Cost adjustment Claim:

Boundary box replacements

ANH_CAC_6.1

Anglian Water

June 2023

Covering page

Document reference	**ANH_CAC_6.1**		
Title of cost adjustment claim	**Boundary box replacements**		
Price control	Water Network Plus	Symmetrical?	~~YES~~/NO
Basis of claim	We were an early adopter in significantly rolling out metering. The housing of these meters have a limited asset life and see deterioration over time due to factors such as ground movement. Because we installed meters earlier than other companies we are now experiencing higher rates of failure (and thus the cost to repair and replace) of this meter housing. We expect these volumes to materially increase in AMP8. This cost adjustment claim reflects our expected costs to resolve this increasing volume of failures. Cost recovery for this activity could be reflected through an upfront cost adjustment claim, or through a true-up mechanism where costs are recovered ex-post on a unit rate basis.		
Gross value (£m five years)		155.4	
Implicit allowance (£m five years)		17.4	
Net value of claim (£m five years)		138.0	
How efficiency of costs are demonstrated		The unit rate is derived from market testing of costs from potential suppliers of boundary box replacements. We have assumed a further efficiency challenge on the basis of economies of scale.	
Materiality (as % of totex for price control)		3.9	
How customers are protected		Customers would be protected either: Through a price control deliverable mechanism if this activity is treated as a cost adjustment claim or; Allowances only being made upon delivery of replacements if this activity is treated as an uncertainty mechanism.	
Supporting document references		ANH_CAC_6.2 – Meter penetration analysis ANH_CAC_6.3 – Boundary box failure analysis	

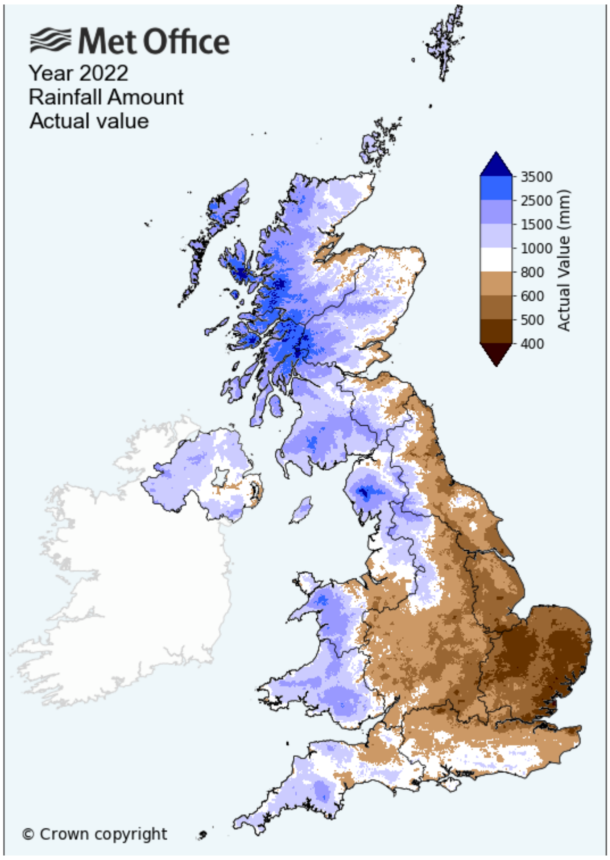
Contents

1. Need for adjustment

1.1. Unique circumstances

a) Is there compelling evidence that the company has unique circumstances that warrant a separate cost adjustment?

Anglian water operates in the driest region of the UK. It has been recognised for multiple AMPs that this puts particular strain on the supply-demand balance compared to other companies. This can be seen by the 2022 rainfall amount as summarised by the below map from the Met Office[1].

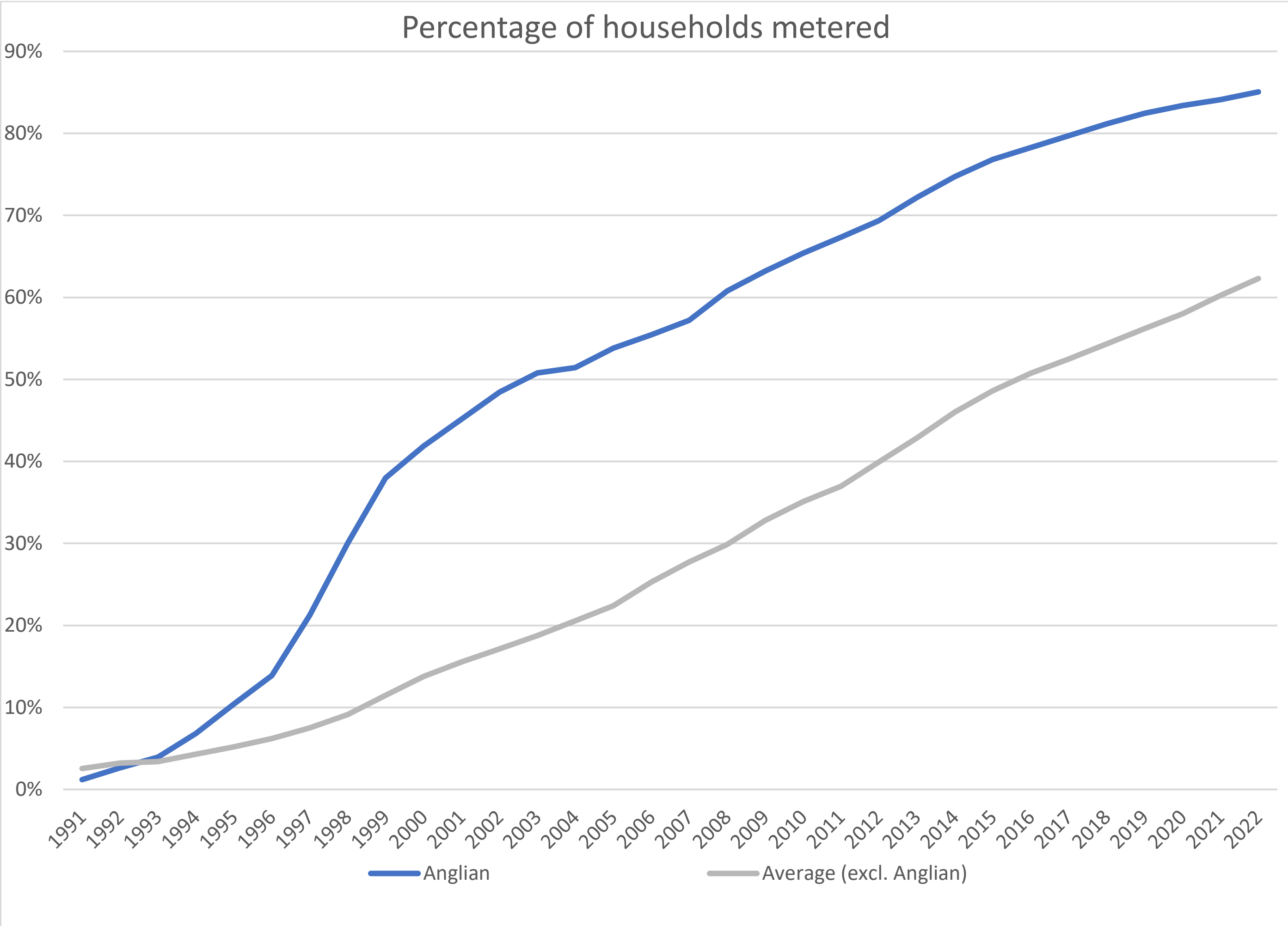


It is because of this that Anglian has historically sought (and continues to seek) ways to ensure security of supply to customers whilst protecting the environment and being appropriately prepared for future supply-demand stresses from climate change, population growth and the need for greater environmental protection. This has required a twin-track approach of supply and demand side measures. There has been a historical preference to make sure that

[1] We included the same map in our base cost modelling submission.

Anglian makes the most of demand-side measures to address the supply-demand balance. One of the ways to do this was to be the first mover on implementing the large scale rollout of meters to allow customers to be charged based on their water usage and support the implementation of incentives to improve water efficiency in homes and businesses (alongside a programme to drive down the leakage frontier for the industry). By the year 2000, we had reached a meter penetration rate of 42%. This compares with a rate of the next highest company of 23% and an overall industry average (excluding Anglian) of 14%.

The need for these measures within the Anglian region has been recognised for a long time, and thus we were the first WaSC to install meters on a large scale across our customer base.

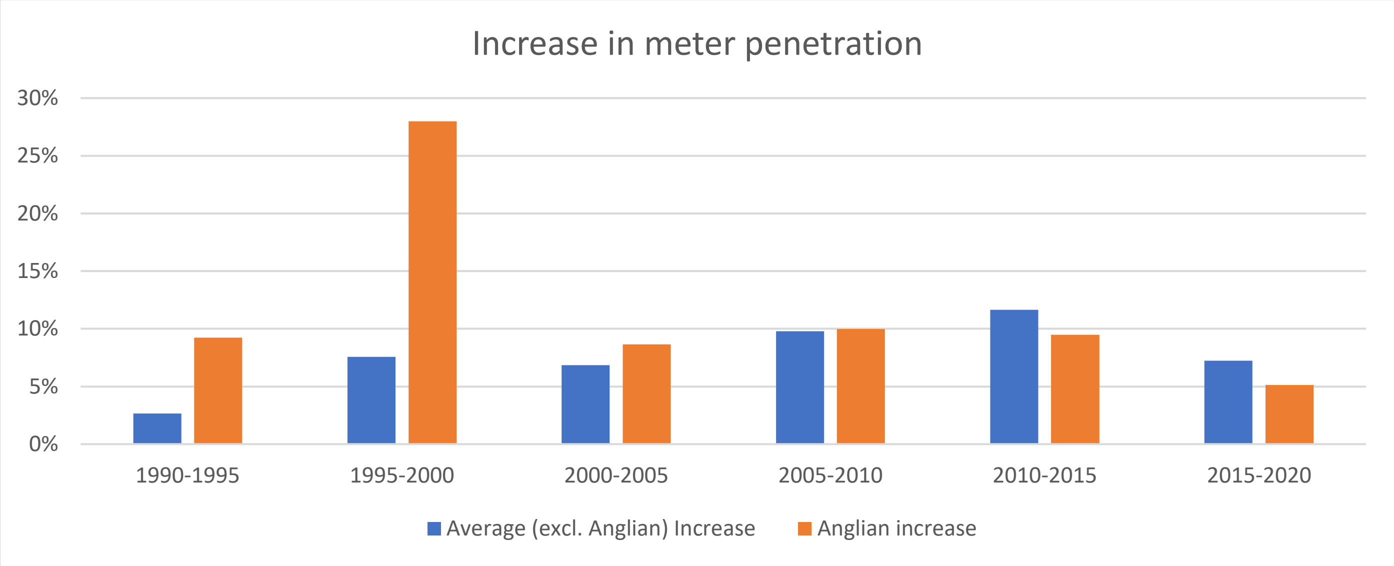


Within our region most water meters are located within a boundary box at the edge of a customer's property. This enables easy access to the meter, allowing them to be read. As with all assets, these boundary boxes have an asset life at the end of which, one would expect it to be replaced to avoid negative customer impacts such as leakage.

Due to the combination of high meter penetration, early installation of meters beginning in AMP1 (10% penetration by 1995 and 42% by 2000, compared to an average of 5% and 14% for other companies respectively) and their housing, and the asset life of these boundary boxes, Anglian is in a unique position of seeing higher maintenance costs than other companies for the replacement of these boundary boxes in AMP8.

This is a new cost adjustment claim for PR24 (i.e. it has not been requested in previous price reviews) because the above factors are coming together at this particular point in time to lead to a significant increase in boundary box replacement in AMP8 compared to AMP7 and previous AMPs. Given that Anglian was the first company to install these assets at a large scale and other companies have subsequently seen an increase in their meter penetration, we would expect some other companies to be in a similar position in future AMPs.

Whilst boundary box replacements are a cost that we expect to see increase across the industry as more of these assets reach the end of their expected lifespan (c. 30 years), Anglian faces unique circumstances in AMP8 because of the significant early rollout of meters (and their boundary boxes) in the late 90s. Furthermore, this is not a cost which balances out over multiple AMPs because Anglian still has a meter penetration rate which is c. 20 percentage points above the industry average. This is illustrated in the chart below, showing the increase in meter penetration over each five year period since 1990 (using the same data as the chart above). The blue bars show that boundary box replacements are likely to increase in future AMPs with Anglian's rate broadly following the industry for installations after 2000, but before then Anglian faces a significant increase in replacements as those installed before 2000 reach the end of their asset life.



As set out later in this cost adjustment claim, we are already experiencing increasing boundary box replacement volumes in AMP7 as those boundary boxes installed in the early 90s reach the end of their asset life. Based on the installation dates above, we expect a further significant increase in AMP8.

b) Is there compelling evidence that the company faces higher efficient costs in the round compared to its peers (considering, where relevant, circumstances that drive higher costs for other companies that the company does not face)?

We have considered the costs that all companies face in relation to the installation and maintenance of meters. Anglian's early installation programme for example means that in recent AMPs and in AMP8, we will face lower costs than other companies for new installations due to smaller volumes of new meter installations being needed. However, this is reflected in lower enhancement scope allowances for new meter installations.

Compared to other companies that have higher meter penetration, we face higher efficient costs because of the initial timing of meter installations (i.e. there is a period between meter installation and the boundary box reaching the end of its asset life where no maintenance costs are required to replace the boundary box). Boundary boxes have an expected asset life of 25-30 years, and so we are now experiencing a significant increase in the number of boundary boxes that need replacing as we reach 25-30 years after the initial installation of these boundary boxes.

c) Is there compelling evidence of alternative options being considered, where relevant?

We have carefully considered the different options available to us to manage the costs associated with maintenance of meters and their chambers, both upon initial installation and when the boundary box fails and needs replacing. These options typically come down to a) where the meter is located and b) the material that is used to house the meter.

Meter location

The key causes of boundary box failures include their exposure to the surrounding environment, deterioration of the boxes in line with their expected asset life, and impact from other external factors such as traffic. The alternative option to externally located meters would be to house meters internally within the customer's property. This would limit the exposure of the boundary box to the strains which cause them to fail and ultimately increase the expected life of the asset. However, this must be considered alongside the other impacts this would have and the context within which meters were first installed.

Historically, meters have been located externally for a number of reasons:

- In 1995, our increase in meter penetration was brought about by high customer demand for switching from unmeasured to measured charges. This meant that the meters being installed were at existing properties with existing infrastructure in place (external stop taps, a communications pipe from the main to the stop tap and a customer's supply pipe from the stop tap to the property.)
- The ability to be able to monitor the supply pipe for leakage. Having an external meter allows this.
- Manual meter reading of an external meters is less expensive and disruptive to our customers than having to gain access to read an internal meter.
- Future meter replacement costs are significantly cheaper for external meters than for internal ones.

Further to this, internal housing would have led to much greater direct interruption to customers (and indirectly – higher costs) for smart meter installation. Overall, in the vast majority of cases, housing meters externally rather than internally offers greater adaptability and greater value to customers.

Meter housing material

When installing a new meter externally, there are four baseline options: high density plastic (HDP) boundary boxes; wall mounted meter boxes; cast iron and; composite chambers. Which casing is installed depends on a number of factors including the cost to install, the expected asset life and associated maintenance costs. As well as these direct cost related factors, the adaptability and level of regret associated with each option needs to be considered.

	HDP boundary box	**Wall mounted meter boxes**	**Cast iron chamber**	**Composite chamber**
ROM cost to install/ replace	Reactive: £1,011 Proactive: £965 Avg: £987	N/A – installation infeasible due to incompatibility with smart metering (see below)	N/A – installation infeasible due to incompatibility with smart metering (see below)	£8,738
Expected asset life	25-30 years			30-40 years
Compatible with smart metering?	Yes	No - Current versions do not have enough space in them to accommodate smart meters	No – smart meter signal would not be able to pass through cast iron, and boxes are too small to house a smart meter (therefore requiring a retrofit)	No –signal would not be able to pass through. This can however be mitigated by using a plastic rather than metal lid.
Additional Benefits	• Small excavation footprint • Use of recycled material • Ease of installation and adjustment to surface type			• Security of cover (locakable)

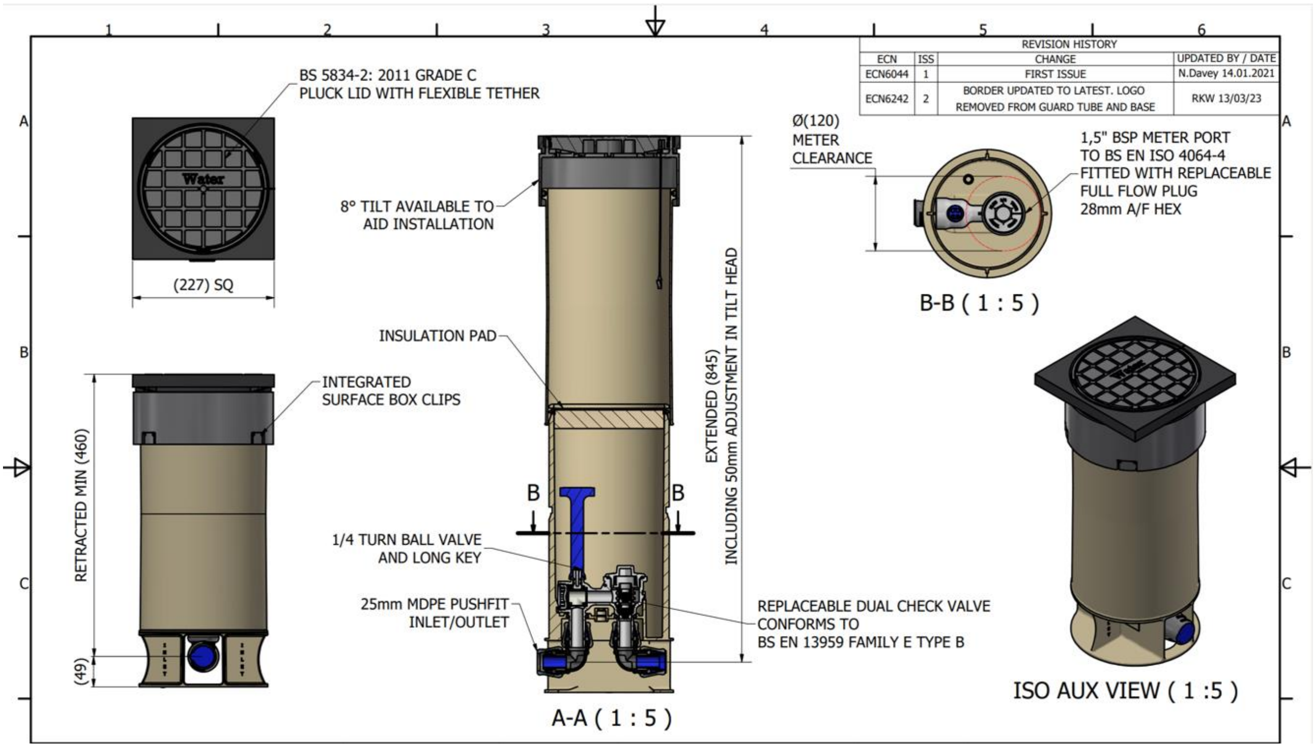
Overall level of regret	Low	High	High	High

As the table above demonstrates, whilst cast iron and composite chambers have longer asset lives, they have higher installation costs and crucially are less adaptable than HDP boundary box. This is particularly important with the rollout of our smart meter programme. For example, had we installed cast iron chambers for meters, they would have needed to be replaced well before their expected asset life with a chamber that allows smart meter capability to be exploited – thus resulting in a much higher whole life cost.

We have the option to replace the HDP boundary boxes within which meters are housed with an alternative boundary box upon failure. On the basis of the analysis above, we have decided against this. Cast iron chambers are incompatible with smart meters which during AMP8 will cover over 50% of our meter stock and over 95% by the end of AMP8. Composite chambers would significantly increase the size of this cost adjustment claim at a price review where there is already a very large capital programme and significant pressure on customer bills – and would present a higher regret option should technological developments in metering in future AMPs mean that these assets become redundant or need replacing early, as would have been the case if we had initially installed meters within brick built chambers on initial installation.

Retrofitting of wall mounted boxes at existing properties, whilst technically possible, would create additional future risks. Replacing a meter in an existing boundary box with one in a wall mounted box in another location requires locating the entry point at the property, and two excavations to remove the old box and install the new one, increasing the cost significantly. Wall mounted boxes are also predominantly made out of HDP and do not offer a significantly longer asset life.

The image below provides an illustration of what an HDP boundary box looks like:



1.2. Management control

d) Is the investment driven by factors outside of management control?

In a long-term context, this investment is driven by the combination of high meter penetration being reached by Anglian and the asset life of HDP boundary boxes. The high meter penetration was achieved in response to the supply-demand needs of the Anglian region. This is driven by factors such as climate and population growth which are outside of Anglian Water's control. In a shorter-term context, this activity is driven by assets which are known to have failed either from a customer contact, a leak, low pressure, supply interruption or a meter being inoperable. This means that we have to respond to failures quickly.

e) Have steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?

The decision on which type of boundary box to install and therefore the asset life of the boundary boxes is within management control. However, the decision on the boundary box to choose was taken with the long-term costs and benefits in mind (see 1c).

We have also taken broader consideration of savings options including:

- Options to repair rather than replace boundary boxes
- Actions to increase the life of boundary box assets
- Options to maximise the value of the boundary box replacements
- Potential to reduce costs through economies of scale
- Planned Repair Programme for boundary boxes to reduce customer impact and improve efficiency of delivery.

Options to repair rather than replace boundary boxes

Whether a boundary box needs to be replaced or repaired (or replacing only part of the asset) depends on the failure mechanism of the boundary box. The most common types of failure which provide the opportunity for a repair over replace resolution are that of the lid, external casing, pipe work or the meter spindle.

The table below sets out the options that are available to us to address any of these failures.

	Option 1	Option 2	Option 3
Lid	Minor Split or wearing to the lid surface: **Repair lid**	Damaged Lid Seal: **Replace Seal**	Cracked/Broken Lid: **Replace Lid**
External casing	Misaligned Upper or Cracked Surround: **Reseat or Repack**	Damaged Upper (cracked or crumbling): **Replace Box**	Collapsed Box Casing or significant structural failure (e.g the base): **Replace Box**
Pipe work	Leaking Inlet/Outlet Join: **Tighten or Replace fitting**	Leaking Ball Valve or Double Check Valve: **Replace the Valve**	Split Internal Pipe or Hole in Moulded Internal Pipe: **Replace the box**
Meter spindle	If Light Wear and Tear: Look to **repair or replace spindle** (depending on box type)	Spindle Stripped or Significant Structural Deterioration: **Replace the Box**	Spindle Cracked, Split or Broken: **Replace the Box**

In the case of each failure, we will progress with the best value option, rather than a one-size fits all response of replacing the entire boundary box. This triage approach resulted in *circa* 8,300 boundary boxes being repaired rather than replaced in 2022/23. This cost adjustment claim refers only to the costs required where the appropriate response to a failure is to replace the boundary box (i.e. where a failure can be fixed by a repair, we are assuming all of these costs to be part of the implicit allowance from the botex models).

Increasing the life of existing meter assets

As a means to limit the cost impact of boundary box maintenance, we have considered if there are options to extend the life of assets to allow phasing of replacements. As the assets are highly dispersed, taking actions which can increase the asset life of boundary boxes is not possible. The factors that drive the failure of assets are also outside of management control including the soil type and geology of the earth surrounding the boundary box.

Maximising the value of boundary box replacements

Given the scale of the meter rollout undertaken by Anglian, we have recognised that the maintenance of these assets will be an important base cost driver in future. Therefore, we have taken an active role in the development of boundary boxes to ensure that we can maximise the value of the new boundary boxes that we install (e.g. by ensuring the asset life of the new box increases over time).

To this end, we have worked with suppliers on the development of technical changes and product development, this learning then formed the basis of the testing criteria for the re-let of the boundary box framework. As illustrated by the tables below the test criteria were broken into three headline categories of Installation, Usability and Maintenance with each supplier being assessed against the questions within each category.

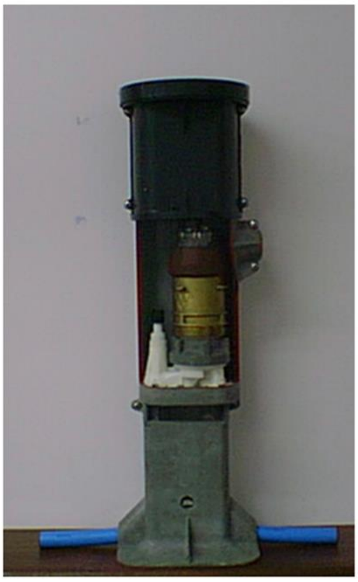
Boundary Box Product Trial Scoring

20 questions: all to be given a score between 0 to 10 (with 10 being the highest score)

[redacted]

[redacted]

Where we replace HDP boundary boxes in AMP8, these will be third-generation boundary boxes which have improved capabilities from previous 1st, 2nd and 3rd generation models pictured left to right below. We will continue to further develop the solutions moving forward.



Notable updates in design between generations of box:

- Generation 1 to Generation 2:
  - Improved material used for body of the box itself, less brittle
  - Improvement to the internal manifold and non-return valve structure.
- Generation 2 to Generation 3:
  - Significant re-design to the box casing to allow for greater flexibility in depth of installation
  - Improved materials used in construction
  - Addition of the supporting lip around the lid to improve stability of the box and reduce movement once installed
  - Change to push-fit connection increasing flexibility of installation and reduces risk of leakage on joints over previous models
  - Updated internal manifold with improved materials and functions.

Economies of scale

The extent of metering in the Anglian region shows that the scale of the need for maintenance relating to boundary boxes to be a large scale investment. We therefore consider that whilst the scale of capital maintenance will increase, the unit cost should decrease compared to the past when fewer replacements were made. Some examples of these opportunities are bulk purchase of materials, improved scheduling of jobs to reduce travel time and opportunity to introduce one-stop end-to-end (E2E) delivery. The increase in the work basket has also unlocked the potential to approach delivery of the replacements in new ways so as to make the most of the scheduling and E2E opportunities in particular, see Planned Repair Programme detail below. We have applied a unit cost which is not based on the costs we are currently seeing and have seen historically, but have built in an efficiency assumption around economies of scale (see table below).

[redacted]

Planned Repair Programme

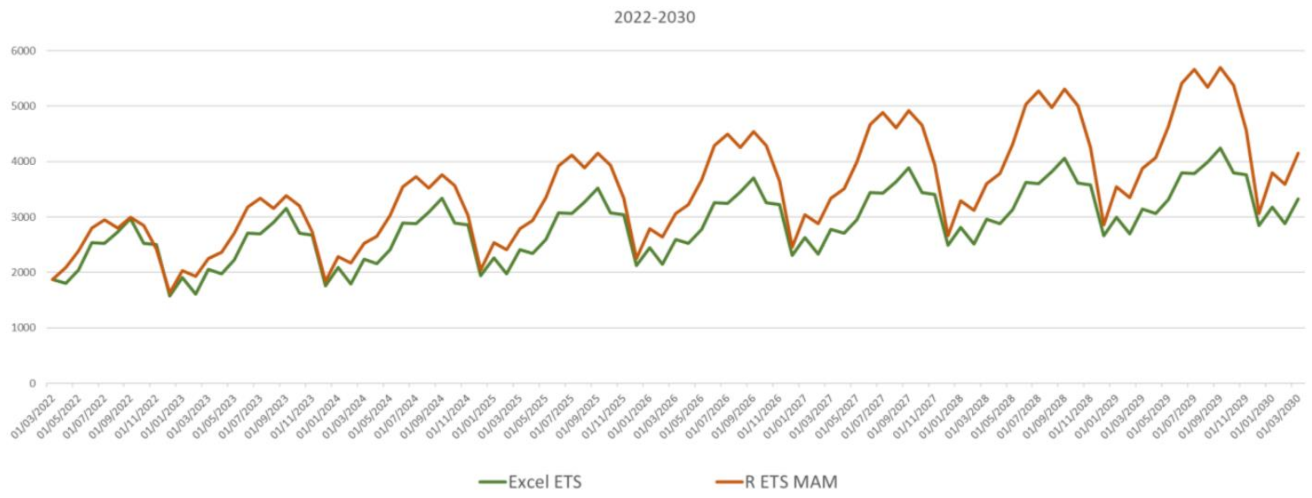
Recognising the increasing scale of the boundary box replacement volumes and the challenges this presented, even when taking into account economies of scale, we have recognised that the delivery model needed to be expanded. To this end in 2021 a new process under the title of *Planned Repair Programme* was developed on the principle of batching work together so as to more efficiently deliver it in a planned and programmatic way. The figure below expands on how this founding principle was further developed and the productivity benefit realised to date, which contributes to the efficiency of the wider boundary box replacement workbasket.

1.3. Materiality

f) Is there compelling evidence that the factor is a material driver of expenditure with a clear engineering / economic rationale?

We have analysed the actual number of boundary box replacements required in AMP7 to date and the expected replacements needed in AMP8 to understand the scale of replacements expected in AMP8 and future AMPs. Using data on expected failures from the date of meter installation, the expected asset life of 30 years (see q1a 'increase in meter penetration' chart[2]), the observed increase in boundary box failures in AMP7 and statistical trend analysis of likely failures in future years, we expect to see a material increase in the number of replacements required in AMP8. The chart below shows the expected forecast increases of replacements using statistical analysis carried out by Aecom. The estimated number of replacements required in AMP8 is 239,331.

[2] Note that we do not expect the number of replacements to exactly mirror the number of installations from 30 years ago, as while the expected asset life is 30 years, the observed asset lifespan will be a spread around this figure (i.e. some will fail earlier, and some later than 30 years)



g) Is there compelling quantitative evidence of how the factor impacts the company's expenditure?

The observed average costs to replace each failed HDP boundary box is £987 per replacement (see q1c 'meter housing material' table). With the increase in volumes expected in AMP8, and the potential this provides for more proactive replacements and potential economies of scale we aim to reduce this unit rate to £649.45 per replacement. This gives an expected expenditure requirement of £155.4m in AMP8 (the gross value of this cost adjustment claim) – a significant additional driver of expenditure in AMP8.

Whilst there is uncertainty over the precise number of failures we will see in AMP8, the direction of travel based on the engineering and economic rationale around expected asset lives of meters installed in the 1990s is clear.

Adjustment to allowances (including implicit allowance)

h) Is there compelling evidence that the cost claim is not included in our modelled baseline (or, if the models are not known, would be unlikely to be included)? Is there compelling evidence that the factor is not covered by one or more cost drivers included in the cost models?

The cost drivers for the base models are not expected to include factors which reflect the scale of meter penetration for each company, nor do any of the cost drivers which are likely to be included in the base models indirectly reflect the variability between companies of the cost drivers that are increasing Anglian's costs for boundary box replacements.

The data on the number of boundary boxes that will need replacing in the next AMP clearly shows a significant increase occurring which is both a) above the level of replacements undertaken in previous AMPs, and b) a rate of increase which has not been seen in previous AMPs. Therefore, the rate of replacement and the increase in the number of replacements are not sufficiently reflected in the level of performance and performance improvements expected from the base cost model allowances.

Our actual volumes of replacements required shows a more than doubling since 2017/18. These volumes will start to be reflected in the base modelling, but a) we expect this only to be seen for Anglian due to the effect of earlier meter installations and b) this is not fully reflected of the scale of further increase that we expect to see in AMP8. Therefore, we do not consider that this factor is reflected in base modelling.

Date	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Volume	12,000	11,423	12,175	14,994	16,196	23,334	24,588

i) Is the claim material after deduction of an implicit allowance? Has the company considered a range of estimates for the implicit allowance?

Considering that the cost drivers in the base cost model do not include factors that reflect the boundary box replacement rates behind this cost adjustment claim, it is not possible to calculate an implicit allowance through the exclusion of cost drivers in the base models.

We have therefore sought to understand the implicit allowance for boundary box replacements by following the same engineering and economic rationale which forms the basis of these claims (i.e. using the expected meter failure rates across the industry using data available on meter installation dates).

To do this, we have analysed the data submitted by companies through APRs and June Returns on the level of meter penetration since 1990. The only continuously running dataset relating to this is on the proportion of properties with metered billing. Whilst an imperfect measure of meter installation rates (i.e. some households will have a meter but not be billed by a meter) we consider this to be a reasonable proxy to compare the proportion of meters installed for Anglian against the industry as a whole (and by extension, a reasonable proxy to compare the volume of boundary boxes installed in each period for Anglian compared to the industry average).

Given the expected asset life for boundary boxes of 30 years, we assume that the base models reflect the activity required on average to replace the boundary boxes installed with new meter installations up to the year 1995 (i.e. thirty years before the start of the PR24 period). We have then compared the new meter installation volumes observed by Anglian in the period 1995-2000 (i.e. thirty years before AMP8) as it is these installations which will drive the bulk of our expected boundary box replacements in AMP8.

This data shows that the industry as a whole increased its meter penetration rate by 3.14 percentage points over the 1990-95 period. Over 1995-2000 we increased our meter penetration rate by 27.99 percentage points. We have therefore assumed that 11.23% of the expected costs for boundary box replacements referred to in this cost adjustment claim are reflected implicitly within the base models.

On this basis the assumed implicit allowance for this cost adjustment claim is as set out in the table below:

	Base cost (£m)
Total expected cost	155.4
Implicit allowance (total cost x 0.1123)	17.4
Cost adjustment claim	138.0

The cost adjustment claim value is therefore greater than the materiality threshold for water network plus[3] and is therefore worthy for inclusion as a cost adjustment claim.

j) Has the company accounted for cost savings and/or benefits from offsetting circumstances, where relevant?

The activity covered by this cost adjustment claim is to maintain current levels of service to customers rather than delivering any improvements. There are a number of activities which this investment will support, but all activities covered by this cost adjustment claim are needed to maintain existing capabilities.

One of the key issues with broken boundary boxes is that they contribute to an increase in leakage. These are not existing leaks that enhancement leakage activity seeks to drive down, but leaks that would increase the level of leakage were no further action taken. We therefore consider that whilst with this funding the level of leakage would be lower than the counterfactual (i.e. replacements are not undertaken) the activity only prevents a deterioration in performance. Further details on our assumptions of the leakage impact are highlighted in response to q3a. It should also be noted that because this CAC is referring to activities which have not taken place at this scale in the past, it does not overlap with the leakage cost adjustment claim (which reflects the efficient rate of maintaining leakage at the industry frontier based on historical data across the industry).

k) Is it clear the cost allowances would, in the round, be insufficient to accommodate the factor without a claim?

[3] 3.9% versus a materiality threshold of 1.0%

We consider that cost allowances in the round include:

- Modelled base costs allowances
- Unmodelled base cost allowanced (including other cost adjustment claims)
- Enhancement cost allowance.

We have set out above how we consider that the cost adjustment claim is net of any modelled base cost allowances.

Of the unmodelled base cost allowances, we consider that there is no overlap. There is a separate cost adjustment claim to maintain current frontier levels of leakage. Whilst leakage forms part of the performance that this boundary box CAC seeks to maintain, the allowance requested for the leakage CAC takes a top-down view drawing from existing observations of leakage performance and costs from companies across the industry. The scale of boundary box replacement activity that this CAC covers is not something which has previously been observed in the industry, and therefore the new increase in required replacement rates are not factored into the leakage CAC.

Our business plan will include enhancement activity on both leakage and metering. These enhancement activities are distinct from the activities covered by this cost adjustment claim. The leakage enhancement activity covers specific activities to expand our capability to reach lower levels of leakage through additional capability which we do not currently have. The metering enhancement covers upgrading the meter itself (rather than its chamber which in most cases will not need to change) to a smart meter, or the installation of new meters at properties which do not currently have a meter.

l) Has the company taken a long-term view of the allowance and balanced expenditure requirements between multiple regulatory periods? Has the company considered whether our long-term allowance provides sufficient funding?

We have taken a long-term view of the expected replacements required in future AMPs to support our view of expected activity required in future AMPs. Our current estimates over a four AMP period are as follows.

AMP	Boundary box replacements
6 (2015-20)	66,788
7 (2020-25)	146,613
8 (2025-30)	239,331
9 (2030-35)	332,890

This increase in the volume of replacements is reflective of asset lives and the increase in the number of meter installations over multiple AMPs in the past. This data shows that this is an area which will require significant activity and investment in future AMPs. Ultimately, we expect this to be a cost which the whole industry incurs in the longer term, and will eventually be reflected within the modelled allowance. However, as these costs have not historically been incurred by companies, and we face a unique position in being the first mover on meter installations in the five year period between 1995 and 2000, there is a need for a cost adjustment claim at PR24 to reflect these unique costs.

The allowance requested in this period is reflective of the view that any phasing of investment to future AMPs has a twofold disbenefit. Firstly, customers will experience the issues associated with boundary box failures for a longer period of time as the resolution of the failure is delayed, and secondly, a delay to the activity would increase the pressure on replacement required in AMP9 and beyond.

On a broader point, as we expect this to be a significant cost incurred for the industry over multiple AMPs, sustainable funding solutions which are fair to customers and don't lead to ever growing costs year-on-year should be considered. Options include the consideration of whether legislative change is required such that customers (rather than water companies) own their boundary box, as is the case for gas and electric meters[4]. This would

[4] Note, we set this out as an illustrative option for debate, not to present this as a preferred view.

transfer costs and control of assets to individual customers rather than the generality of customers. Clearly, such a solution is beyond the scope of this cost adjustment claim but presents one possibility long-term cost control.

m) If an alternative explanatory variable is used to calculate the cost adjustment, why is it superior to the explanatory variables in our cost models?

The key alternative explanatory variable that would be used to calculate this cost adjustment claim is meter penetration. Combined with the expected asset lives of boundary boxes this explains the scale of replacements that are currently required. None of the explanatory variables within the proposed Treated Water Distribution cost models reflect (directly or indirectly) the level of meter penetration.

2. Cost efficiency

a) Is there compelling evidence that the cost estimates are efficient (for example similar scheme outturn data, industry and/or external cost benchmarking, testing a range of cost models)?

Comparable cost data on boundary box replacements are not available at an industry or international level and so industry benchmarking is not as straightforward as it is for other activities. Cost models do not currently take into account costs driven by meter penetration levels and so industry cost models are unavailable for use.

One of the closest comparable datasets that we have considered for cost benchmarking is the enhancement benchmark models for new meter installations. However, this does not provide a suitable comparator because of the different characteristics of the activity of new meter installations compared to new boundary box replacements. For example, many new meter installations are internal and screw-in meter installations which do not require excavation of footpaths, unmade ground or carriageways which are more costly and make up the entirety of meter boundary box replacements. We would therefore expect unit costs for boundary box replacements to be greater than meter installation costs. Without industry data on the proportion of different meter installation types, a reliable cost comparison cannot be made to undertake cost benchmarking.

For this cost adjustment claim we have therefore considered that market testing is the most effective way to understand cost efficiency. We have sought unit costs for boundary box replacements from different suppliers, and based this cost adjustment claim on the lowest unit rate we currently have available.

At the time of submission of this cost adjustment claim[5], we continue to seek opportunities to compare our costs to external benchmarks to triangulate and further scrutinise the efficiency of the costs in this claim.

b) Does the company clearly explain how it arrived at the cost estimate? Can the analysis be replicated? Is there supporting evidence for any key statements or assumptions?

Our cost estimate has been derived from market testing of costs to replace boundary boxes (as described above). This has given a cost estimate for boundary box replacements where these are carried out in a carriageway (typically highest cost), footway and unmade ground (typically lowest cost). The table below shows how the cost estimate of this cost adjustment claim has been arrived at using these assumptions.

Replacement surface type (expected % of total volume)	Number of expected boundary box replacements	Total cost (£m)
Unmade (23%)	55,046	27.3
Footway (74%)	177,105	121.4
Carriageway (3%)	7,180	6.7
Total expected volume (100%)	239,331	**155.4**

c) Does the company provide third party assurance for the robustness of the cost estimates?

As set out in section 2a, we plan to undertake further work to ensure the efficiency of these costs - we will undertake third-party assurance on these final costs ahead of our business plan submission.

[5] 9 June 2023

3. Need for investment

a) Is there compelling evidence that investment is required?

The ultimate driver of this investment is the age profile and lifespan of boundary boxes. Where boundary box failure occurs, and no action is taken this would lead to significant deterioration in customer service.

Impact on leakage maintenance

One significant impact of boundary box failure is an increase in the level of leakage. Not replacing the boundary boxes included in this cost adjustment claim would lead to increase in leakage of 70.56 Ml/d by 2030 above base levels. This is based on observations that where a boundary box fails, 50% of these failures lead to a leakage impact, with an average leakage of 720 l/Day for visible leaks (30% of failures) and 216 l/day for non-visible leaks (70% of failures). With the expected volumes of failures of 239,331 we expect this to lead to an additional 15.68 Ml/d impact each year with a 70.56 Ml/d leakage impact in 2029/30 should the failed boundary boxes not be replaced.

In addition to the direct leakage impacts, there are corollary safety and behavioural impacts of boundary box failures. Where leaks occur, they are close to the ground surface, leading to a very visible leakage impact. This would have a further impact on public safety by presenting slip and trip hazards to the public, and also impact on resilience during times of water shortage. Our customer engagement has demonstrated that customers are less likely to feel they should reduce their own water usage where there is a perception that their water company is not playing its part by addressing leaks.

Low pressure and interruptions to supply

In addition to the leakage, health and safety and behavioural impact of failures, there are impacts on low pressure at affected properties. Where a failure occurs, we have seen that 0.5% of boxes that leak lead to low pressure impacts. This would lead to low pressure issues at an additional 120 properties per annum.

Customer's may also experience interruption to supply from severely failed boundary boxes. We approximate this to be affecting 0.2% of boxes which are leaking, affecting approximately 48 customers on average per annum.

Customer experience

We currently have 2,166,894 metered customers. At an average expected failure rate in AMP8 of 47,868 boundary boxes/year, we expect 2.2% of our customers with a water meter will be affected by the failure of boundary boxes and remediation per annum. Whilst the work we carry out will improve customer experience relative to the counterfactual where the boundary box failure persists, this is ultimately activity carried out to maintain service and avoid negative impacts to customers rather than improve customer experience.

b) Is the scale and timing of the investment fully justified?

The scale and timing of this investment is based on the need to avoid the negative impact on customers highlighted above, and on expected failure rates in AMP8 and future AMPs should no action be taken. Any phasing of investment by delaying the replacement of boundary boxes would extend the period over which the negative impacts of boundary boxes would be experienced by customers, and push investment into future AMPs where the number of boundary box replacements required will be even higher.

Conversely, we do not consider that it would be appropriate to bring additional boundary box replacements into PR24. Whilst this would in effect increase the number of proactive replacements which take place before failures occur, this needs to be balanced against feasible deliverability and customer affordability when the expected scale of investment required in PR24 is much higher than has been seen in previous AMPs.

c) Does the need and/or proposed investment overlap with activities already funded at previous price reviews?

This investment does not overlap with activities funded at previous price reviews. Previous price reviews have covered the costs of new meter installation, through enhancement allowances. However, this reflects the one-off costs of installing a new meter, and not its ongoing maintenance. Base cost allowances are assumed to reflect the ongoing maintenance of assets which, within the lifespan of boundary boxes we have assumed to be reflected within the base cost models. However, the base cost models include no driver for the significant cost of boundary box replacements at the end of their lifespan, and due to the timing of meters reaching the end of their lifespan in AMP8, this is not a cost that Anglian, or other companies, have experienced in previous AMPs.

d) Is there compelling evidence that customers support the need for investment (both scale and timing)?

This investment is ultimately driven by the supply-demand needs of our region, and the desire in the 1990s for our customers to be charged based on their water usage. The scale and timing of this investment is ultimately based on these expenditure drivers.

4. Best option for customers

a) Did the company consider an appropriate range of options to meet the need?

See 1c.

b) Has a cost–benefit analysis been undertaken to select proposed option? There should be compelling evidence that the proposed solution represents best value for customers, communities and the environment in the long term? Is third-party technical assurance of the analysis provided?

See 1c

c) Has the impact of the investment on performance commitments been quantified?

The main performance commitment that this would have an impact on is leakage. As set out in response to 3a, if we only invested the base implicit allowance in meter chamber replacements, we estimate that this would have the effect of deteriorating leakage performance in 2030 by 70.56ML/d compared to the 2025 baseline. This is an impact that we would not see were we not a company which had made an early start on significant meter penetration in the 1990s. Investing the request from this cost adjustment claim will be enough to maintain current leakage levels from boundary boxes, not to deliver any improvement in performance.

d) Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where utilisation will be low?

Cost uncertainties exist in relation to this cost adjustment claim in that the cost of boundary boxes may change between now (2023) and the required new installation date of boundary box installation. Should the out-turn costs vary from that expected from our current market testing, then the pain/benefit from this will be shared with customers through cost sharing.

On benefits, we have a high level of certainty that our proposed solution will deliver the expected benefits (i.e. that meters will be housed in a new boundary box, removing the negative customer impacts of leakage, low pressure etc. referred to earlier).

We are confident that there will be high utilisation of the solutions. Smart meters are a pivotal part of our Long-Term Delivery Strategy and Water Resources Management Plan. There is therefore a negligible risk that the investment delivered through this cost adjustment claim will lead to stranded assets as every smart meter needs to be appropriately housed in a chamber which allows it to function effectively.

e) Has the company secured appropriate third-party funding (proportionate to the third party benefits) to deliver the project?

The issues that this investment resolves (e.g., on leakage and customer experience) ultimately benefit two parties: the generality of Anglian customers, and the specific customer whose boundary box is replaced. It could reasonably be proposed therefore that the costs of this investment (or a portion of the costs) should be borne by the individual customer rather than the generality of Anglian's customer base. However, as the housing of meters is currently the sole responsibility of water companies, and not individual customers, there is no existing mechanism to reflect third-party funding from the individual customer benefitting from this cost adjustment claim. We therefore do not consider there to be third-party funding sources to support this cost adjustment claim.

f) Has the company appropriately presented the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?

The investment is heavily integrated into the network and our business, with each boundary box being closely integrated into our network. Information on which boundary boxes are in need of being replaced is also heavily integrated into our business, making this investment indistinct from other parts of our business. We have therefore concluded that this activity would not be appropriate for delivery through DPC.

g) Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views

In selecting the preferred option we have taken into account customer views on smart metering, leakage and asset replacement, alongside other criteria for the selection of the proposed solution outlined in 1c. Our customer engagement has shown that customers are less willing to take action to reduce their own water consumption if there is a perception that we are not doing everything we can to manage leakage and look after our assets.

5. Customer protection

a) Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?

The costs of this programme could be covered by a payment-by-results method. Such a method would ensure that we are only given funding for boundary box replacements that we have actually delivered. Such a mechanism would negate the need for an upfront cost adjustment and a price control deliverable as Anglian would not receive an upfront allowance for boundary box replacements and therefore not need to return any funding back to customers if the investment is cancelled, delayed or reduced in scope.

In the event that such an uncertainty mechanism is not possible to implement, customers would be protected through a price control deliverable based on the efficient unit rate to deliver each boundary box replacement. This would return the proportion of the cost adjustment claim back to customers should any of the expected boundary box replacements not happen in AMP8.

b) Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?

By tying an uncertainty mechanism or price control deliverable to the delivery of boundary box replacements, the mechanism would inherently cover all the benefits that would be delivered from this cost adjustment claim.

We have considered alternative customer protection mechanisms tying to leakage, or low pressure but consider that a) a single protection mechanism which is directly linked to the delivery of the CAC is both simpler and better serves the principle of customer protection than multiple outcome-focussed PCDs, b) has less reliance on assumptions around benefits that will be delivered by the CAC, and c) reflects the asset health benefits which are more difficult to reflect in multiple outcome-focussed protection mechanisms.

c) Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including the mechanism for securing sufficient third-party funding?

As highlighted in 4e, we do not anticipate any third-party funding for this investment.