Cadent
Your Gas Network

Appendix 10.12

Uncertainty Mechanism Case

Diversions

Cadent
Your Gas Network

Cadent's systematic approach to developing uncertainty mechanisms to manage forecast uncertainty

1. Defining our customers' needs

- What is the area?
- Why is it important to customers and stakeholders?
- What insights are shaping our thinking?
  - Customer insights
  - Stakeholder insights
  - Legislative insights
  - BAU operational information
  - Historic insights
  - Wider research

2. Evidencing forecast uncertainty

- What do we know about future workload & costs in this area?
- Why can't expenditure be forecast with sufficient confidence?
  - For example using historical / independent benchmarks
- Why are levels of expenditure outside of network control?
- What customer / network impacts could there be from a forecast error?
- What network behaviours could arise from inclusion within the base plan?
  - What would the customer impact be?

3. Qualitative assessment of the options

- What options other than inclusion in the base plan are available?
- Why are they the options?
- What option(s) are we proposing and why?
- How would the mechanism(s) work? (Implementation, triggers, materiality thresholds etc.)
- What are the customer benefits & drawbacks of the mechanism(s)? (Inc. simplicity)
- Why do the customer benefits outweigh the drawbacks?
- What network behaviours could the mechanism drive?
  - What would the customer impact be?

4. Quantitative assessment of the proposed options

- How do we know our 'input variables' are the best available? (i.e. ranges of workload, costs, trigger points, frequency, probability etc.)
- How are we assuring our modelling results?
- What is the best view of materiality for the area?
- What is the modelled cost volatility for the area?
- How does the proposed mechanism(s) deliver value for money?

5. Quantifying the overall customer impact

- What is the overall customer impact of all areas of forecast uncertainty – with and without mechanisms?
- What does this mean for the balance of forecast risk between customers and networks?
- What does this mean for customer bills?

6. Setting standards that customers love

- Are our proposals, and the associated impacts, easy to understand?
- Can it be demonstrated that they protect customers and investors?
- Is our suite of proposed mechanisms acceptable to customers and stakeholders?

Uncertainty area			
Demand uncertainty	Legislative uncertainty	Cost confidence	Heat Policy

Diversions

Cadent proposal

Re-opener Uncertainty Mechanism

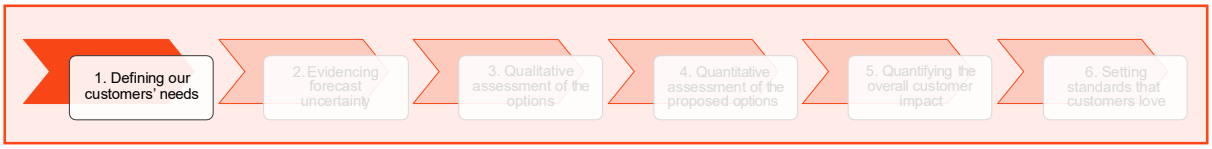
We must undertake diversion works to maintain the safe operation of networks, enable growth and to ensure we can continue to access our assets following third-party development. This work is triggered by external developer demand or changing environmental factors and is consequently difficult to forecast.

Our requirement to undertake such work is driven by responsibilities under the Gas Pipeline Safety Regulations to be able to actively access and maintain our pipes and thereby manage health and safety risks and interruptions to supply caused by gas escapes and/or pipes collapsing.

This work is generally rechargeable in whole or in part. However, in some instances, it is not possible for us to charge developers for the costs incurred. A non-chargeable diversion may result from a lack of legal protection for our pipeline route or be driven by environmental effects such as reduced depth of cover or riverbank erosion.

While we have knowledge of some existing interventions that may be required in RIIO-2, there is considerable uncertainty over the total volume of work we must undertake. Costs for pipeline diversions are generally well understood, however specific site challenges and diversion of none pipeline equipment introduce uncertainty. Therefore, it is challenging to predict the future needs of our customers and developers during RIIO-2.

1. Defining the need



1.1. What is the area?

The requirement to undertake pipeline diversions is driven by our own business needs or the needs of a third-party stakeholder, in order to maintain the safety of our network.

For a chargeable diversion, we will be requested to undertake diversionary works to support the activities of third-party developers. For example, an external developer or customer may propose a new development or wish to carry out construction work near an existing gas pipe. Where this poses a risk to the safe and cost-effective operation of our assets, a diversion or protective works will be proposed and agreed with the relevant third party.

In some instances, it is not possible for us to charge the cost of diversion work back to a developer. This can be due to a range of factors including where:

- Gas pipes have been built over without permission where the customer has no legal obligation to fund the diversion

- Gas pipes are near other infrastructure or buildings which might limit our ability to manage and maintain our assets quickly and safely
- We have no right of access onto land via easements or other licenses
- A customer has legally binding rights that require us to move the asset from their land
- The integrity of the asset has been compromised

1.2. Why is it important?

We have a responsibility under the Gas Pipeline Safety Regulations to be able to actively access and maintain our pipes, to minimise the health and safety risks and risks from supply interruptions to customers caused by gas escapes and pipe failures. We are therefore required to intervene to ensure the safety of our gas pipes in response to changing demands, such as infrastructure development in areas close to our assets.

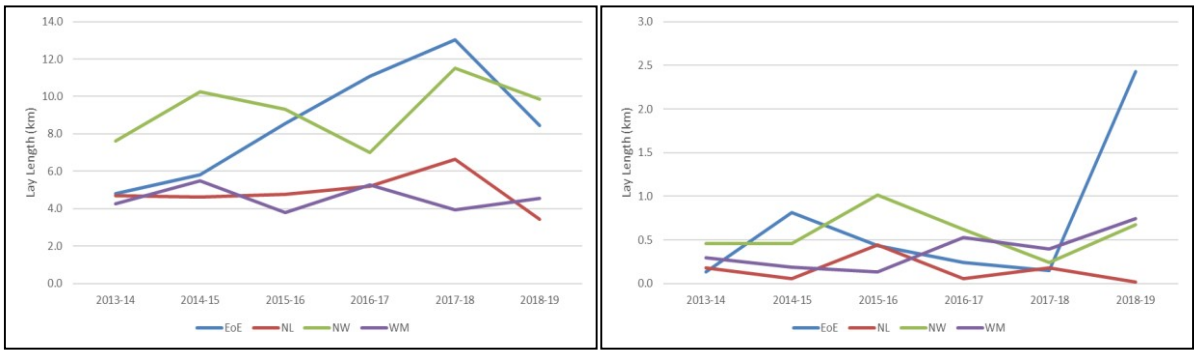
Alongside mitigating the risk of damage to our network, we also look to support infrastructure growth and to ensure that our assets can be safely operated and maintained in the future following further industrial or housing development work.

1.3. What insights are shaping our thinking

We have taken a reactive approach to chargeable and non-chargeable diversions in RIIO-1, responding to customer demand for such work. Throughout this period, we have tracked activity to understand the nature of our costs over time and to understand the potential volumes we may face in RIIO-2. This has also included engaging with relevant third-party stakeholders to understand their potential future requirements and the associated diversion work this may trigger.

Figure 1 below outlines the volumes of chargeable and non-chargeable below 7 bar reinforcements that we have undertaken during RIIO-1. As shown in both charts, diversions activity can display significant volatility over time, creating challenges in identifying common trends that may materialise in RIIO-2.

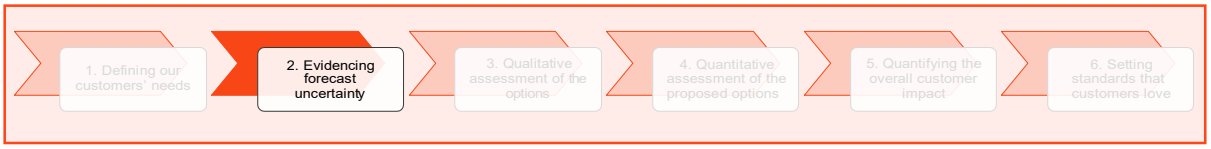
Figure 1: Volumes of chargeable (left) and non-chargeable (right) below 7 bar diversions undertaken in RIIO-1



The importance of maintaining the security of supply is also demonstrated by our engagement with customers. Safety, including the prevention of emergency situations, was consistently highlighted as the most important or joint-most important priority across each engagement method during our phase 1 research, which included deliberative workshops, a domestic customer survey, a public survey, focus groups with hard to reach groups, stakeholder interviews and vulnerability interviews. The May 2019 Cadent employee survey found that 'guaranteed gas supply' was scored as the fourth-highest priority (with a weighted

score of 4.49 out of 5) for staff when answering as 'customers' (the survey asked staff to consider questions both as customers and as employees).

2. Evidencing the uncertainty



2.1. What we know about the future

Diversions will continue to be driven by third-party development, environmental change and construction activity. Through existing engagement, we have visibility over several works that are likely to be delivered in RIIO-2. However, there is considerable uncertainty on the specific timing of these works, and the ultimate form of diversion that may be required. Our experience over the RIIO-1 period has demonstrated that developers and other third parties may unpredictably change the timing or scope of their plans, resulting in changes to required diversions.

Comparing uncertainty to costs included in our base plan

During RIIO-1, we received a fixed baseline allowance for diversions. For both chargeable and non-chargeable, our activity and associated spend at the beginning of the RIIO-1 period was relatively low. As demonstrated in Figure 1 above, this trend has reversed towards the end of the period as further volumes have materialised.

Our RIIO-2 base plan includes expenditure annually based on a volume equivalent to 80% of the minimum below 7 bar chargeable and non-chargeable diversions. This is associated with a total cost in our base plan of £5.9m for chargeable diversions and £2.09 for non-chargeable. Further details are provided in Appendices 09.24 and 09.25.

Table 1: Baseline costs associated with below 7 bar chargeable diversions

Base costs *£m, 18/19 prices*	2021/22	2022/23	2023/24	2024/25	2025/26
East of England					
North London	Redacted due to commercial sensitivity				
North West					
West Midlands					

Table 2: Baseline costs associated with below 7 bar non-chargeable diversions

Base costs *£m, 18/19 prices*	2021/22	2022/23	2023/24	2024/25	2025/26
East of England					
North London	Redacted due to commercial sensitivity				
North West					
West Midlands					

Our proposal for an uncertainty mechanism provided funding for additional volumes above and beyond those included in our base plan. As will be discussed further in this document, the mechanism is based on the same unit costs used to develop our base-plan proposals. In Section 3, we provide a full evaluation of how the mechanism would work in practice alongside a baseline allowance.

2.2. Why we face forecasting difficulties

While we can consider the profile of costs incurred to date in RIIO-1 and our engagement with developers and other third parties has indicated potential future diversions that may be required, it is extremely challenging to establish a total cost estimate for inclusion in our plan. This uncertainty is driven both by the volumes of work we will be required to undertake and by the costs of doing so:

- **Volumes** – diversions are triggered by developer demand, which may materialise in period without forewarning in RIIO-2. The volume of activity is driven by societal and economic factors outside of Cadent's control and their interaction with our network. For example, the building of a new road will depend on Government policy and depending on how the route is developed the scale of impact on our network will vary. For diversions driven by environmental change – soil erosion, river migration – it is again difficult to predict rates of change which can be materially impacted by weather conditions and storm events. Under the Gas Pipeline Safety Regulations, we must undertake such work. Developers' plans, and therefore requirements, are also susceptible to change at short notice, creating even greater uncertainty over the volume of work we will be required to undertake.
- **Costs –** We have a good understanding of pipeline diversion costs, particularly below 7 bar. However, for diversion of higher pressure pipelines, diversion of none pipeline equipment (such as governors) and in certain geographically challenging circumstances the costs can become more uncertain. The specific interventions we will be required to undertake in RIIO-2 will be driven by the specific characteristics of each individual site, creating challenges in understanding the total programme cost impact. This is further compounded by the challenges posed by land access and associated legal costs where applicable.

We are unable to control the volume of diversions work that we will have to undertake in RIIO-2 since it is predominantly developer-led. While we may have some control over the ultimate solution required at each individual site, if a diversion is the only appropriate intervention based on safety considerations or legal requirements, this work must be delivered.

We will continue to engage with developers and other third parties to develop a **better view** of potential demand for diversions work going into RIIO-2. This includes the potential impact of any future Government decisions in relation to infrastructure investment that may have implications for our network.

2.3. Network impacts and behaviours from including in the base plan

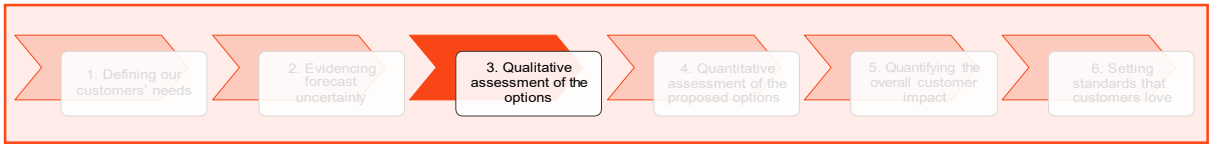
The risk with including all potential volumes and costs for diversions in our base plan is that we would be required to rely on an uncertain estimate of future need for such work. This creates a risk that our estimate either under- or over-predicts the volume of work we will need to undertake, in an area where we have licence obligations to maintain the resilience of our network.

If we were to include all costs associated with diversions in the base plan as part of our RIIO-2 submission, we would be required to develop a cost estimate based on our historical experience to date during RIIO-1. This would involve relying on trend analysis to inform future demand for diversions work, which represents challenges as the workload is dictated by third parties. Furthermore, we would be required to assume that the future workload mix would remain unchanged, and that work undertaken to date is representative of future diversion needs.

There is a **credible risk to Cadent** that we may underestimate future volumes of required work, or that more complex interventions may be required in RIIO-2 in response to the changing requirements of customers and developers. We would face an incentive to price risk into base plan estimates for reinforcements in order to ensure we were adequately funded if there was a significant growth in customer demand for diversions.

However, this **creates a risk to customers**. Volumes might outturn below an allowance in RIIO-2, and this could create an opportunity for windfall gains for Cadent.

3. Qualitative assessment



3.1. Options for addressing uncertainty

Given the uncertainty on the volume and to a lesser degree cost of diversions that will be required in RIIO-2, we have evaluated the appropriateness of different mechanisms that could address this risk:

Table 3: Evaluating options for uncertainty mechanisms

Mechanism Option	Description
Volume driver	A volume driver is not wholly appropriate for this risk. Whilst we are confident in the costs of standard below 7 bar pipeline diversions, future costs will be specific to the nature of individual diversions we are required to undertake (particularly at larger diameters and where there are specific environmental challenges). It would be inappropriate to develop unit costs across the full range of potential interventions, which would require an assumption that the future workload (driven by individual developer requirements) would remain unchanged going into RIIO-2.
Re-opener mechanism	A re-opener accounts for uncertainty in costs when both the design and the requirements for projects in RIIO-2 are unknown. Elements of diversions are well suited to this mechanism, as the specification of works we will be required to undertake is currently unknown. This mechanism would allow us to develop an evidence-based cost forecast during the RIIO-2 period once the scope of a diversion is identified, which would be subject to review from Ofgem.

Mechanism Option	Description
Volume driver	A volume driver is not wholly appropriate for this risk. Whilst we are confident in the costs of standard below 7 bar pipeline diversions, future costs will be specific to the nature of individual diversions we are required to undertake (particularly at larger diameters and where there are specific environmental challenges). It would be inappropriate to develop unit costs across the full range of potential interventions, which would require an assumption that the future workload (driven by individual developer requirements) would remain unchanged going into RIIO-2.
Use it or lose it allowance (PCD)	This would involve a price control deliverable (PCD) as part of our RIIO-2 plan. While this would protect customers from under-delivery, a PCD does not address the challenge we face in forecasting a total cost when the volume and unit costs of diversions are unknown. There is also a risk that barriers are created if there are insufficient funds to deliver against any new requirements.

We have also undertaken a qualitative assessment of uncertainty in this area to further understand the need for an uncertainty mechanism for diversions.

Table 4: Qualitative assessment of risks posed by diversions

Volume risk	Unit cost risk	Impact on outputs	Material cost / bill impact
High	**Low / Medium**	**Medium**	**Medium**

Further detail on our assessment is provided below:

- **Volume risk**: Work is driven by developer demands, which we are unable to control. We are also required to undertake work under the Gas Pipeline Safety Regulations to maintain the safety of our network.
- **Unit cost risk**: There is uncertainty over cost forecasts at present, given the scope of individual diversions and the volume of work that will be required. Unit costs will be specific to the requirements of each individual job. For standard below 7 bar diversions we are confident in unit costs. For above 7 bar assets and some specific diversions which include particular geographical challenge or diversion of assets other than pipelines, the costs are more uncertain.
- **Impact on outputs**: This area has implications for our outputs relating to interruptions to supply and safety.
- **Material cost / bill impact:** As discussed further in Section 5, this may be a material area of cost in RIIO-2 will bill implications. There is significant uncertainty over the timing of works which will be driven by when customers require diversions to be undertaken.

3.2. Our proposed uncertainty mechanism

We are proposing to address uncertainty related to non-chargeable diversions using a **re-opener mechanism** in RIIO-2, with a materiality threshold and an anytime trigger[1]. In practice, this mechanism would allow us to make a submission to Ofgem during RIIO-2 once the materiality threshold is breached. The assessment of materiality would be conducted at the individual network level rather than the Cadent level. In this submission, we would propose the costs we intend to recover from customers, providing evidence on why they are appropriate and efficient. This mechanism ensures that scrutiny remains over any future costs we intend to reclaim. It also provides an opportunity to engage with external developers if required on the reopening of our determination.

Operation of the proposed re-opener in practice

- **Form of the trigger:** The need to undertake additional work under this re-opener would be triggered by the identification of the need for a diversion intervention on our network. This need will be triggered by a direct customer request, or the identification of an environmental risk that needs to be mitigated. In the case of a chargeable diversion, this would also include the agreement of an acceptable rate with the relevant third party. These triggers are externally determined, and readily evidenced.
- **Mitigating the likelihood of the trigger:** While the trigger would be externally determined by developer demand or safety requirements, we would continue to engage with external developers to understand their future requirements and to identify the most appropriate solution. Whilst it is unrealistic to suggest that we could materially alter plans for a major scheme, small alterations in design may allow the creation of utility corridors or other lower costs means of protecting our assets.
- **Claiming costs through the re-opener**: As outlined above, we have proposed that costs can be reclaimed at any time during the RIIO-2 period for this mechanism, once a materiality threshold has been breached. We propose that this includes a point in time whereby evidence can be presented that the threshold will be breached in the near future. As part of this process, we would demonstrate costs incurred or expected to be incurred in response to requirements to undertake diversion works. This would include evidencing the trigger of such diversions.

Our subsequent analysis in the remainder of this document is focused on below 7 bar diversion volumes. However, we propose the above mechanisms also apply to any above 7 bar diversions we may be required to undertake in RIIO-2. We have only included known schemes in our base RIIO-2 submission, these are predominantly developer funded; however, there is potential for this work to be triggered by external developer demand

3.3. Evaluating our proposed uncertainty mechanism

A re-opener allows us to respond to the demands of customers and developers within the RIIO-2 period, and to undertake required diversion interventions to maintain a safe network. This provides an opportunity to develop a higher-confidence cost estimate. As outlined in Section 2.3, there are risks associated with including a cost estimate in our base plan at

[1] For the purposes of our modelling and analysis we have used a 1% materiality threshold, as is used in RIIO-GD1. However, due to potentially significant changes in financeability and totex sharing arrangements in RIIO-2, we are assessing if the materiality threshold should be revised. Our proposals for a re-opener for diversions are based on this adjustment being made, as discussed in Chapter 10. If this was not the conclusion of Ofgem's consultation, we would need to consider the most appropriate treatment for diversion costs.

present, creating opportunities for Cadent to make losses or windfall gains, specifically around more complex activities.

Nevertheless, it is important to fully evaluate the behaviours that our proposed uncertainty mechanism will encourage, to ensure it does not create perverse incentives. Below, we consider positive behaviours that a mechanism should promote.

Table 5: Evaluating incentives created by our proposed uncertainty mechanism

Behaviours and incentives	Evaluation
To minimise costs	The costs we submit to Ofgem through the re-opener process will be subject to review and challenge. Any costs identified as inefficient will be disallowed. This creates an incentive to focus on incurring or estimating efficient costs and demonstrating this with robust evidence.
To deliver required work	Ofgem will also focus on ensuring that these only relate to relevant activities. Any costs submitted for work Ofgem do not believe to be required will be disallowed, creating an incentive to focus on work with a compelling need. This will ensure that work which can be objectively defined as 'diversions' will be included, in line with existing reporting guidelines under the RPP. There may be concerns that the re-opener does not maintain an incentive to undertake required work. However, as identified in Section 1.1, this risk relates to work that will be triggered by external demand, which needs to be addressed to maintain safety and our obligations under the Gas Pipeline Safety Regulations. Failing to do so would create safety risks for customers as well as financial and reputation risks to our business.
To take a whole-systems approach or to identify strategic solutions	There may be a concern that a re-opener limits our incentive to consider wider strategic solutions or to take a whole-systems approach to new changes in demand for diversions. As described above, the evidential bar associated with the mechanism will encourage cost minimisation. Where this can be achieved by taking different approaches to future work, we would be able to demonstrate an efficient case to Ofgem.
Interactions with expenditure included in our base plan	The costs and volumes included in our base plan are developed across identical categories of diversion (objectively determined, in line with RRP requirements). Our proposal is for costs incurred to be allocated initially to our baseline allowance. Any further diversions would be reclaimed through the re-opener. It would not be possible for us to gain from this allocation, given that work is undertaken in response to customer demand – we therefore do not have ultimate control over the phasing.

A potential drawback for customers is that any costs incurred through the re-opener mechanism may introduce some volatility to their bills, with adjustments made in-period to account for the additional investment we have undertaken. This risk is partially mitigated by the inclusion of a minimum level of chargeable and non-chargeable diversions in our base plan.

Interactions with other uncertainty mechanisms in our proposed package

Heat policy

Our proposals for a diversions volume driver may interact with Ofgem's prescribed re-opener for Heat Policy in practice. There may be a scenario whereby a future policy decision influences overall growth rates across our network, which may influence the volume of diversions we may be required to undertake.

Recognising this dependency, our proposed approach ensures we can adapt and respond accordingly. For example, if a decision was taken that prevented new gas connections during RIIO-2, this could limit the volume of diversions work required in RIIO-2 (although work would still remain driven by safety factors). By including a conservative estimate of diversions in our base plan, customers' risk of funding windfall gains is limited, while costs for diversions can only be claimed through the re-opener once a materiality threshold is breached.

4. Quantitative assessment

4.1. Inputs for uncertainty modelling

Chargeable diversions below 7 bar

We have analysed our RIIO-1 workload for chargeable diversions and identified the highest length of work undertaken on an annual basis in each of our networks. We have calculated the cost associated with this volume, using the average unit costs and rates of cost recovery through customer contributions during the period. This data has been used to develop our high-case assumptions. We have developed our likely scenario as a 50% discount on this value, based on our analysis of RIIO-1 workloads. Our low case of '0' relates to the scenario whereby no additional costs are incurred over the amount included in our base plan.

Table 6: Input assumption - Costs associated with below 7 bar chargeable diversions

Total cost by scenario and network (£m, 18/19 prices)	Scenario	2021/22	2022/23	2023/24	2024/25	2025/26
East of England	High case	Redacted due to commercial sensitivity				
	Likely case					
	Low case					
London	High case					
	Likely case					
	Low case					
North West	High case					
	Likely case					
	Low case					

Total cost by scenario and network (£m, 18/19 prices)	Scenario	2021/22	2022/23	2023/24	2024/25	2025/26
West Midlands	High case		Redacte	due to c	ommercia	
	Likely case			sensitivity		
	Low case					

Non-chargeable diversions below 7 bar

We have analysed our RIIO-1 workload to understand the potential range of costs that may be incurred in RIIO-2. Table 7 below outlines the total-cost scenarios for RIIO-2 that have been included in our Monte Carlo analysis. Our likely scenario has been developed by analysing the average costs incurred in RIIO-1 and assuming the same trend applies over the RIIO-2 period. This required two material assumptions:

- The number and type of interventions in RIIO-1 will be similar in RIIO-2.
- The unit costs for different interventions will remain unchanged. Our contractor rates will remain consistent with RIIO-1 cost base.

We have developed a high-case scenario as 50% deviations around this value to demonstrate the potential volatility in volumes that may occur. This is informed by our analysis of our RIIO-1 workload. Our low case of 0 relates to the scenario whereby no additional costs are incurred over the amount included in our base plan.

Table 7: Input assumption - Costs associated with below 7 bar non-chargeable diversions

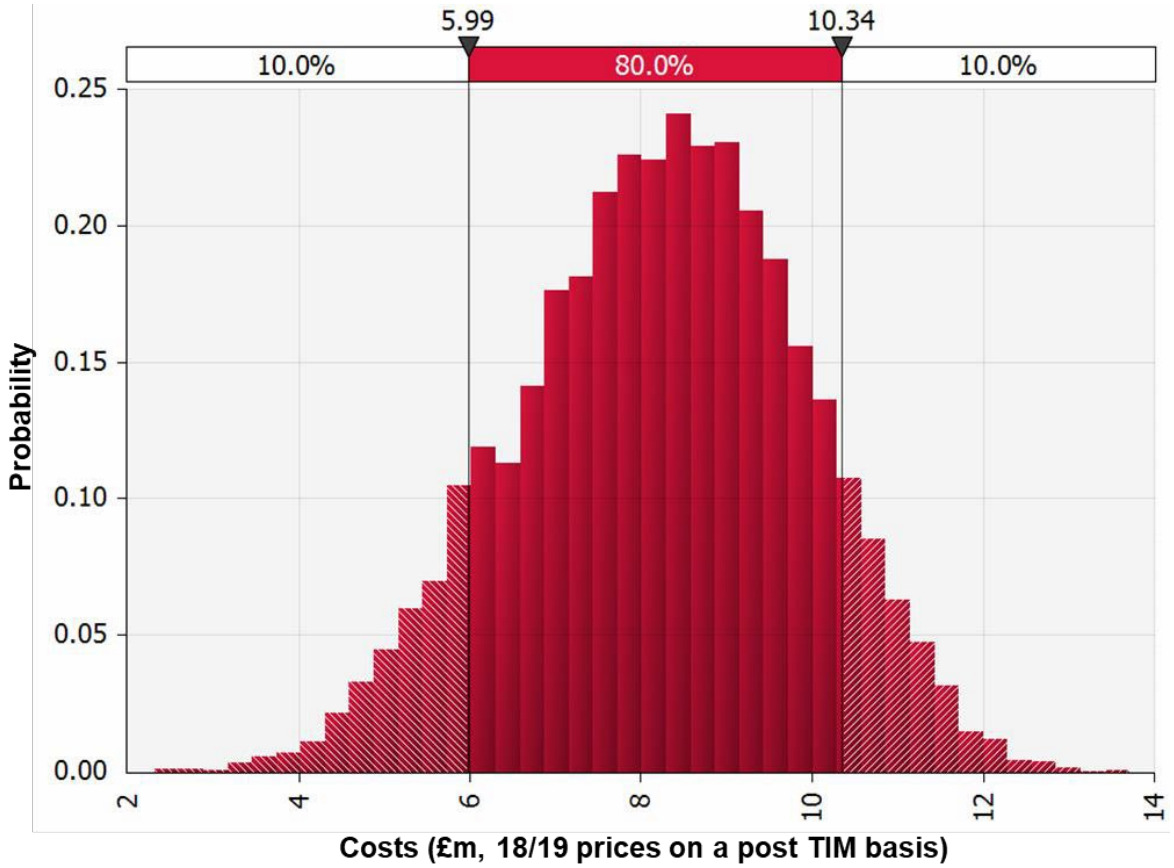
Total cost by scenario and network (£m, 18/19 prices)	Scenario	2021/22	2022/23	2023/24	2024/25	2025/26
East of England	High case					
	Likely case					
	Low case					
London	High case					
	Likely case					
	Low case		Redacted	due to c	ommercia	
North West	High case			sensitivit		
	Likely case					
	Low case					
West Midlands	High case					
	Likely case					
	Low case					

In Section 3.3 we confirmed our Monte Carlo analysis excluded costs associated with above 7 bar diversions. In practice, we would seek to reclaim these costs using a tendering process to identify efficient costs for delivering required work.

4.2. Assessing uncertainty

Using our input data described above, we have undertaken Monte Carlo analysis to understand the range of cost impacts for this area of uncertainty in RIIO-2. This provides a distribution of the potential cost outcomes for non-chargeable diversions, based on 10,000 iterations. This approach illustrates the high and low scenarios of uncertain costs, alongside the mean cost outcome and the associated volatility. Figure 2 below summarises this distribution, while Table 8 provides a breakdown of this risk on a network basis.

Figure 2: Monte Carlo: Total Cadent RIIO-2 cost risk for diversions, no mechanism. Costs, £m 18/19 prices on a post TIM basis



Minimum	Maximum	Mean	Standard Dev	Iteration
£2.32m	£13.71m	£8.23m	£1.66m	10,000

This analysis illustrates the uncertainty in the volumes and costs of work we may be required to undertake. Without the introduction of an uncertainty mechanism, there is a considerable risk that actual costs incurred in RIIO-2 may deviate from any initial estimate proposed as a baseline allowance.

Table 8: Monte Carlo: Total RIIO-2 cost risk by network for diversions, no mechanism. Costs, £m 18/19 prices

Network	Minimum	Maximum	Mean	Standard Dev
East of England	£0.12m	£7.13m	£3.92m	£1.37m
North London	£0.07m	£3.63m	£1.94m	£0.70m
North West	£0.05m	£2.90m	£1.64m	£0.56m
West Midlands	£0.02m	£1.31m	£0.74m	£0.25m

4.3. Impact of our proposed uncertainty mechanism

Table 9 below summarises the impact of introducing a re-opener mechanism to address this risk. As shown, the use of a re-opener marginally reduces the mean risk and reduces the overall range of the potential risk. As the uncertainty mechanism would ensure we only recovered appropriate and acceptable costs from customers, this is an improvement from including a potentially higher base-plan allowance to mitigate against the cost risk identified without the presence of an uncertainty mechanism in Table 8.

Our proposals for a re-opener for diversions assume that an adjustment is made to the 1% materiality threshold, as argued in Chapter 10. If this was not the conclusion of Ofgem's consultation, we would need to consider the most appropriate treatment for diversion costs.

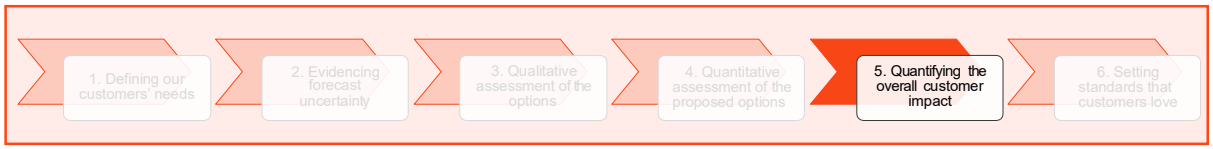
Table 9: Range of cost risks with and without mechanism, diversions. Costs, £m 18/19 prices on a post TIM basis.

Value	Without mechanism	With mechanism
Range of Impacts	£2.32m to £13.71m	£1.46m to £12.66m
Materiality (mean risk)	£8.23m	£7.65m
10th Percentile	£5.99m	£4.98m
90th Percentile	£10.34m	£9.85m
Standard Deviation	£1.66m	£1.84m

Several assumptions have been made to produce these results:

- Figures are presented on a post TIM basis, using an incentive rate of 40%.
- In the case of re-openers, we have assumed a 1% materiality threshold of average annual revenues. We have also assumed 100% of costs are reclaimed in re-openers.
- Finally, we have not considered the phasing of income in this analysis – we have focused on the value of risk and potential incomes.

5. Quantifying the customer impact



In Section 5 of Appendix 10.00 (Our approach to managing risk and uncertainty) we have analysed the overall customer impact of uncertain costs with and without our proposed package of mechanisms. We have also evaluated how our proposed package recognises the trade-off between sharing exposure of cost risk between Cadent and our customers. In Chapters 10 and 11 of our Business Plan, we also quantify the impact of our proposed package of uncertainty mechanisms on customer bills in RIIO-2.

We have also quantified the bill impact associated with the diversion re-opener individually. **Error! Reference source not found.** below summarises the potential bill impact per annum by the end of RIIO-2 for the mean, P10 and P90 costs estimated in our Monte Carlo. As the costs associated with this uncertainty mechanism are categorised as capex, the bill impact is spread over a significantly longer period. For the mean cost impact below, this is equivalent to £0.05 per annum at the Cadent level.

Table 10: RIIO-2 end bill impact, P10 mean and P90 costs from uncertainty analysis

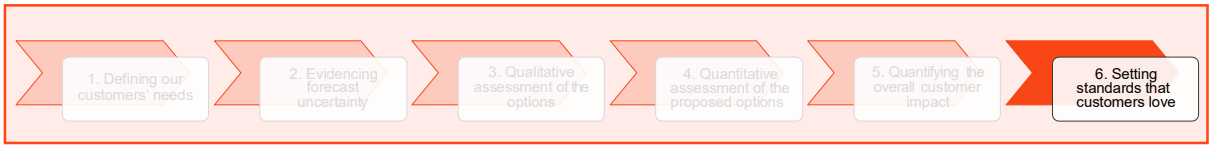
RIIO-2 end bill impact (£, 18/19 prices)	P10	Mean	P90
East of England	£0.07	£0.10	£0.13
London	£0.06	£0.09	£0.11
North West	£0.05	£0.06	£0.08
West Midlands	£0.03	£0.04	£0.05

For the purpose of constructing bill impact estimates, we have focused on the costs from our Monte Carlo analysis and have not considered the potential timing effects on revenue recovery from the use of a volume. In practice, bill impacts would materialise with a lag following a successful claim through the mechanism.

As outlined in Chapter 10 (Managing risk and uncertainty), Ofgem's business plan guidance suggests that "uncertainty mechanisms that highlight risks to consumers of which Ofgem would not otherwise have been aware" is an example that could constitute part of a Consumer Value Proposition (CVP). We discuss our CVP in Section 7.1 of Chapter 7.

The value of a bespoke uncertainty mechanism to customers does not obviously lend itself to be monetised in the same way of some of outputs commitments where we have calculated a social return on investment or have clear willingness to pay data. One way the value could be calculated is to look at the value that might otherwise have needed to be forecast into the base expenditure plan that may not have been subsequently needed if the uncertainty did not arise. For example, you could take consider our likely cost estimate, and multiply this by the totex incentive sharing factor that the customer would be faced with (e.g., 60%). This is not as robust a method as SROI or willingness to pay but provides an indicative estimate. In the case of diversions, this is equivalent to approximately **£12.35m in RIIO-2.**

6. Setting the standards



Our proposals for a re-opener mechanism are clear and simple for our customers to understand. These proposals have also incorporated challenges we have received from our CEG. We only propose to request funding for the costs we efficiently incur in response to customer-led requests for diversions. If we are required to lodge a notification through this mechanism within RIIO-2, we would clearly articulate to customers the detail behind any additional expenditure.

Our evaluation of the implications of including costs for reinforcements in our base plan, as outlined in Section 2.3, and of the incentives associated with our proposed volume driver mechanism, demonstrate the benefits of this approach for customers and stakeholders.

Our overall approach to managing risk and uncertainty using uncertainty mechanisms has been tested with customers through our acceptability testing. A full discussion of this engagement is provided in Chapter 10 – it is noted here that customers found this approach to be acceptable and that we had been thorough in our work to manage cost risk in RIIO-2.