expenditure on asset maintenance and replacement, across the *industry as a whole*. There may be individual companies whose allowances would be consistent with their historical spend (as long as they can evidence that they do not require the step-change in asset maintenance and replacement).

To prevent double-counting, i.e. including costs twice (once in base allowance and once in the dedicated allowance), base costs would need to be redefined to exclude expenditure related to asset maintenance and replacement. The question of *how* to define the costs that are removed from base allowances is a substantial one. Our suggested approach for doing so would be to look at the historical expenditure on asset maintenance and replacement and exclude this from base allowances. The size of the new dedicated allowance would then be based on: (i) the level of asset maintenance and replacement that has historically been delivered using the expenditure that has been identified in the base costs, *plus* (ii) an uplift for the additional asset maintenance and replacement that needs to occur relative to previous levels. This ensures that the dedicated allowance is both: (a) larger than the amount that is identified in the base costs to enable the step-change in investment; and (b) based on actual asset maintenance and replacement output levels, giving greater certainty that the allowance is efficient.

In terms of the impact on allowed revenues, instead of applying the company's relevant PAYG rates, there is an argument that this spend should be largely/entirely added to the RCV, on the basis that investment in asset maintenance and replacement is (primarily) a capital investment, the benefits generated by which accrue over generations of customers – thus, being consistent with long-term cost recovery. A 'softer' version would allow for a differential PAYG rate for asset maintenance and replacement, with a greater proportion added to the RCV, relative to the 'typical' wholesale rates.

To prevent inefficient expenditure, companies would make a case to show, in broad terms, what asset maintenance and replacement activities the dedicated allowance will

fund, and that the requested costs are necessary and efficient. This process would be similar to that for cost adjustment claims and certain enhancement costs at PR19, with one important change. At PR19, Ofwat set very high thresholds to permit these claims, and so to avoid underinvestment in asset maintenance and replacement, this reform option should logically have less stringent thresholds.

Companies would have control over how the dedicated allowance is spent, provided it is used for asset maintenance and replacement and in line with their initial proposals. There would be some flexibility in precisely how companies spend the allowance as compared to their initial proposals, to accommodate any changes in the operating environment and priority areas. As such, this approach would not involve setting asset maintenance and replacement targets, or making any rewards/penalties contingent on fulfilling certain asset maintenance and replacement activities. Rather, companies could be incentivised to spend their full allowance by having no rewards for underspending the allowance, and by excluding these ring fenced costs from the overall totex underspend rewards (to prevent companies overstating their required costs for asset maintenance and replacement, and then benefitting from the totex underspend reward). For overspend, a (low) penalty would be imposed in order to maintain an efficiency incentive.

On the whole, on the scale of efficiency considerations versus the need to invest, this option sits closer to the latter end.

Figure 13: Investment versus efficiency priority for Option 1



Source: *Economic Insight*.

The table below sets out our evaluation of the dedicated cost allowance option.

Table 2: Evaluation of Option 1

Criterion	Rating	Evaluation
Increase in funding	Green	The dedicated allowance is expected to reflect the required uplift in funding required for the step-change in asset maintenance and replacement.
Incentives to invest	Amber	Since the option includes no underspend rewards, companies will be encouraged to use the full allowance, but this allowance may not be spent efficiently on asset maintenance and replacement as companies will not have any specific targets.
Incentives to maintain efficiency	Amber	This option includes a penalty for overspending (beyond the allowance) but there would be no incentive to limit spending below the allowance.

Criterion	Rating	Evaluation
Flexibility to future changes	Green	This option includes no specific targets and, therefore, the companies will have complete flexibility in adjusting their asset maintenance and replacement plans to accommodate future changes.
Impact on bills	Amber	There would be an increase in costs to be borne by customers, but because these (primarily/entirely) go through the RCV, the impact on bills will be spread over time and should not lead to any spikes.
Delivery of well-prioritised investment	Amber	Companies would need to plan their asset maintenance and replacement efficiently since they would need to make a case to justify the allowed costs. However, as the allowance would not be linked to specific targets, there might be a limit on how efficiently the allowance is actually spent.
Alignment with Ofwat PR24 proposals	Green	Ofwat has suggested that a dedicated allowance for asset health may work as a top-down ODI. ³⁰
Company accountability	Red	This option does not include any specific asset maintenance and replacement targets which companies must meet.
Regulatory burden	Amber	The additional processes involved in this option would not require significant changes or additions to the price control framework. However, there may be some complexity involved in identifying the expenditure related to asset maintenance and replacement included in the base costs.
Practicality	Amber	This option would not require companies to know <i>ex-ante</i> the status of their asset health but, instead, companies would have flexibility in planning asset maintenance and replacement activities required during the price control period. However, there may be implications for companies in identifying the expenditure related to asset maintenance and replacement included in the base costs.

Source: Economic Insight.

³⁰ 'PR24 and beyond: a discussion paper on outcome delivery incentives.' Ofwat (2021); page 17.

3E. Option 2: Specific totex under/outperformance sharing rate

Under this option, an asset maintenance and replacement specific totex under/outperformance rate could be applied, requiring asset maintenance and replacement expenditure to be separately identified and monitored. This will give comfort that the desired level of asset maintenance and replacement is being delivered.

In general, given the challenges associated with asset maintenance and replacement, there may be grounds to suppose that the balance between ‘ensuring investment’ and ‘achieving efficiency’ should be more tilted towards the former. Therefore, there may be a case for lower overall totex sharing rates for this category of expenditure. However, in order to both promote investment and maintain cost efficiency incentives, the sharing rates could be made conditional. Specifically:

- A sharing rate on asset maintenance and replacement totex underspend is only applied on the condition that companies have undertaken the ‘target’ level of asset maintenance and replacement activities they said they would in their plan. That is to say, they only get the totex underspend reward if they undertake the targeted activities (or, get a reduced reward, depending on how far they fall short of said targets). The rationale for this is that, if the activities were undertaken, Ofwat could take some comfort that the investment has occurred and thus, underspend is (likely) due to efficiency (which Ofwat would want to continue to incentivise). Asset maintenance and replacement totex overspend penalties would be the same as for general totex, except in cases where companies have met the asset maintenance and replacement target, and are able to demonstrate that (part of) the overspend is due to external, unforeseen changes (which cannot be attributed to inefficiencies). In such cases, the additional costs associated with this would be excluded from the totex overspend, and the penalty calculated based on this adjusted amount.
- An alternative to linking the sharing rates to activities would be to apply sharing rates only where underspend was demonstrably shown to be due to efficiency (or overspend due to inefficiency). Under this approach, where a company underspent on its asset maintenance and replacement totex allowance, it would make a case to Ofwat that the reward sharing rate should apply, because it had been ‘efficient’. In relation to overspend, the default position could either be that no penalty applies (unless Ofwat found evidence of inefficiency), or that a penalty applied unless a company showed the overspend was due to necessary changes in the scope of replacement/activities undertaken.

We view the first of the above options (linking the asset maintenance and replacement specific sharing rates to activities) as having more merit. This is because, under the latter approach, one is left with the difficulty of determining efficiency ex-post (which, as we have explained in section 2C, is challenging). We recognise that there are also some challenges associated with using ‘activities’, rather than ‘outcomes’, to determine the sharing rate – and care would be needed to avoid unintended consequences. However, on the other hand, this approach neatly ensures that companies do what they

This approach neatly ensures that companies do what they said they would do with the money, providing greater comfort that variation in expenditure ex-post is related to efficiency.

said they would do with the money, providing greater comfort that variation in expenditure ex-post is related to efficiency.

In order for asset maintenance and replacement costs to be assessed separately from the rest of totex, this option requires that these costs be clearly defined. As part of this, there is flexibility over whether asset maintenance and replacement costs are ring-fenced and viewed distinctly from base costs – similar to Option 1 – or whether they form part of base costs and are distilled only for the purpose of assessing totex under/outperformance.

On the scale between investment and efficiency, this approach places somewhat greater weight on the latter, as shown below.

Figure 14: Investment versus efficiency priority for Option 2



Source: *Economic Insight*.

The table below sets out our evaluation of this option.

Table 3: Evaluation of Option 2

Criterion	Rating	Evaluation
Increase in funding	Red	This option does not include any explicit additional funding.
Incentives to invest	Green	This option should create strong incentives to invest in asset maintenance and replacement by tying the incentive to activities.
Incentives to maintain efficiency	Green	The lower sharing rate for asset maintenance and replacement activities should give companies the incentives to reduce costs through efficiency (rather than simply 'cutting' expenditure).
Flexibility to future changes	Amber	Companies would be committed to delivering specific asset maintenance and replacement activities within each five year price control period, but only in the medium-term.
Impact on bills	Green	There should be minimal bill impacts since this option would not allow additional costs.
Delivery of well-prioritised investment	Amber/ Red	There is no incentive to efficiently prioritise asset maintenance and replacement activities. In fact, since this option does not allow additional funding, there is a risk that

Criterion	Rating	Evaluation
		low-cost activities are prioritised over more urgent activities.
Alignment with Ofwat PR24 proposals	Red	This option does not directly line up with any of the proposals that Ofwat has made to date.
Company accountability	Amber	The level of accountability in this option would broadly be the same as it currently is since there is no additional onus on the companies to meet targets.
Regulatory burden	Green	This option requires limited work since it is simply an adjustment to the existing mechanism.
Practicality	Green	This option would not require companies to know <i>ex-ante</i> the status of their asset health but, instead, companies will be incentivised to undertake the target activities. In addition, there is no complication in terms of identifying costs for asset maintenance and replacement already included in base costs.

Source: *Economic Insight*.

3F. Option 3: Price control deliverables

PCDs have been proposed as a new feature of PR24, but their exact design has not yet been determined. In short, PCDs serve a similar function to ODIs and performance commitments; but rather than being focussed on outcomes, they provide funding for delivering specific projects or outputs during the price control period. PCDs are company-specific and Ofwat has indicated that it will be for companies to propose PCDs and demonstrate that they are cost efficient.³¹ When Ofgem used PCDs in RIIO-2, they were permitted to be either ‘mechanistic’ (based on output volumes or units), or ‘evaluative’ (based on an assessment, when the output is not entirely fixed or quantifiable). PCDs would factor in the risk of non-delivery, such that future cost allowances could be adjusted to make up for this occurrence, and would also incorporate long-term impacts to ensure customers receive these benefits.

Ofgem has adopted different approaches for assessing the delivery of mechanistic and evaluative PCDs. The delivery status of mechanistic PCDs is reported purely on the number of units that are delivered in the year. If the company falls short of the proposed volume, then allowances will be adjusted to account for this. Evaluative PCDs, by contrast, have six possible assessment outcomes:

³¹ *‘PR24 and beyond: Creating tomorrow, together.’ Ofwat (2021); page 90. ‘PR24 and beyond: Performance commitments for future price reviews.’ Ofwat (2021); page 8.*

- (i) fully delivered;
- (ii) fully delivered with alternative specification (i.e. reaching the same outcome through a different means than originally proposed);
- (iii) partially delivered;
- (iv) partially delivered with alternative specification;
- (v) delayed; and
- (vi) not delivered.

In the case of either of the ‘full delivery’ results, i.e. (i) and (ii) above, no adjustment to the allowance is made. When the PCD is ‘partially delivered’, i.e. (iii) and (iv) above, an adjustment in proportion to the amount of the project that was undertaken is made. For ‘delayed’ projects, Ofgem will ‘re-profile’ the allowances for the updated timeline. Finally, PCDs classed as ‘not delivered’ will have allowances reduced by the full amount, or the full amount less any efficient costs incurred for any work that was undertaken.

THE FUNDING FOR EVALUATIVE PCDs IS CONDITIONAL ON SUCCESSFUL DELIVERY, WHICH MAY MAKE THEM SUITABLE FOR MORE UNIQUE AND RISKY PROJECTS.

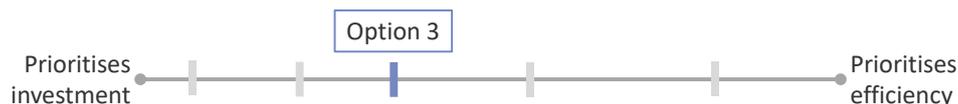
Ahead of Ofwat providing its full methodology for PCDs, our assumption in developing this option is that it will follow the same broad approach as Ofgem (i.e. as described above), and that the PCD submission process will be akin to companies proposing bespoke ODIs. That is, companies will: come up with plans for asset maintenance and replacement projects; scope out what is involved and the time required for delivery; propose metrics for measuring progress; and calculate how much it will cost. Ofwat will then assess these proposals and either: (i) allow the full costs requested by the company; (ii) accept the proposal, but with a reduced cost allowance based on what the regulator considers to be efficient; or (iii) reject the proposal (e.g. on the grounds that the project is not required, or is covered in base costs).

As implied by outcome (iii), this option maintains the position that certain asset maintenance and replacement activities are covered in base costs. PCDs would then be used to provide funding for activities *over and above* what is included in base costs. It is important to set a clear distinction between what is covered by base costs and what falls under PCDs in advance. Our proposed method of doing this would be to assess the historical level of asset maintenance and replacement activities that has been delivered through base costs, and assume that the same level will be achieved in the next five years. Therefore, any step-change in asset maintenance and replacement activities over and above this defined volume will then be funded through PCDs. This would help to ensure that the typical level of asset maintenance and replacement achieved through base costs will be maintained, and if PCDs are utilised, there will be an *increase* in asset maintenance and replacement overall, with additional costs provided outside of base allowances.

The PCD approach puts a priority on making sure that the necessary investments happen. However, within this, there is a degree of pragmatism – and efficiency considerations – as the costs for investment are only permitted as long as there is evidence of the asset maintenance and replacement activities being undertaken. In this sense, PCDs can be seen as sitting somewhere in between options 1 and 2. They are

similar to Option 1 in that they create a ring fenced pool of funding for companies to invest in asset maintenance and replacement. However, unlike Option 1, but similar to Option 2, they incentivise the investment by making the funding conditional on specific asset maintenance and replacement activities. Where PCDs diverge from Option 2 is that there is less incentive for companies to be efficient, as they either receive the allowance (or not) based on delivery. Therefore, the PCD approach sits between options 1 and 2 on the 'investment versus efficiency' scale.

Figure 15: Investment versus efficiency priority for Option 3



Source: *Economic Insight*.

The table below sets out our evaluation of this option.

Table 4: Evaluation of Option 3

Criterion	Rating	Evaluation
Increase in funding	Amber	This option will allow additional funding to fund specific projects and/or outputs identified by specific companies. However, it would not necessarily allow the commensurate increase in funding required to fund the step-change in asset maintenance and replacement across the industry. In other words, this option is reliant on companies identifying specific projects and/or outputs.
Incentives to invest	Green	This option should create a strong incentive to invest in asset maintenance and replacement since the allowed costs would be contingent on delivery of specific projects/outputs.
Incentives to maintain efficiency	Green	Assuming that Ofwat will only permit the efficient level of costs, and that allowances will be adjusted depending on the delivery status, this option should provide an efficiency incentive.
Flexibility to future changes	Red	The allowances for PCDs are linked to discrete projects and/or outputs which makes them less flexible to changes in future needs.
Impact on bills	Amber	This option would result in companies incurring additional costs which would need to be recouped from customers (though these would be efficient). There is also a risk that the bill impact may be lumpy over time, depending on the timing of companies' investments.

Criterion	Rating	Evaluation
Delivery of well-prioritised investment	Amber	Since companies will need to make a case for additional funding for specific PCDs, this option should encourage well-planned and necessary projects. However, this may also incentivise projects which can be discretely identified, not necessarily urgent projects.
Alignment with Ofwat PR24 proposals	Green	Ofwat has indicated it will use PCDs at PR24, and so this could be an effective way of incorporating asset health in the price control.
Company accountability	Green	Companies would be held accountable for non-delivery of PCDs.
Regulatory burden	Green	PCDs are already due to be part of PR24, and so the main additional input would be for Ofwat to review the proposals for asset maintenance and replacement put forward by companies.
Practicality	Amber	This option will require companies to identify and plan discrete projects and/or outputs. In addition, there may be implications for companies in identifying the expenditure related to asset maintenance and replacement included in the base costs.

Source: *Economic Insight*.

3G. Option 4: No regrets allowance

Under this option, companies would be set a long-term asset maintenance and replacement target, which they can achieve through any reasonable means that they see fit. For example, a target may be set over 25 years for companies to replace a certain proportion of all assets. The allowed costs to reach this would effectively be unlimited (or, perhaps with a cap at a very high level) and would pass-through directly to customer bills.

At each price control, companies would set out plans for how they will work towards the long-term target within that period. Ofwat would assess the plans to ensure they are feasible and appropriate, but otherwise would permit companies to recover the associated costs from customers. All asset maintenance and replacement would be funded through this allowance, and so base costs would be revised to exclude asset maintenance and replacement costs.

Over time, as the understanding of asset health improves, and other external factors impact the priorities around asset health, the specific target can be amended to reflect this. Companies would be able to amend their plan at each price control to account for any changes in the target. At the end of the target period, companies could be

This approach would be akin to adopting a 'rate of return' regulatory model specifically for asset maintenance and replacement expenditure.

rewarded/penalised based on whether they reached the target. In essence, this would be akin to adopting a 'rate of return' regulatory model *specifically for asset maintenance and replacement expenditure*.

A less extreme version of this option, to also balance efficiency, would be that Ofwat undertakes detailed assessments of companies' proposals to achieve the target, including setting higher evidence thresholds/efficiency challenges in order for the plans to be accepted. Then, at the end of the target period, rewards for underspending whilst (still reaching the target) would be imposed to incentivise further efficiency.

Of all the options presented, this one places the most emphasis on ensuring the necessary investment proceeds, with little consideration of efficiency. This option would be suitable if one believed that the long-term negative externalities of not intervening and improving asset health are so great that they outweigh any costs incurred in the present.

Figure 16: Investment versus efficiency priority for Option 4



Source: *Economic Insight*.

The table overleaf sets out our evaluation of this option.

Table 5: Evaluation of Option 4

Criterion	Rating	Evaluation
Increase in funding	Green	This option allows any costs necessary to meet the long-term asset maintenance and replacement target.
Incentives to invest	Green/ Amber	This option should encourage appropriate level of investment since there would be a clear long-term target to meet. However, depending on the level of scrutiny of interim plans, there may remain some scope for short-term procrastination.
Incentives to maintain efficiency	Red	Having a cost allowance capped at a very high level means there is almost no incentive to reduce spending. A greater efficiency incentive could be introduced in the alternative version, but this would also reduce the investment incentive.
Flexibility to future changes	Green	This option specifically focuses on the long-term and, therefore, companies could revise their asset maintenance and replacement strategy at any time (even within a price control).

Criterion	Rating	Evaluation
Impact on bills	Red	There would be upward pressure on bills as companies would inevitably incur substantial costs. This may be mitigated slightly by the fact that the investment is geared towards a long-term target, which may limit any sudden one-off bill rises.
Delivery of well-prioritised investment	Green/ Amber	This option should, by design, encourage companies to take a long-term view of their asset maintenance and replacement needs. However, depending on the level of scrutiny of interim plans, there is a risk poor planning early on could lead to a rush to meet targets at the end of the period.
Alignment with Ofwat PR24 proposals	Amber	This would be quite a departure from the current regulatory framework. However, this contributes towards Ofwat's focus on the long-term.
Company accountability	Green/ Amber	Companies would be held accountable for meeting a long-term target, but would have limited accountability in the short-term.
Regulatory burden	Amber	This would introduce an additional step in the price control process, but would not be overly complex to implement as companies would choose their own approach. However, there may be some complexity involved in identifying the expenditure related to asset maintenance and replacement included in the base costs.
Practicality	Amber	By setting an industry-wide long-term target, companies do not need to provide information about their own asset health, but simply work towards the goal. However, there may be implications for companies in identifying the expenditure related to asset maintenance and replacement included in the base costs.

Source: Economic Insight.

3H. Option 5: Update to existing asset health ODIs

Asset maintenance and replacement is already somewhat incentivised through the existing asset health ODIs – mains repair, unplanned outage, and sewer collapses. However, a shortcoming of these measures is that they are not directly informative of the current status of asset health, and the performance commitment levels in the ODIs may be achievable through means *other* than asset maintenance and replacement. Therefore, one could address this concern by incorporating targets for asset maintenance and replacement activities directly into the ODI design. Like options 2 and 3, a key concept behind this approach is to incentivise the activity (output) *as well as* the outcome. There are various ways that asset maintenance and replacement activities could be incorporated directly into the ODI framework, from making the ODI rewards/penalties contingent on delivering a certain *volume* of asset maintenance and replacement, to adjusting the ODI metrics themselves to include a target level of asset maintenance and replacement activities.

This approach is relatively neutral with regards to whether it prioritises the investment versus efficiency concerns.

Figure 17: Investment versus efficiency priority for Option 5



Source: *Economic Insight*.

The table below sets out our evaluation of this option.

Table 6: Evaluation of Option 5

Criterion	Rating	Evaluation
Increase in funding	Red	This option does not include any explicit additional funding.
Incentives to invest	Green	This option should create a strong incentive to invest in asset maintenance and replacement since the ODI rewards/penalties would be linked to undertaking asset maintenance and replacement activities.
Incentives to maintain efficiency	Amber/ Red	This option would encourage more asset maintenance and replacement activities (to earn the ODI rewards) but this might not actually be the efficient approach to meet the outcome.
Flexibility to future changes	Amber	Companies would be committed to delivering specific asset maintenance and replacement activities within each five year price control period, but only in the medium-term.

Criterion	Rating	Evaluation
Impact on bills	Green	There should be minimal bill impacts since this option would not allow additional costs.
Delivery of well-prioritised investment	Red	If asset health ODIs are not the ideal indicators of asset health, then any investment will not be optimised. Similarly, it may be possible to achieve the ODI and meet the asset maintenance and replacement target without making the best types of investments.
Alignment with Ofwat PR24 proposals	Red	Ofwat has suggested that its preferred way of incorporating asset health more is not through ODIs.
Company accountability	Green	Companies would be responsible for delivery of specific asset maintenance and replacement activities and rewarded/penalised accordingly.
Regulatory burden	Green	This option is relatively easy to implement since it involves an amendment to existing process, rather than introducing something entirely new.
Practicality	Green	This option would not require companies to know <i>ex-ante</i> the status of their asset health but, instead, companies would be incentivised to undertake the target activities. However, there may be implications for companies in identifying the expenditure related to asset maintenance and replacement included in the base costs.

Source: *Economic Insight*.

3I. Conclusions

Table 7 summarises the evaluation of each option against the criteria.

Table 7: Summary of options assessment

Criterion	Option 1	Option 2	Option 3	Option 4	Option 5
Increase in funding	Green	Red	Yellow	Green	Red
Incentives to invest	Yellow	Green	Green	Green, Yellow	Green
Incentives to maintain efficiency	Yellow	Green	Green	Red	Yellow, Red
Flexibility to future changes	Green	Yellow	Red	Green	Yellow
Impact on bills	Yellow	Green	Yellow	Red	Green
Delivery of well-prioritised investment	Yellow	Yellow, Red	Yellow	Green, Yellow	Red
Alignment with Ofwat PR24 proposals	Green	Red	Green	Yellow	Red
Company accountability	Red	Yellow	Green	Green, Yellow	Green
Regulatory Burden	Yellow	Green	Green	Yellow	Green
Practicality	Yellow	Green	Yellow	Yellow	Green
Average score	6.0	6.3	7.0	5.8	5.8

Source: Economic Insight.

Based on our evaluation, we make the following recommendations.

We recommend that Option 3 (PCDs) should be taken forward as part of the package to be used at PR24. Not only does this score highest on the evaluation criteria, but it has the crucial benefit of already being a part of the PR24 framework. It therefore provides an effective way of incentivising asset maintenance and replacement, without overly disrupting the price control process. PCDs can be applied either to ‘outputs’ related to an activity, or to specific projects. In the context of asset health, it may be more appropriate to adopt the project approach. This is to accommodate the fact that there are different asset health needs between companies, and so by proposing specific projects, this allows for flexibility in how companies make use of the PCD. In addition, the fact that the funding for PCDs is contingent on delivery makes them more suitable for riskier projects, and therefore we recommend that **PCDs are more suitable for discrete projects identified by specific companies.**

In addition, in order to encourage a step-change in asset maintenance and replacement *across the industry*, **we recommend using PCDs (which will fund specific projects) alongside a combination of options 1 and 2.**

Option 1 (dedicated cost allowance) and Option 2 (specific totex under/outperformance sharing rate for asset maintenance and replacement) both have merits. Option 1 allows for additional funding, and therefore goes to the source of the asset maintenance and replacement issues, while Option 2 has benefits in terms of ensuring efficiency. Therefore, a combined Option 1 and 2 would essentially combine the ring-fencing element of Option 1 and the activity-contingent totex sharing mechanism from Option 2.

This approach has a number of benefits, including:

- By creating an explicit allowance for asset maintenance and replacement costs, it allows for closer monitoring of companies’ asset maintenance and replacement activities.
- The requirement to set target levels of asset maintenance and replacement encourages companies to undertake the necessary investments, rather than cutting costs by reducing activities.
- At the same time, including a specific under/outperformance cost sharing rate maintains an efficiency incentive, but one which makes it clear that any underspend is due to efficiency itself, not cuts (i.e. any ‘reward’ is conditional on companies doing what they say they will).
- There is a balance between company-specific and industry-wide considerations, given that companies put forward their own unique plans, but which are assessed by Ofwat in the context of the industry as a whole.
- It can be combined with the use of PCDs to separate out each company’s cost allowance for ‘common’ asset health activities, from higher risk projects.

The table below sets out our evaluation of this option for completeness.

Table 8: Evaluation of combined Option 1 and 2

Criterion	Rating	Evaluation
Increase in funding	Green	The dedicated allowance is expected to reflect the required uplift in funding required for the step-change in asset maintenance and replacement.
Incentives to invest	Green	This option should create strong incentives to invest in asset maintenance and replacement by tying the allowances to undertaking activities.
Incentives to maintain efficiency	Green	The underspending rewards alongside the lower sharing rate should give companies the incentives to reduce costs through efficiency (rather than simply 'cutting' expenditure).
Flexibility to future changes	Amber	Companies would be committed to delivering specific asset maintenance and replacement activities within each five year price control period, but only in the medium-term.
Impact on bills	Amber	There would be an increase in costs to be borne by customers, but because these (primarily/entirely) go through the RCV, the impact on bills will be spread over time and should not lead to any spikes.
Delivery of well-prioritised investment	Amber	Companies would need to plan their asset maintenance and replacement efficiently since they would need to make a case to justify the allowed costs. However, there is no explicit incentive in this option to plan for the long-term.
Alignment with Ofwat PR24 proposals	Amber	Ofwat has suggested that a dedicated allowance for asset health may work as a top-down ODI but the differential sharing rate is not in line with any of its proposals to date.
Company accountability	Green	The cost allowance would be contingent on delivery of specific asset maintenance and replacement activities.
Regulatory burden	Amber	The additional processes involved in this option would not require significant changes or additions to the price control framework. However, there may be some complexity involved in identifying the expenditure related to asset maintenance and replacement included in the base costs.

Practicality	Green/ Amber	This option would not require companies to know <i>ex-ante</i> the status of their asset health but, instead, companies will be incentivised to undertake the target activities. However, there may be implications for companies in identifying the expenditure related to asset maintenance and replacement included in the base costs.
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Source: Economic Insight.

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