Cadent
Your Gas Network

Appendix 10.14

Uncertainty Mechanism Case

Traffic collision protection

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

- 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

- 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?

- 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?

- 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?

- 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?

- 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

Traffic collision protection

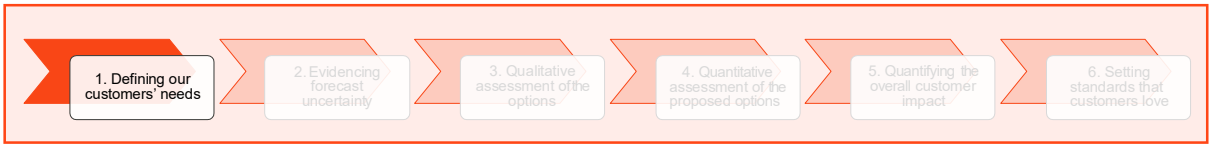
Cadent proposal

Volume Driver Uncertainty Mechanism

We take measures to prevent damage to operational assets or possible injury to our employees or members of the public as part of our duties under the Health and Safety Work Act 1974.

Recent examples of vehicle collisions involving our governor assets, and subsequent interventions by the Health and Safety Executive (HSE), have demonstrated the potential for additional requirements to be placed on us to address specific sites. Following actions under an improvement notice from the HSE at a specific site, there is uncertainty as to whether further requirements could be put in place across our networks. While we have undertaken risk assessments across our governor population to understand their specific vehicle collision risk, we cannot accurately predict the potential direction of future HSE policy in this area.

1. Defining the need



1.1. What is the area?

We undertake investments to mitigate the risk of traffic collisions with assets across our gas network. These measures seek to prevent damage to operational assets or possible injury to our employees or members of the public, maintaining our duties under the Health and Safety at Work Act 1974 and under Pipeline Safety Regulation number 16.

The need for this investment has become increasingly apparent as we have been subject to an HSE intervention following damage by vehicles at two governor sites. This has included challenges regarding the protections we currently have in place. We undertook a risk assessment based on the scoring at these two sites to ensure we had adequately identified other potential sites requiring intervention. This information was presented to the HSE in October 2018.

Between the HSE meetings in October 2018 and February 2019, 1,097 assessments have been undertaken on the intermediate pressure (IP) governor population. An Improvement Notice was issued by the HSE on 31st July 2019 for the Magpie Lane/Childerditch Common district governor to ensure, so far as is reasonably practicable, that persons are not exposed to risks associated with its location.

This uncertainty case focuses on the uncertainty that future requirements may be introduced across other sites in our network, following the precedent set from these recent incidents.

This document does not focus on the actions which are being undertaken in RIIO-1 following specific notices from the HSE.

1.2. Why is it important?

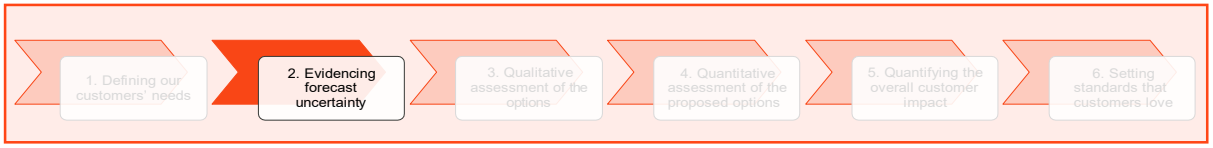
We have duties under the Health and Safety at Work Act to maintain the safety of our employees and members of the public near our assets. It is also important that we have adequate protection for our assets in order to support our objective of maintaining a safe and secure supply of gas to our customers.

1.3. What insights are shaping our thinking?

We have engaged thoroughly with the HSE in response to historical risks identified at specific governor sites. We have since undertaken survey work to understand the risks associated with our assets from vehicle collision. From our survey of 1097 governor sites, we identified 227 as requiring further action in relation to traffic collision protection.

We also have insights from our customer engagement. Safety, including prevention of emergency situations, was consistently highlighted as the most important or joint-most important priority across each engagement method during phase 1 research. This includes deliberative workshops, a domestic customer survey, a public survey, focus groups with hard to reach groups, stakeholder interviews and vulnerability interviews. The Cadent employee survey in May 2019, 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 employees).

2. Evidencing the uncertainty



2.1. What we know about the future

Our survey work to date has identified the number of governors in the IP population that require some form of action in relation to traffic collision protection. We also know through recent engagement with the HSE that this remains an area of focus, therefore new requirements could be introduced that we must comply with.

Comparing uncertainty to costs included in our base plan

In RIIO-1, costs will be incurred following the actions taken in response to the recent HSE notice. We have subsequently undertaken surveys and identified governors in our IP population that will require intervention for traffic collision protection in RIIO-2.

Our base plan includes expenditure on an annual basis to address these identified risks in each of our networks. These volumes are outlined in Section 4 and are associated with a total cost in our base plan of £81.45m as outlined below:

Table 1: Baseline costs associated with traffic collision protections

Base costs *£m, 18/19 prices*	East of England	London	North West	West Midlands
Traffic collision protection costs for IP assets	Redacted due to commercial sensitivity			

Our proposal for an uncertainty mechanism provides 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 valuation of how the mechanism would work in practice alongside a baseline allowance.

2.2. Why we face forecasting difficulties

While we have undertaken survey work and understand the potential risk associated with our IP governor sites from traffic collision, there is still uncertainty whether additional protections would be required for our MP and LP populations. Given the much larger size of this population, survey work has not been undertaken to date, so we do not know the total volume of MP and LP governors that may be at risk of traffic collision. Alongside understanding the risk in our asset base, there is uncertainty as to whether the HSE may introduce new requirements for traffic collision protection.

We are unable to fully control the volume of traffic collision protection interventions we will undertake in RIIO-2, which will ultimately be driven by a decision from the HSE to expand work to a greater number of our assets. We will continue to analyse our MP and LP governor asset population to develop a **better view** of the potential risk associated with these assets.

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

The risk with including all potential volumes and costs for traffic collision protections in our base plan is that we would be required to rely on an uncertain estimate of the number of our assets that will require intervention. This creates a risk that our estimate either under or overpredicts the required volume of work in an area where we may face further requirements from the HSE.

If we were to include all costs associated with traffic collision protections in the base plan as part of our RIIO-2 submission, we would be required to rely on an uncertain estimate of the total number of assets that are potentially at risk.

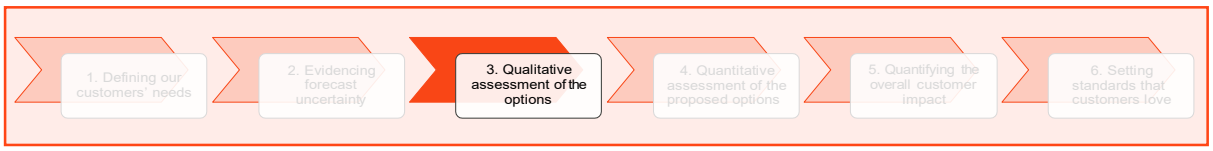
There is a **credible risk** that our estimate could underpredict future volumes, creating a financial risk in an area where we may be mandated to maintain safety standards from the HSE and to address risk in our network. We would face an incentive to price risk into the

base plan for protections, to ensure we were adequately funded in the case where many interventions are required.

However, this **creates a risk to customers.** Volumes that materialise in RIIO-2, which will be driven by the conclusions of individual site inspections, may be lower than the assumptions used to develop our base allowance. This creates the opportunity for windfall gains.

Removing a component of this expenditure ensures that customers only pay for the volumes of work that we deliver. This also helps to protect our obligations to maintain a secure and safe supply of gas alongside our ability to address any future HSE requirements.

3. Qualitative assessment



3.1. Options for addressing uncertainty

Given the uncertainty of the volume of actions we may be required to take for traffic collision protections during RIIO-2, we have evaluated other mechanisms that could address this risk:

Table 2: Evaluating options for uncertainty mechanisms

Mechanism Option	Description
Volume driver	A volume driver makes use of existing information we have on the unit costs of installing additional protections at governor sites identified as 'at risk'. This would effectively address the uncertainty we have identified in forecasting the volume of work in our asset base and ensures we have access to funding to address risks to the safety of supply in our network and the safety of our employees and the public.
Reopener mechanism	A reopener accounts for uncertainty in costs when the design and the requirements for projects in RIIO-2 are unknown. Traffic-collision protections are not well suited to this, given the insight we have on the risks identified to date in the IP governor population, and its associated costs.
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 at present, when the volume of work is unknown. There a risk that a PCD may be introduced which does not adequately fund the levels of protection that may be required in RIIO-2.

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

Table 3: Qualitative assessment of risks posed by traffic collision protections

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

Further detail on our assessment is provided below:

- **Volume risk**: Our work in this area is driven by the risks that we identify in our governor population. This may also be influenced by any requirements introduced by the HSE in the future to undertake such work.
- **Unit cost risk**: There is uncertainty over cost forecasts at present, given the uncertainty in the total volume of work that will be required. While we have greater certainty over interventions required for our IP governors, the same is not possible for our MP and LP assets.
- **Impact on outputs**: This area has implications for outputs relating to the security of supply, minimising disruptions 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. This will be driven by the scale of risks identified in the MP or LP population upon inspection.

3.2. Our proposed uncertainty mechanism

We are proposing to address uncertainty related to traffic collision protections using a **volume driver** in RIIO-2, using a unit cost approach to reflect the cost of installing new traffic collision protections. In practice, this mechanism would involve agreement on the relevant unit rate to apply to specific volumes of new protections with Ofgem.

Operation of the proposed volume driver in practice

- **Form of the trigger:** As discussed in Section 2.2, we undertake survey work and risk assessments to identify risks in our asset population. Additional workloads beyond those included in our base plan will be triggered by any actions or policy changes made by the HSE, requiring work across a larger asset population.
- **Mitigating the likelihood of the trigger:** Given the risk-driven nature of workloads, and any conclusion reached by the HSE, it would be not appropriate for us to mitigate the likelihood of additional protections being required.
- **Claiming costs through the volume driver:** As part of the RRP process, we would on an annual basis submit data on the actual volumes of protection measures that we have undertaken. Revenues would be recovered with a year lag, in line with agreed unit rates, allowing time to verify our submitted volumes.

Form of the volume driver:

- **Unit of volume:** We propose volumes are measured in relation to the number of interventions made on our different governor assets. This can be easily measured and reported and allows the application of distinct unit costs by pressure tier.
- **Establishing unit costs:** As discussed further in Section 4.0, we have proposed the unit costs within this volume driver align to the unit costs for the delivering traffic collision protections used to develop our base plan. These cost estimates have been developed based on our existing experience, including analysis to understand the likelihood of land access and legal costs being incurred.

3.3. Evaluating our proposed uncertainty mechanism

A volume driver allows us to protect against the risk of submitting a full base-plan allowance that may be calibrated on an incorrect forecast of risks. If this occurs, customers may be exposed to the risk that actual volumes in RIIO-2 turn out below our allowed rate. In contrast, there is also a risk that volumes beyond our estimate are required. This creates a risk to our business, especially given our obligations towards safety and maintaining a safe and secure supply of gas. A volume driver would make use of agreed unit-cost rates to ensure customers only pay for work that is undertaken.

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 4: Evaluating incentives created by our proposed uncertainty mechanism

Behaviours and incentives	Evaluation
To minimise costs	The costs we have proposed as part of our baseline allowance for traffic collision protections represent our view of achievable and efficient unit costs in RIIO-2. We have developed our proposed volume driver in line with these costs. A financial incentive remains under the volume driver to identify further efficiencies and to deliver further protections below these unit costs where possible. This would also benefit customers with a lower unit cost in the future, shared through the totex incentive mechanism.
To deliver required work	As discussed in Sections 1 and 2, future volumes of traffic-collision protections will be driven by risks identified in our asset base as well as any future policy direction from the HSE. A volume driver would not create an incentive to avoid undertaking this work. Doing so would have negative safety implications for our network and creates financial and reputational risks to our business given HSE scrutiny in this area. It also would not be possible for us to undertake interventions beyond the economically efficient level, given that such work is triggered by an objective risk assessment and will be driven by external HSE requirements. Finally, there may be a concern that a volume driver would incentivise us to self-select less onerous interventions and reclaim costs at the agreed unit rate above the true cost of work undertake. However, it would not be possible for us to systematically select workloads in this way given safety and reputational risks associated with leaving complex governor sites at risk.
To take a whole-systems approach	There may be a concern that a volume driver limits our incentive to consider wider strategic solutions. However, this concern is less material in this case, given that interventions will necessarily be conducted on a site by site basis, tailored to individual safety requirements.

Behaviours and incentives	Evaluation
Interactions with expenditure included in our base plan	The costs and volumes included in our base plan are developed using the same unit costs associated with our volume driver. Our proposal is for costs incurred for initial IP governor interventions to be allocated initially to our baseline allowance. Any further IP interventions or work required in our MP or LP governor population would trigger the application of the volume driver. It would not be possible for us to gain from whether a specific intervention is determined as a 'baseline' or 'volume driver' activity as identical unit costs would apply in each scenario.

A potential drawback for customers is that bills may be exposed to any volatility in traffic collision protection interventions on an annual basis, with revenues recovered with a yearly lag. However, this risk is mitigated by the inclusion of a minimum level of investment in our base plan, creating an element of stability within the overall bill impact of traffic collision protections.

4. Quantitative assessment

4.1. Inputs for uncertainty modelling

We have considered potential scenarios for future actions required for traffic collision protections. We have considered the following factors:

- **Unit costs –** the individual rates that apply to interventions
- **Volumes -** we have considered potential scenarios for volumes of governors requiring action in the IP and MP/LP populations.

Volumes

As previously described, work has identified 227 sites for IP governors that may require some form of protection intervention and a baseline cost has been included in our plan, equivalent to intervening on 125 during RIIO-2. In terms of forecasting this for the rest of the MP and LP network, the percentage of the IP governor population requiring intervention has been applied to the total MP and LP governor population to establish a forecast for work in RIIO-2.

Table 5 below summarises the annual volumes of traffic collision protections included in our scenario analysis. The likely case is based on our understanding of IP sites currently above the threshold and is equivalent to 25 sites per year (this is approximately equivalent to the total risk identified in the population). Our 'low case' assumed that only a single additional action is required at an IP site per year per network. Finally, our 'high case' assumed that all risks in the IP and MP or LP populations are addressed, based on the analysis described above.

Table 5: Input assumption – annual protection volumes at governor sites by scenario

Scenario (no. of sites)	East of England	London	North West	West Midlands
High	144	25	55	42
Likely	10	5	5	5
Low	2	1	1	1

In our high case scenario, we have also assumed that a single governor relocation is required on an annual basis. We already have knowledge of an existing relocation that is required and have included it in our base plan; therefore, this scenario is informed by our latest experience.

Unit Costs

Table 6 below outlines the relevant unit costs for traffic collision protections, based on our experience to date with these interventions.

Table 6: Input assumption – unit costs for traffic collision protections (£, 17/18 prices)

Costs of protection associated with governors (£, 17/18 prices)	Unit Cost
Intermediate Pressure (IP)	Redacted due to commercial sensitivity
Medium Pressure (MP)	
Low Pressure (LP)	
IP Governor relocation	

Legal costs are also associated with accessing land to implement traffic -collision protections. We have developed estimates on the average cost per project based on the different fees we are liable for and the likelihood that such fees are payable for a given site. Based on historical experiences with land access, we have assumed 40% of instances may require such fees, therefore we have included an average legal cost of £7,400 per project as shown in Table 7 below.

Table 7: Input assumption – legal unit costs per intervention (£, 17/18 prices)

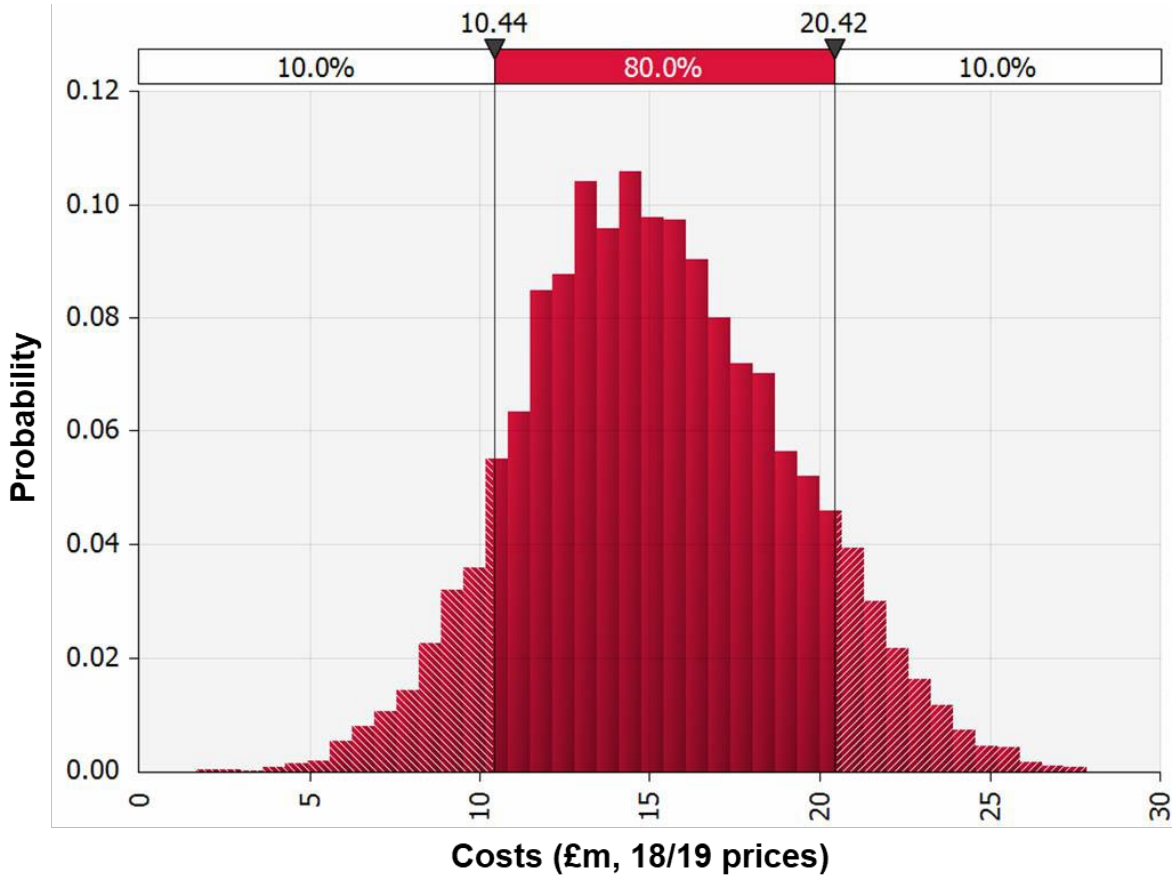
Legal fees associated with land access (£, 17/18 prices)	Unit Cost
Internal land fees - Fees for external agents to acquire rights	Redacted due to commercial sensitivity
Third-party land fees	
Internal legal fees – documenting new rights (£5,000 consideration, £2,000 legal fees)	
Third-party legal fees	
Planning permission fees	
Total	
Total after 40% adjustment	

Therefore, our cost assessment of uncertainty in this area is driven by the volume of governors that are assumed to require traffic-collision protection. Unit costs for both the intervention itself and associated legal fees are in line with our base plan assumptions and are applied to modelled volumes as summarised in Section 4.2.

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 traffic collision protections, based on 10,000 iterations. This approach illustrates the high and low scenarios of uncertain costs, alongside the mean cost outcome and associated volatility. Figure 1 below summarises this distribution while Table 8 provides a breakdown of this risk by network.

Figure 1: Monte Carlo: Total RIIO-2 cost risk for traffic collision protections, no mechanism. Costs, £m 18/19 prices.



Minimum	Maximum	Mean	Standard Dev	Iterations
£1.67m	£27.84m	£15.20m	£3.84m	10,000

This analysis illustrates the uncertainty in traffic collision volumes, and the associated cost risk. Without the introduction of an uncertainty mechanism, there is a considerable risk that actual costs incurred in RIIO-2 may deviate from an initial estimate proposed as a baseline allowance.

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

Network	Minimum	Maximum	Mean	Standard Dev
East of England	£0.32m	£16.49m	£7.50m	£3.38m
North London	£0.15m	£3.53m	£1.94m	£0.79m
North West	£0.16m	£6.50m	£3.11m	£1.32m
West Midlands	£0.16m	£5.25m	£2.64m	£1.07m

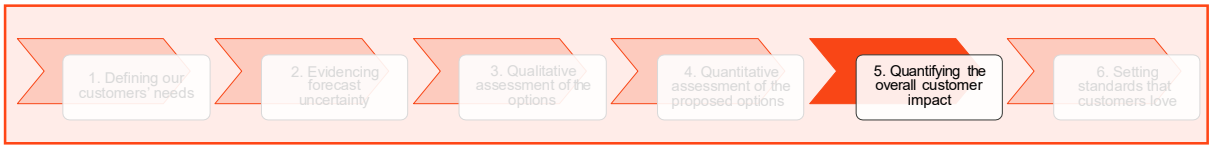
4.3. Impact of our proposed uncertainty mechanism

As we have assumed that income from volume drivers is not subject to the totex incentive mechanism, and given that a materiality threshold is not applicable, our modelling implies from a theoretical perspective that the uncertain cost risk outlined above would be fully mitigated using our proposed mechanism.

This **does not imply** that the costs associated with the uncertain volumes are fully mitigated and removed. Instead, the volume driver effectively allows us to collect associated revenues for traffic collision protections that we undertake. This removes a cost risk (i.e. any remaining costs that we are exposed can be recovered through the RIIO-2 period).

In practice, we will remain exposed to residual risk based on how outturn unit costs compare to the rate agreed as part of the mechanism. This places an incentive on us to maintain a focus on cost efficiency when installing new protections. Customers are also protected as costs are only recoverable for the actual volumes of work we undertake. Given the driver of traffic collision protections is risk management, we have a duty to our customers to maintain the safety of our network and to maintain a secure supply.

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 us 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 high-pressure valve volume driver individually. Table 9 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 analysis. 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 £0.04 per annum at the Cadent level.

Table 9: RIIO-2 end bill impacts, P10 mean and P90 costs from uncertainty analysis

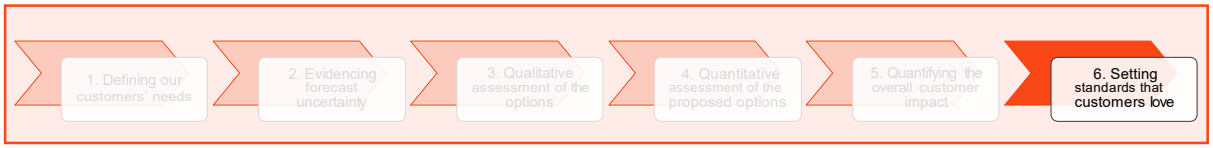
RIIO-2 end bill impact (£, 18/19 prices)	P10	Mean	P90
East of England	£0.04	£0.06	£0.09
London	£0.02	£0.03	£0.04
North West	£0.03	£0.04	£0.05
West Midlands	£0.01	£0.02	£0.02

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 driver. 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 (SROI) 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 traffic collision protections, this is equivalent to approximately **£9.12m in RIIO-2.**

6. Setting the standards



Our proposals for a volume driver are clear and simple for our customers to understand. We will only be able to recover revenue for traffic collision protections that have to be undertaken from a risk perspective. Our proposed unit cost rate must be agreed by Ofgem as part of this mechanism to ensure we deliver work efficiently. These proposals have also incorporated challenges we have received from our CEG

Our evaluation on the implications of including costs for connections 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.