Cadent

Your Gas Network

Appendix 07.03.06

Getting our customers back on gas

Figure 1: Document overview

This output case describes our approach to transforming our customers' experiences of unplanned interruptions to their gas supply.

It outlines how by the end of RIIO-2 we will reduce the total annual duration of unplanned interruptions that our customers experience by 59% from 2018/19 levels. This is a significant step change for our household and business customers.

It describes how our Business Plan complies with Ofgem's sector specific methodology decision but that we do not believe the proposed measure delivers the outcomes required by customers. As such, it also describes how we are committed to continued engagement with Ofgem and other stakeholders to develop a performance measure for RIIO-2 which better assesses the impact of unplanned interruptions on our customers.

To achieve our ambition during RIIO-2 we will[1]:

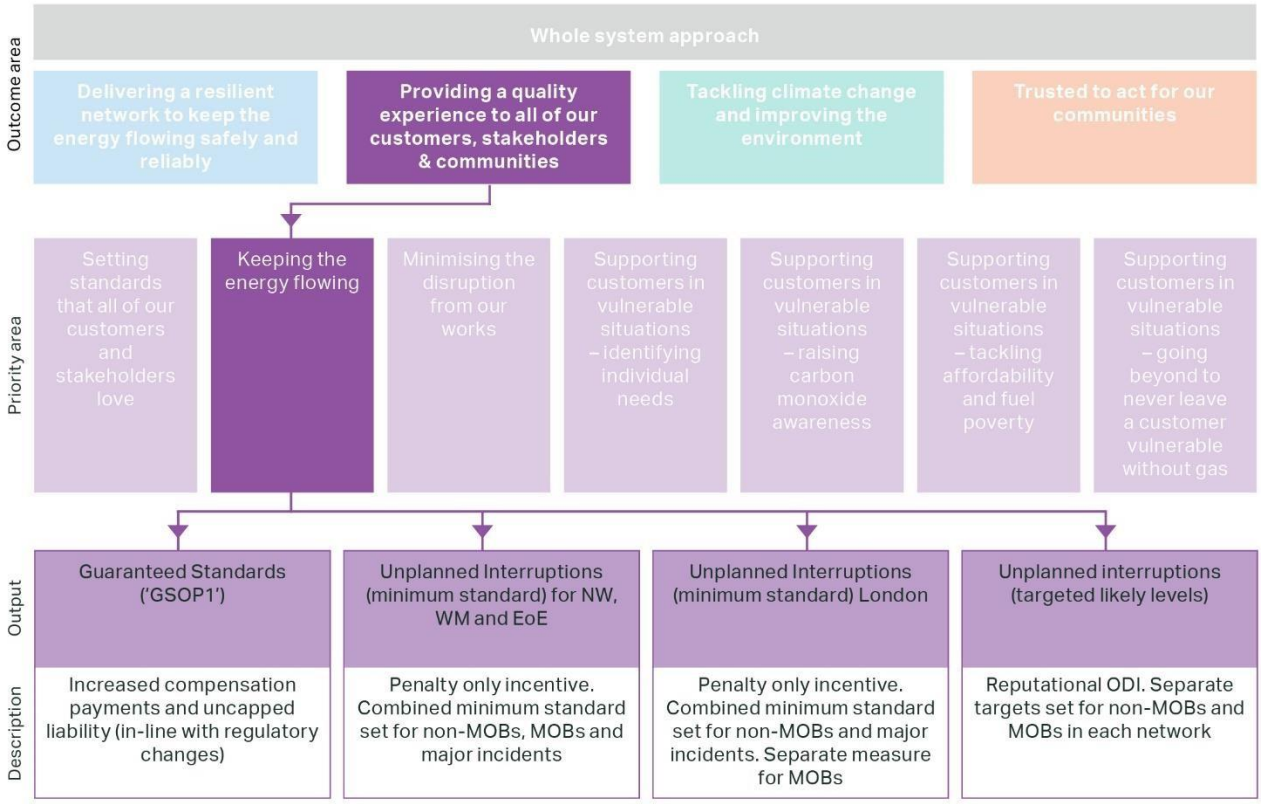
- Reduce the number of non-MOB interruptions by 17%.
- Reduce the number of MOB interruptions by 32%.
- Reduce the average duration of non-MOB unplanned interruptions by 10% in all our networks.
- Reduce the average duration of MOB unplanned interruptions by 34% on average across our networks.

Eight other appendices describe other aspects of this transformation in customers' experiences of interruptions to their gas supply, they are:

- 07.03.01 Establishing and raising the bar for all our customer and stakeholder experiences
- 07.03.05 Measuring and enhancing accessibility and inclusivity
- 07.03.07 Providing time-bound appointments
- 07.03.08 Minimising disruption from our works
- 07.03.09 Identifying your needs and joining up support services
- 07.03.12 Going beyond to never leave a customer vulnerable without gas
- 09.02 Distribution Mains and Associated Services (Iron, PE, Steel & Other)
- 09.04 Transforming the Experience for Multiple Occupancy Building Customers

[1] *All reduction figures are from the average of 2015/16 to 2018/19 reported performance unless otherwise stated*

We will deliver:



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How we have developed our proposals

1. **We started with our company purpose** – To keep the energy flowing for all our customers. So when there is an unplanned interruption we want to get our customers back on gas as soon as possible and minimise the impact of the interruption through a manner of other means.

2. **We reviewed how we currently measure supply interruptions** – We currently measure the total volume and duration of unplanned interruptions which does not segment between the different categories of interruptions e.g. non-Multiple Occupancy Buildings (MOBs) and MOBs . This makes it difficult to set targets that represent the differing needs of customers and recognise the specific challenges of different situations.
3. **This provided us with a clear problem statement** – In most cases we provide a reliable and fast service to restore supply which needs to be maintained. However, we recognise that consistency is important and that some of our worst served customers experience significant delays in restoration which we need to address over the remainder of RIIO-1 and through RIIO-2.
4. **We've applied our own lessons learned from RIIO-1** – Unplanned interruptions vary and require separate treatment in order to deliver a positive customer experience. This also needs to be reflected within reporting, with the experiences of non-MOBs, MOBs (medium and high rise), and large incidents (affecting >250 customers) being measured separately.
5. **We gathered insights from historic experience and targeted engagement** – Customers believe it's important to find ways of avoiding interruptions occurring in the first place, however when they do occur we should prioritise getting customers back on gas, especially in winter and at times when customers need a reliable gas supply. Many MOBs customers questioned if an ambitious reduction in average durations could be achieved given the many factors, such as coordination with building management, that are outside of our control.
6. **We have looked at best practice on how to measure interruptions and ways to reduce restoration time** – The Interruptions Incentive Scheme (IIS) used in Electricity Distribution measures both the likelihood of an interruption and duration – both of which customers care about. We have, and continue, to identify and assess different engineering techniques and operational approaches across the industry, and wider, to find ways to avoid interruptions completely or where they cannot be avoided reduce the duration.
7. **We assessed how far the current measures and Ofgem's proposed measures take us against our ambition** - Ofgem are proposing a new financial penalty only Output Delivery Incentive for unplanned interruptions based on average restoration time to ensure there is no significant deterioration in interruptions performance. This will be set as a fixed combined mean for all interruption types for every network except London. For London there will be two bespoke outputs, one for MOBs and another combining non-MOBs with major incidents. These measures will set minimum standards; we are also proposing our own reputational targets for reducing average durations based on feedback from customers. We believe there are better measures available than those proposed in the SSMD.
8. **We've developed and considered a number of options** - Based on these insights and best practice we have developed five measurement options including no measure, continuation of the existing measure, Ofgem's proposal on average restoration time, a version of this which disaggregates targets, and an evolved IIS measure.
9. **We developed performance levels** – For non-MOB interruptions (which cover most, almost 95%, of our interruptions), we developed performance levels for average restoration time ranging from current levels of service, a 10% reduction and a 20% reduction.
10. **We tested these options with customers and stakeholders** – Business insights and early customer and stakeholder comments supported a reduction in restoration time following an unplanned interruption. However, once we developed costed options, the majority actually preferred the lower cost, low target option to maintain current levels of service. We feel there is still benefit in improving performance and therefore will be proposing commitments that go beyond the minimum requirements at no additional incremental cost to the customer.
11. **Our commitments** – We commit to delivering the following output measures:
    - GSOP1 – Increased compensation levels in line with inflation and removal of the £1,000 payment cap

- Penalty only financial ODI - unplanned interruptions average restoration time (minimum standard)
  - Common combined (MOBs, non-MOBs, and major incidents) measure for East of England, North West, and West Midlands
  - Bespoke MOBs measure for London
  - Bespoke combined (non-MOBs and major incidents) measure for London
- Reputational ODI - unplanned interruptions average restoration time (targeted aspirational levels)

12. **We believe there could be better measures to meet customer needs** – We have proposed commitments that comply with Ofgem's Sector Specific Decision Methodology (SSMD) and at least meet, and in many cases exceed, their objectives. However, whilst developing our targets we identified challenges with the proposed measure. We also identified two other measures which could better measure the impact of unplanned interruptions upon customers. We are committed to working with Ofgem and stakeholders to explore and develop these alternative measures.
13. **Consistency of data measurement and reporting** – There is currently inconsistency in reporting across GDNs which means performance is not comparable. As such, there is a need for Ofgem to work with GDNs to understand the inconsistencies and work to ensure consistency in RIIO-2. To support this, and as stated in our 2018/19 RRP, we are currently undertaking a review of our historic data. This review will be completed ahead of submitting our 2019/20 RRP.

The tables below summarise our commitments in this area:

Table 1: Summary of our commitments

Guaranteed Standards of Performance (GSOP) 1 – Supply Restoration

Common / Bespoke	Common
Output type	Licence Obligation
Comment	Increased compensation in line with inflation and removal of £1000 cap
Target	Restore customers gas supply following an unplanned interruption within 24 hours
Cost implications (annual)	No costs included in Totex[2]
Incentive range	Uncapped penalties.
CVP	N/A

Unplanned interruptions average duration – Minimum Standards	
Common / Bespoke	Common (EoE, NW, WM) / Bespoke (Lon)
Output type	Output Delivery Incentive (F-)
Comment	Unplanned interruptions average duration: - EoE, NW, WM – Combined (Non-MOBs, MOBs and Major Incidents) - Lon – Combined (Non-MOBs and Major Incidents) Lon – MOBs
Target	Minimum standard targets throughout RIIO-2: Combined average duration - EoE – 1,852 mins (1.3 days) - Lon – 1,493 mins (1.0 day)[3] - NW – 1,848 mins (1.3 days) - WM – 2,505 mins (1.7 days) London MOBs average duration Lon – 36,078 mins (25.1 days)
Cost implications (annual)	No incremental costs
Incentive range	Up to -0.5% of revenue
CVP	N/A

[2] See Appendix 09.21 'Cadent's Regional Factors'
[3] Combined non-MOBs and major incidents only

Unplanned interruptions average duration – Reputational targets	
Common / Bespoke	Bespoke
Output type	Output Delivery Incentive (R)
Comment	Unplanned interruptions average duration: - MOBs Non-MOBs
Target	Target by end of RIIO-2: MOBs - EoE – 19,385 mins (13.5 days) - Lon – 31,029 mins (21.5 days) - NW – 9,440 mins (6.6 days) - WM – 16,400 mins (11.4 days) Non-MOBs - EoE – 471 mins (7.9 hours) - Lon – 618 mins (10.3 hours) - NW – 562 mins (9.4 hours) WM – 481 mins (8.0 hours)
Cost implications (annual)	No incremental costs
Incentive range	N/A
CVP	N/A

1. Defining our customers' need

What is the area

Keeping the energy flowing is a priority for Cadent and we do our utmost to maintain high levels of reliability in the supply of gas to our customers. In 2018/19 we sustained 99.996% overall network reliability, which corresponds to an average customer being off gas for 13 mins every year.

However, there are occurrences where we will need to isolate a customer's gas supply to respond to an emergency gas escape or upgrade our network for planned safety work. This includes isolation on our network but also at the customer's meter, meaning they will have no gas supply to their appliances. This can have a significant impact on customers, especially when it is unplanned. Therefore, it is important to avoid unplanned

interruptions to supply in the first instance, but when they do occur we should reduce the length of time it lasts for and seek to improve the overall customer experience especially for our worst served customers.

Why is it important to customers and stakeholders?

Even though the likelihood of an unplanned interruption to a customer's gas supply is almost one in 300 years, when they do occur it can have a significant impact on a customer's life. When there is an emergency gas escape, customers expect us to respond as soon as possible and ensure they are made safe. Although in emergency circumstances customers prioritise safety and wellbeing, they also expect us to provide a convenient and comfortable service to restore their gas supply.

What insights are shaping our thinking?

Summary of insights

We have gained a wide range of insights from our historic experience and performance and our targeted engagement for RIIO-2. This output case focusses on how we measure unplanned interruptions, whilst other parts of our Business Plan address some of the other insights and we have indicated this in the table below.

Feedback/Insight	How we have addressed this
Customers indicated that it was important for us to stop interruptions occurring in the first place. Overall there was positive willingness to pay for reducing the probability of both short (3-24 hours) and long (>24 hours) unplanned interruptions	By the end of RIIO-2 we will reduce the total annual number of interruptions by 17% for non-MOB customers and 32% for MOBs customers from the levels seen in the period 2015/16 to 2018/19. We are committed to continued engagement with Ofgem and other stakeholders in developing a performance measure for RIIO-2 which better assesses the impact of unplanned interruptions on our customers. We discuss the relevant output measures in this output case however please refer to Appendices 09.04, 'Transforming the Experience for Multiple Occupancy Building Customers', and 09.02, 'Mains and associated
	services', for details of how we plan to reduce the likelihood of unplanned interruptions to supply.
Domestic customers and business customers have highlighted the importance of reducing the duration of an unplanned interruption when they occur. Willingness to pay analysis supported this, especially for domestic customers	Over the duration of RIIO-2 we will reduce the average duration of non-MOB unplanned interruptions by 10% in all our networks. For MOBs unplanned interruptions we will reduce the average duration by almost 35% in London, by 10% in East of England and West Midlands, and maintain the strong performance in North West.[2]

[2] *All reduction figures are from the average of 2015/16 to 2018/19 reported performance*

Priority should be given to customers in vulnerable situations during an unplanned interruption as the impact losing supply is greater for these customers	During an unplanned interruption we will provide a choice of alternative welfare provisions to customers in vulnerable situations to ensure they are able to access hot food, hot water, and heating. See output case 07.03.12 'Going beyond to never leave a customer vulnerable without gas' for more information.
We should avoid unplanned interruptions during the winter if possible as there is greater reliance on a reliable gas supply	Unplanned interruptions are unpredictable and occur throughout the year, however to ensure we are more responsive during winter our emergency and repair teams run seasonal patterns with more capacity in these colder months. Annualised hours are a feature of our new staff terms and conditions we agreed for 2019 onwards. This gives us the flexibility to implement longer winter hours when we need to.
We exceed customer expectations during large incidents by providing a bespoke service in keeping customers informed, utilising social media, and providing the required provisions whilst the gas is off	We will continue to improve our services during major incidents. Our proposals to improve the accessibility and inclusivity of our communications will aid in doing this. See output case 07.03.05 'Measuring and enhancing accessibility and inclusivity'
Many MOBs customers questioned if an ambitious reduction in average durations could be achieved given the many factors, such as coordination with building management, are outside of Cadent's control. However, we should continue to keep customer informed and proactively work with other stakeholders	Although we face challenges in MOBs during unplanned interruptions. We recognise that there are aspects within our control that can be improved. In addition to reducing the unplanned interruptions average duration in the networks where improvement is required, we will develop building specific remediation plans, undertake tailored ongoing engagement and provide enhanced welfare solutions to improve the experience during the interruption. See Appendix 09.04 'Transforming the Experience for Multiple Occupancy Building Customers' for more information

Detailed insights

Sources of insight



94,490
Stakeholders and customers engaged

37
Sources of insight

33
Tailored RIIO-2 engagement activity

We engaged with the following stakeholders and customers across a range of methods to understand their wants and needs with regards to unplanned interruptions to supply.

Customers	**Industry stakeholders**
• Domestic customers • Customers in vulnerable situations • Multiple Occupancy Building customers • Fuel poor customers • Business customers • English as a second language (ESL) customers • Non-English-speaking customers • Future customers • Employees	• Gas Distribution Networks • Ofgem • Local businesses/communities • Local authorities • Housing associations • Building owners • Verve

Insights were gathered through historical engagement, BAU insights and our RIIO-2 engagement programme. We have summarised each activity, the questions asked (where applicable), the numbers involved, and a robustness score based on the following criteria:

Criteria	**Robustness score**		**Relevance**
The score shown is based on a combination of the robustness of the source information (judged on whether it was recent, direct and representative) and the relevance to this area.	<1.5	One or zero criteria met	Limited relevance
	1.5 – 2.0	Two criteria met	Significantly relevant and contributory
	>2.0	All criteria met	Highly relevant and contributory

Figure 2: Engagement activities

Phase	Date	Source name	Source description	Questions asked	# of stakeholders	Score
Historical Engagement	Nov-18	Surveys following major loss of gas (Eye, Suffolk and Deanshanger, Northamptonshire)	We surveyed 89 customers who had experienced major interruptions incidents in Deanshanger, Northamptonshire and Eye, Suffolk in order to understand their views of how we managed these incidents as an organisation and how we could improve the experience for future customers in a similar situation. These were over and above the standard CSAT and Rant & Rave surveys we send following works. Overall, customers were extremely positive about Cadent's response to the gas emergency with the vast majority saying that Cadent exceeded their expectations in this regard.	Customers were asked about their awareness of Cadent prior to the incidents. Then, in relation to their experience of the incident itself, customers were asked whether they felt well informed, whether Cadent was communicative and responsive and what methods of communication were used. Their experience of Cadent representatives in the community was sought and whether they were found to be well-trained and professional. Customers were asked whether customers in vulnerable situations were appropriately supported during the incident. Finally, customers were asked for their overall impressions of Cadent and the level of trust in the organisation.	89	2.0
BAU Insights	Ongoing	Social Media	We monitor social media for comments and posts relating to Cadent and try to resolve specific concerns in response. We also analyse social media trends over time to identify potential common issues.	N/A	1,068	1.5
	Ongoing	CSAT	We are required to send postal surveys to a proportion of our customers following work on their properties to understand their views of our performance. This is used to determine our CSAT incentive.	Customers provide a score for our work across different areas relating to each process covered by CSAT, for example time off gas, competency and skills and respect to customer and property for the Emergency Response and Repair process.	24,067	1.5
	Ongoing	Rant & Rave	Rant & Rave SMS surveys allow customers to give real time feedback on our work, allowing immediate interventions to take place to improve customer experiences. We have implemented this over and above the standard CSAT postal surveys we are required to send out by Ofgem. We have analysed these based on common root causes of issues.	Customers provide a score for our work and then give comments to explain the reasons behind this. We will act based on this to try to rectify any low scores.	52,240	1.0

Discovery	Nov-17	Regional stakeholder workshops	We held four workshops in different regions to seek feedback from key stakeholders on the early development of our Business Plan. Each workshop began with a short presentation, followed by roundtable discussions. Electronic voting was also used to ask stakeholders about preferred options.	The workshops explored a number of topics, including: safeguarding (e.g. PSR awareness, partnerships and innovation opportunities); the future role of gas and the decarbonisation of home heating. Cadent's general approach to its Business Plan was also discussed, for example the importance and coverage of the four outcome areas identified, the extent to which the plan should respond to the needs of specific customer groups or regions. - How strongly do you feel that networks should collaborate?	127	2.0
	Sep-18	Deliberative workshops	We delivered full day deliberative workshops in each of our regions to discuss what services customers find important, find our customer expectations of GDNs and gather feedback on our (at the time) four draft customer outcomes. The sessions began with information-giving and building knowledge of Cadent, then eliciting participants' views of services and priorities.	Participants were asked about their awareness of Cadent and expectations of a GDN. Participants were also asked for their views on the four draft outcomes in Cadent's Business Plan: keeping your energy flowing safely, reliably and hassle free; protecting the environment and creating a sustainable energy future; working for you and your community safeguarding those that need it most; value for money and customer satisfaction at the heart of all our services. The aim of the discussions was to shape these draft outcomes and identify any gaps.	206	3.0
	Oct-18	Focus groups with hard to reach groups	We held focus groups with individuals considered 'hard to reach' in each of our regions. Each group contained 8-10 participants and lasted two hours. Participants covered three groups: urban customers with English as a Second Language, Future Generations and Non-Customers (predominantly from rural areas). These built on our previous deliberative workshops, whose voices could otherwise become 'lost within the crowd'.	Participants were asked what they expected of Cadent. The four draft outcomes for the Business Plan were shared with participants and they were asked for their views on these, what they wanted to see from Cadent and whether there were additional outcomes that Cadent should include.	57	2.0
	May-19	WWU regional community workshops	Wales & West Utilities (WWU) hosted a series of regional workshops to seek feedback from stakeholders on its current and future business activities. These deliberative workshops explored: stakeholder priorities, value for money, mains replacement and the theft of gas, future energy solutions and social obligations.	These deliberative workshops explored: stakeholder priorities, value for money, mains replacement and the theft of gas, future energy solutions and social obligations.	52	2.0

	May-19	Business surveys	We commissioned Traverse to survey 508 businesses with a view to understanding specific business customer wants and needs in order to inform our proposed services for our RIIO-2 Business Plan. The survey explored the general characteristics of the business and its gas such as whether it is connected to gas, how much it uses and the role that gas plays in the business. The effects of interruptions and business expectations were explored. In addition, views on delivering our four outcomes were also discussed: delivering a safe, resilient network; supporting the energy transition; providing a high quality and reliable service; and acting in a fair, transparent and responsible way.	The survey explored the general characteristics of the business and its gas such as whether it is connected to gas, how much it uses and the role that gas plays in the business. The effects of interruptions and business expectations were explored. In addition, views on delivering our four outcomes were also discussed: delivering a safe, resilient network; supporting the energy transition; providing a high quality and reliable service; and acting in a fair, transparent and responsible way.	508	3.0

Discovery	May-19	Business interviews	We commissioned Traverse to interview 18 businesses with a view to understanding specific business customer wants and needs in order to inform our proposed services for our RIIO-2 Business Plan. The interviews explored the general characteristics of the business and its gas use before establishing their existing knowledge of Cadent. The effects of interruptions and business expectations were explored. In addition, views on delivering our four outcomes were also discussed: delivering a safe, resilient network; supporting the energy transition; providing a high quality and reliable service; and acting in a fair, transparent and responsible way.	The interviews explored the general characteristics of the business and its gas use before establishing their existing knowledge of Cadent. The effects of interruptions and business expectations were explored. In addition, views on delivering our four outcomes were also discussed: delivering a safe, resilient network; supporting the energy transition; providing a high quality and reliable service; and acting in a fair, transparent and responsible way.	18	2.5
	May-19	RIIO-2 Employee engagement	We engaged with 783 of our employees through a survey to test the latest RIIO-2 Business Plan proposals to ensure that the Plan was robust, fit for purpose and accurately represented what our customers want from us. Employees were asked for their views both as customers and as subject matter experts. Participants were asked for their priorities from their perspective as customers. Then, as subject matter experts, they were asked to rate, and provide their views, on different service offerings (Customer Contact, Emergency Response and Repair, Domestic Connections, Commercial Connections and Mains Replacement).	Employees were asked for their views both as customers and as subject matter experts. Participants were asked for their priorities from their perspective as customers. Then, as subject matter experts, they were asked to rate, and provide their views, on different service offerings (Customer Contact, Emergency Response and Repair, Domestic Connections, Commercial Connections and Mains Replacement).	783	1.5

Targeted	Apr-19	Cadent London stakeholder engagement event	We conducted a poll of 92 stakeholders to understand their views on disruption to inform our Business Plan for RIIO-2. The poll explored what they found most disruptive (e.g. roadworks, customers being off gas or digging holes in the road or on private land), what improvements Cadent should focus on, and willingness to pay for such improvements. Roadworks were considered most disruptive and multi-utility working to mitigate this was viewed positively.	When you consider disruption caused by utility providers, what do you consider 'disruption' to be in your role? The disruption that I would like Cadent to work hardest to eliminate is? For roadworks disruption, what kind of improvement would you like Cadent to focus on? For disruption caused by customers being off gas, what kind of improvement would you like Cadent to focus on? For disruption caused by digging holes in the road or on private land, what kind of improvement would you like Cadent to focus on? If Cadent could find ways of reducing disruption, how much more do you think bill payers would be willing to pay?	92	2.0
	Aug-18	Ofgem's RIIO-2 Customer and Social working group	We engaged with the regulator and industry players at Ofgem's RIIO-2 Customer and Social Working Group	N/A	12	3.0

Targeted	May-19	Cadent customer forums: Interruptions and Reinstatements	The third round of customer forums was held at four locations (Ipswich, London, Manchester, Birmingham) involving 104 customers. The forums are designed to be ongoing conversations with customers, with engaging discussions around the role of Cadent within society. The third customer forum focused on planned and unplanned interruptions and public and private reinstatements to inform these sections of the RIIO-2 Business Plan. Within these themes, we investigated how customers are impacted and what level of customer service they think we should provide.	Customers were guided through different questions about the current service during planned and unplanned interruptions and new ideas Cadent were considering around: communication, length of interruption, provisions and timeslots to get gas back on. Discussions on public reinstatement focused on: impact of public reinstatement on customers, communication, and multi-utility working. Discussions on private reinstatements focused on the quality and duration of works.	104	3.0

Willingness To Pay	Feb-19	NERA & Traverse: Estimating Customers' Willingness to Pay for Changes in Service during RIIO2 (Stated preference)	We commissioned NERA and Traverse to design, implement and analyse a stated preference survey to estimate domestic and non-domestic customers' willingness to pay for improvements in our service. 12 different service attributes were considered. These covered issues relating to interruptions (probability, length and timeslots for restoration); the environment (leakage; green gas, clearing up disused sites); reinstatements (duration and number) and supporting customers in vulnerable situations and fuel poverty (provisions during an interruption and connecting fuel poor to the network).	The surveys consisted of 12 attributes related to the service provided by Cadent Gas, which were grouped into three sets of attributes to ensure customers were presented with a manageable number of attributes at any one time. Customers were asked to choose a preferred service package from a number of options in each of these areas, given the associated bill impact. ▪ First set of attributes: – Restoring gas supply after short unplanned interruptions (3-24 hours); – How long the short interruption lasts; – Restoring gas supply after an unplanned interruption lasting more than 24 hours; and – Offering customers time slots for restoring gas supply; ▪ Second set of attributes: – Reducing the proportion of gas lost through leakage; – Proportion of gas that comes from green sources; – Clearing up disused sites; and – Reducing the number of excavations in roads; ▪ Third set of attributes: – Providing welfare services during interruptions; – Measures to address fuel poverty; – Connecting households in fuel poverty to the network; and – Reducing the length of time it takes to carry out work.	3,103	3.0
	Feb-19	Benefits Transfer Study	We commissioned NERA to draw on evidence from the gas, electricity and water sectors, and on published guidance from government departments and agencies to provide information that we can use to help value potential changes under consideration for our RIIO-2 Business Plan.	N/A	0	3.0

Willingness To Pay	May-19	NERA & Traverse: Estimating Customers' Willingness to Pay for Changes in Service during RIIO2 (Revealed preference)	We commissioned NERA and Traverse to conduct research to inform our assumptions on the value of avoiding supply interruptions as part of the development of our Business Plan. This study used a revealed preference approach to estimate customers' willingness to pay to avoid supply interruptions. 791 interrupted customers were surveyed in order to understand the average cost that customers incur to mitigate the impact of an interruption, for example takeaway meals or purchase of alternative heating.	In the survey, introductory questions explored whether respondents remembered or were affected by the interruption. The survey then focused on aversive actions taken: participants were asked about the degree of usage of alternative types of cooking, heating and hot water equipment and whether these were bought as a result of the interruption. The number of times any alternative equipment was used by customers and the duration of an item's use was also asked. The survey also included closed questions with options around other actions including additional travel, means of travel, accommodation and payment for accommodation, work and the length of these actions. Open questions on additional purchases or other actions taken during interruptions were also included.	818	3.0
	Jul-19	NERA & Traverse: Triangulation by attribute	We commissioned NERA and Traverse to produce a report which "triangulates" the willingness to pay evidence previously prepared through desk-based research and surveys. This brought together the conclusions from previous studies including: (1) the benefit transfer report, which used desk-based research to survey existing valuation evidence available from published sources; (2) the targeted benefit transfer study, focusing on estimating the economic value of extending the gas network to new customers; (3) the stated preference study; and (4) the revealed preference study focused on surveying customers about their experiences of actual gas supply interruptions. The objective was to draw on a range of estimates to improve the reliability of any business planning assumptions that we make.	N/A	0	3.0
Business Options Testing	Jun-19	Cadent customer forum, round 4, Traverse	We held our fourth customer forum in Ipswich, London, Birmingham and Manchester to get customers' views on their priorities on a range of issues. This cross section of customers discussed with us various options (some proposed by us, some suggested by them) in a deliberative style session. Key topics discussed included: customer service, replacing pipes, reinstatement, interruptions, fuel poverty, carbon monoxide, decarbonising energy and becoming carbon neutral.	Participants were asked questions about a range of topics. On customer service, we explored what "great" looks like. We also asked about timeliness and communication with respect to reinstatements. We also tried to understand the level and type of service customers want during an unplanned interruption, including views on provisions, length of time without gas, and timeslots for getting the gas turned back on. We also	200	3.0

				asked for views on our options for addressing fuel poverty and carbon monoxide.		

Business Options Testing	Aug-19	Workshops with customers in MOBs, Traverse	We commissioned Traverse to hold workshops with 41 customers who live in MOBs and have experienced unplanned interruptions in the last 18 months in order to understand the specific issues facing such customers given the atypically long duration of their interruptions relative to other customers. Themes emerging from the workshops included: the importance of coordination with the Council / housing management and communication with residents; the need for consistent and personalised provisions; and the need to recognise that MOBs (and London) are more complicated.	Customers who live in MOBs and have experienced unplanned interruptions in the last 18 months were asked about their priorities. We also sought to understand their experience of unplanned interruptions in MOBs, and their preferences for improving the process, provisions during an interruption and compensation. Customers were also asked what factors should be prioritised when replacing mains pipes.	41	2.5

	Aug-19	Workshops with ESL and nonEnglish speakers, Traverse	We commissioned Traverse to hold three workshops with ESL and non-English speaking customers: 22 Polish-speaking participants with English as a second language and 9 Bengali speaking participants. During this session we asked customers to tell us what role they thought that we should play in relation to carbon monoxide safety, provisions during an interruption and responding to climate change. They agreed that communication was critical with respect to interruptions. For provisions, all agreed oil filled radiators were important, but there were interesting differences too: the Bengali group prioritised hot meal vouchers and kettles, both given low priority by the Polish group which favoured shower access and hot plates. They confirmed that they believed, we as with other big businesses should be acting responsibly and seeking to reduce our carbon footprint. The specific intention of this session was to ascertain the views of a different (typically hard to reach) group of customers to check if their views were consistent with other customer segments.	Customers were asked about their priorities. We also sought to understand their views on our business options in relation to carbon monoxide, provisions during interruptions, and decarbonisation.	31	2.0

Business Options Testing	Aug-19	Employee workshop, Traverse	We commissioned Traverse to engage with 80 Cadent employees (across grades and geographies) in a full day workshop. We sought views on our July draft Business Plan and held a number of exercises to gain input into further iterations. We gained a number of useful insights: influencing contractors was highlighted as a challenge for achieving carbon reductions, communication was noted as critical to great customer service, internal silos were highlighted as a barrier and some argued that greater ambition was possible for interruptions and reinstatements.	We sought views on our July draft Business Plan and held a number of exercises to gain input into further iterations. Topics discussed included: improving the environment (including future hydrogen and carbon neutral options), achieving a quality customer experience (including the length of, and provisions during, interruptions; and reinstatements); what trusted to act for society means and our obligations to customers and society; and safety and resilience (including our Business Plan options and how realistic / ambitious they are).	80	2.5

	Aug-19	Workshops with customers in fuel poverty, Traverse	We commissioned Traverse to engage with 83 customers in fuel poverty at deliberative workshops in Wolverhampton and Peterborough to understand their views on options for our Business Plan in relation to a number of areas of relevance to customers in fuel poverty or vulnerable situations. The most ambitious option (option 3) was chosen for each of CO awareness & action, priority safety checks and fuel poor solutions (including income & energy advice). The specific intention of this session was to ascertain the views of a different (typically hard to reach) group of customers to check if their views were consistent with other customer segments.	Customers were asked about their priorities. We also sought to understand their views on our business options in relation to carbon monoxide, proactive safety checks, addressing fuel poverty, PSR awareness, the length of, and provisions during interruptions.	85	2.0
	Aug-19	Business customer workshops, Traverse	We commissioned Traverse to engage with 74 business customers through deliberative workshops to understand their views on options for our Business Plan in relation to a number of areas that would affect their businesses such as the supply and demand of gas, interruptions, reinstatements and minimum standards. One of the topics discussed was demand-side response. Many businesses said they could turn gas down or off to some extent but noted that education and awareness were critical.	Businesses were asked about their priorities. The future of gas, including decarbonisation, was also discussed in terms of business awareness of the issue and potential implications. The ability and willingness for businesses to reduce their demand under certain circumstances was also discussed. The impact of interruptions and reinstatements on their business was also explored including the need for provisions during interruptions, the desirability of timeslots when gas is switched back on, multi-utility working and communication. Businesses were also asked if they would be willing to pay for Cadent to go beyond minimum standards.	74	2.5

Business Options Testing	Aug-19	CIVS engagement, Traverse	We commissioned Traverse to engage with 65 customers in vulnerable circumstances, through deliberative workshops and telephone interviews to understand their views on options for our Business Plan in relation to the protection of customers in vulnerable situations. The most ambitious option (option 3) was chosen for raising awareness of the PSR and charity partnerships. Both options 2 and 3 were popular for staff safeguarding training and using innovation to support customers. The specific intention of this session was to ascertain the views of a different (typically hard to	Participants were asked about their priorities. We also sought to understand whether business options for a number of commitments were ambitious enough and identify and understand reasons behind their preferences. The business options discussed related to PSR awareness, partnerships with other organisations, training of Cadent staff, innovation around new technologies and services, the duration of, and provision of services during, interruptions and supporting customers in vulnerable situations.	65	3.0

			reach) group of customers to check if their views were consistent with other customer segments.			
	Aug-19	Cadent customer forum, round 5, Traverse	We held our fifth customer forum in Ipswich, London, Birmingham and Manchester with 130 participants to get customers' views on their priorities on a range of issues. This cross section of customers discussed with us various options (some proposed by us, some suggested by them) in a deliberative style session. Key topics discussed included: minimum standards and compensation; options for raising PSR awareness; interruptions - both acceptable length and appropriate provisions; supporting customers in vulnerable situations; options for Cadent's objective to become a carbon neutral business, the merits of connecting off-grid communities; and roadworks information and communication.	Participants were asked questions about a range of topics. On minimum standards, customers were asked whether current standards and levels of compensation were appropriate. With respect to PSR awareness, customers were asked about their preferred package of options. For interruptions, we discussed which provisions customers feel Cadent should provide as a core package and how customers would like to be informed of the availability of those provisions as what an acceptable duration for interruptions was. We also explored if there is an appetite for Cadent's engineers to be trained to do minor pipe and appliances repairs. On environmental options, we discussed Cadent's commitments around becoming a carbon neutral business and the connection of off-grid communities. Finally, we discussed which communications methods customers prefer with respect to roadworks.	130	3.0

Business Options Testing	Aug-19	Public consultation, BOT, qualitative phase, Traverse	We commissioned Traverse to conduct a survey of 2,605 members of the public to understand views on certain aspects of our Business Plan in each of the 4 outcome areas (environment, quality experience, trusted to act for society and resilience). The survey revealed strong support for utilities working together to minimise disruption and for outstanding customer service, as well as providing useful information on the relative importance to customers of different types of information and different environmental initiatives.	Participants were asked questions to understand their views and preferences on issues within each of the four outcome areas. On resilience, customers were asked which one single improvement we should make to reduce disruption the most. In relation to a "quality experience", customers were asked what level of service they'd love the most and how much they'd be willing to pay to ensure a vulnerable customer could get enhanced help if their gas stopped working. On the environment, customers were asked their relative preference for initiatives to achieve carbon neutrality and eliminate avoidable waste to landfill. Customers were also asked how much they knew about the decarbonisation challenge. Finally, for "trusted to act for society", customers were asked what the most important information to know about Cadent was and how we can help the customer / Cadent conversation flow. We also asked about their awareness of Cadent.	2,605	2.5
	Aug-19	Domestic and business surveys, quantitative phase, Traverse	We commissioned Traverse to conduct a survey of more than 2000 domestic customers and more than 500 business customers to understand preferences between the different business options under consideration across 14 different service areas. The options presented combined service provisions e.g. educate 50,000 customers most at risk of CO poisoning and a monetary impact on the customer's annual bill. Across both the domestic and business surveys, the highest weighted average scores, supporting the most ambitious options, were achieved in areas relating to safety and protection of customers in vulnerable situations: responding to carbon monoxide incidents, repairing and replacing faulty appliances, helping vulnerable customers without gas and carbon monoxide safety.	Domestic and business customers were asked their preferred options (with varying degrees of ambition / cost) for 14 commitments: 1. Carbon Monoxide Safety 2. Responding to Carbon Monoxide incidents 3. Repairing and replacing faulty appliances 4. Helping vulnerable customers without gas 5. Helping all customers without gas 6. Getting customers back on gas 7. Carrying out safety checks 8. Minimising disruption from our works 9. Tackling Fuel Poverty 10. Awareness of Priority Services Register 11. Priority Services Register training 12. Becoming a Carbon neutral business 13. Communities not currently connected to gas 14. Keeping the energy flowing reliably and safely	2,547	3.0

Acceptability Testing	Oct-19	Phase 4 - Business interviews and surveys	We commissioned Traverse to test the acceptability and affordability of Cadent's proposed Plan amongst business customers. This consisted of an on-line / face to face survey of 504 business customers and in-depth qualitative telephone interviews with 45 business customers. This showed that the Plan had achieved high levels of acceptability and affordability from a business customer perspective.	Business customers were asked about the acceptability and affordability of Cadent's overall Plan. If they said that the Plan was unacceptable, they were asked to explain their response. If they said that it was neither acceptable nor unacceptable, they were asked what they would like to see in order to find it acceptable. Business customers were also asked to rate the acceptability of the outcome areas (environment, quality experience and resilience). Then, having learnt about the outcome areas, customers were asked as "informed customers" to rate the overall acceptability and affordability of the Plan.	549	2.0

Acceptability Testing	Oct-19	Acceptability testing - final survey report on domestic customers,	We commissioned Traverse to test the acceptability and affordability of Cadent's proposed Plan amongst domestic customers. This consisted of surveying 4,446 domestic customers through on-line and face to face methods. This showed that the Plan had achieved high levels of acceptability and affordability amongst domestic customers, including those who are fuel poor.	Customers were asked about the acceptability and affordability of Cadent's overall Plan. If they said that the Plan was unacceptable, they were asked to explain their response. If they said that it was neither acceptable nor unacceptable, they were asked what they would like to see in order to find it acceptable. Customers were also asked to rate the acceptability of the outcome areas (environment, quality experience and resilience). Then, having learnt about the outcome areas, customers were asked as "informed customers" to rate the overall acceptability and affordability of the Plan.	4,446	2.0
	Oct-19	Acceptability testing - focus groups with the general population	We commissioned Traverse to explore the acceptability of our Plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 79 members of the public in regional focus groups. Participants were supportive of our Plans for quality experience and resilience, but no consensus was reach on our environmental plans.	A group discussion was facilitated to discuss views on Cadent's plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	79	2.0
	Oct-19	Acceptability testing - customer forum	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 109 customers who had attended previous customer forums. Overall, participants found our plans to be both acceptable and affordable.	A group discussion was facilitated to discuss views on Cadent's plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	109	2.0

	Oct-19	Acceptability testing - focus groups with future customers	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 20 "future customers" (16-18-year olds) in 2 focus groups. Participants were supportive of our plans for the environment and resilience but questioned whether helping vulnerable customers was part our remit.	A group discussion was facilitated to discuss views on Cadent's plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	20	2.0
	Oct-19	Acceptability testing - fuel poor focus groups	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) with 35 customers in fuel poverty in regional focus groups. Overall, participants were supportive of our plans in all three areas.	A group discussion was facilitated to discuss views on Cadent's plans in each of the three outcome areas and participants were also asked to complete a survey to rank levels of acceptability and affordability.	35	2.0
	Oct-19	Acceptability testing - interviews with CIVs	We commissioned Traverse to explore the acceptability of our plans and commitments in each of the three outcome areas (environment, quality experience and resilience) by interviewing 20 CIVs. Overall, our plans were supported, and all found the plans affordable.	Throughout the interviews the CIVS were explained the elements of the Plan, asked to comment on whether they found each outcome acceptable, which particular elements were important to them, and whether they had any additional comments. They were also asked whether the new Business Plan was affordable.	20	2.0

Acceptability Testing	Oct-19	Verve Business Plan consultation	We commissioned Verve to gather views on our plans to reduce our carbon footprint from 25 customers. We did this through an online forum with customers and stakeholders to discuss the key components that we shared on our EAP. This included our intentions to support our employees to make a positive difference to tackling climate change.	Participants were asked about their awareness of cadent, discussed the three outcome areas (environment, quality experience and resilience), discussed the bill impact breakdown (both at present and as a result of the Plan), risks and uncertainties and innovation funding.	25	2.0
	Nov-19	Verve acceptability testing stakeholder interviews	We asked Verve to interview a small number of expert stakeholders and ask for feedback on our Plan	We shared a summary of our October Plan with stakeholders and asked them for feedback.	5	2.5

Engagement feedback & insights

The specific engagement undertaken on this topic highlighted how significant unplanned interruptions to gas supply and the associated impacts are to our customers. Getting customers back onto gas is an absolute priority, and customers and stakeholders reiterated that we should be providing additional support services during interruptions to ensure customers feel safe.

Stopping interruptions occurring in the first place.

During phase 1 deliberative workshops, customers viewed disruption to their gas supply as a top priority area, as a reliable supply of gas supports their quality of life. Some customers in workshops told us that immediate reconnection after a disconnection is important, and that they were also in favour of increased investment to reduce the number of interruptions, for example, through new technology to detect problems.

Some of the 80 employees that took part in workshops felt we could be incentivised to be more proactive to reduce the number of interruptions, and that an outstanding level of service would be having no unplanned interruptions. Many participants felt that keeping customers informed (being transparent about potential delays) and doing a good job without return visits would be more important that the length of interruptions.

The NERA / Traverse revealed preference valuation of avoiding gas supply interruptions revealed that the average expenditure customers attributed to supply interruptions was £30.42, implying that customers would have been willing to pay that amount, on average, to avoid the interruption. This was primarily driven by food expenditure (takeaways and eating out) rather than travel costs and purchasing of equipment. This did not include our own costs to manage the incident, inconvenience to the customer, or other externalities and as such represents a lower bound for the society value of a gas interruption.

However, the NERA / Traverse stated preference survey with more than 3,000 domestic and non-domestic customers revealed slightly different results when it estimated customers' willingness to pay for a reduction in the probability of short unplanned interruptions (3-24 hours).

The scaled willingness to pay (WTP) of domestic customers for a decrease in the probability of short unplanned interruptions to supply was £1.16, £1.50, and £1.69 annually for probabilities of 1/400, 1/550, and 1/650 as compared to 1/250, respectively. For non-domestic customers, the willingness to pay was zero.

The scaled WTP for a decrease in probability of long unplanned interruption (>24 hours) to supply (compared to 1/2000) was £0.31, £0.46, and £0.62) for 1/3000, 1/4000 and 1/6000 probabilities respectively.

NERA summarised the most comparable willingness to accept (WTA) and willingness to pay (WTP) values from the London Economics / Ofgem VoLL studies together with results from the water sector and converted them into a value that corresponds to the type of interruptions experienced by our customers, which average around 11 hours. These results show that the value of avoiding an electricity supply interruption is around twice as high as the value of avoiding a gas supply interruption. The value of an unplanned gas interruption in £ / outage / customer was £25.67 compared to £58.36 for electricity. The value of a water supply interruption was found to be extremely high relative to estimates for gas and electricity at £468.60 (but noted that there could be comparability issues given the generally shorter duration of water interruptions). Similar results were found for industrial and commercial customers with values in £ / term ranging from £0.99 (adjusted for price changes since the study) to £8.64 for gas and from £31.51 to £44.10 for electricity.

NERA and Traverse were then commissioned to 'triangulate' the willingness to pay evidence above. The valuation assigned to a 1/1000 change in the probability of a short unplanned interruption per customer per year, on average across all regions was as follows:

- For a change in service level of 1 in 250 to 1 in 400 interruptions per year, low (L), central (C) and high (H) case domestic customer valuations were: £0.22 (L), £0.77(C) and £1.52 (H).

- For a change in service level of 1 in 400 to 1 in 650 interruptions per year, the domestic customer valuations were £0.22 (L), £0.69 (C) and £1.34 (H).
- For non-domestic customers, the valuations were the same across all service levels: £0 (L), £0.48 (C) and £1.20 (H).

For unplanned interruptions greater than 24 hours, the valuation assigned to a 1/1000 change in the probability of an interruption per customer per year, on average across all regions was as follows:

- Across all service levels (which ranged from 1 in 2000 to 1 in 6000 interruptions a year), low (L), central (C) and high (H) case domestic customer valuations were: £1.32 (L), £1.86(C) and £3.64 (H).
- Across all service levels, low (L), central (C) and high (H) non-domestic customer valuations were: £0 (L), £2.83(C) and £24.16 (H). There were no regional variations for non-domestic customers.

There were some regional variations of domestic customer preferences with WTP higher than average in London (Lon), North West England (NW) and the East of England (EoE), and lower than average in the West Midlands (WM). There were no regional variations for non-domestic customers.

Minimising the duration of an interruption

During an unplanned interruption, customers expected their gas to be reconnected as soon as possible. The amount of time customers were willing to go without gas again depended on factors such as weather and vulnerability. Whilst customers wanted to be back on gas as soon as possible, they understood potential emergency implications, such as safety precautions and assessing the severity of the problem, could affect length of time to be without gas.

During the London stakeholder event, 81% of stakeholders also indicated that they would like Cadent to focus on timeliness in restoring faults, and our employees surveyed indicated that ‘guaranteed gas supply’ was their fourth highest priority, scored at 4.49 out of 5.

Through further analysis of 200 social media posts and messages, we found out that time off gas was one of the most common reasons Cadent was mentioned. These findings were reflected in our ‘Rant & Rave’ survey where time off-gas was the second most common reason for a low score.

Some of the 80 participants at our August 2019 employee workshops noted that the length of interruptions is based on a variety of factors and that reducing it will come at a cost, due to the need for additional equipment and greater staff capacity and skills.

Across business types, organisations wanted us to focus primarily on getting the gas flowing again. Companies that would be impacted by a loss of gas, such as hospitality and leisure services, suggested compensation be made available, while office-based businesses such as legal and accounting firms did not.

We conducted a variety of studies in order to understand customers’ willingness to pay for improved service regarding gas supply. The NERA / Traverse stated preference survey with more than 3,000 domestic and nondomestic customers revealed that the willingness to pay of domestic customers for a decrease in the hours of short unplanned interruption (compared to 20 hours) was £2.91, £5.83, and £8.74 for 15 hours, 10 hours and 5 hours respectively. For non-domestic customers, the scaled WTP was zero. However, there was some indication from non-domestic customers that they would be willing to pay for certain service improvements separately. In the case of an hour's reduction in short unplanned interruptions, this was £2.30 per hour.

Experience during large incidents

We speak with all of our customers impacted by major incidents to understand their experience. Overall, customers highlighted that the experience was positive and we were flexible and responsive to specific needs.

Customers also highlight that on-site presence, social media updates and effective use of the Incident Application (mobile app) are aspects working very well.

We also undertook additional surveys to drill down into aspects of the customer experience received at two major loss of gas incidents at Deanshanger, Northamptonshire and Eye, Cambridgeshire. Both incidents painted a positive picture of our performance during the interruption.

In both cases, only a minority of the 89 surveyed customers were aware of Cadent before the incident (around 20% in Eye and less than 5% in Deanshanger). However, once customers understood there was a problem, the vast majority felt well-informed (over 85% in Eye and over 90% in Deanshanger). More than 80% of Deanshanger respondents strongly agreed that we responded well to questions from the community, and more than 70% in Eye. In both cases, more than 90% of respondents strongly agreed that we communicated well using social media. However, views as to whether we used leaflets and letters effectively were more mixed, particularly in Eye, where more disagreed than agreed, with just over 60% agreeing in Deanshanger. Face to face communications were rated more positively, with 80% of Deanshanger respondents strongly agreeing that our representative communicated well in person, with 65% in Eye.

95% of Deanshanger respondents and 83% of Eye respondents strongly agreed that Cadent representatives were professional, and in both cases, more than 90% strongly agreed that they were courteous. The vast majority of respondents thought that Cadent's response to the emergency exceeded their expectations (more than 90% on Deanshanger and more than 80% in Eye). All bar three respondents said that they trusted us to keep the energy flowing to their home - those three said that they trusted Cadent 'a bit'.

Challenges faced in Multiple occupancy buildings

Most of our interruptions occur in single occupancy properties and restoring supply follows a consistent and controllable process. However, restoration of supply following interruptions which occur in multiple-occupancy buildings (MOBs) can last much longer due to engineering complexities and factors beyond our control

The level of engineering complexity in restoring gas to MOBs is far higher than other residential properties. We also face challenges relating to access to individual properties within a MOB and permission from building owners and local authorities in order to commence works. We utilise our customer liaison officers to repeatedly attend properties in order to obtain access and engage with local authorities, building owners and tenant management organisations to assist where access remains a problem.

We are continuing to engage with our stakeholders to improve the processes required to carry out work within MOBs. Gaining planning permissions, engaging with agents and tenancy management organisations, and seeking access to each property are just a few factors which lead to significantly longer interruptions.

These issues are most prevalent in our London network along with the London districts of our East of England network where MOBs density is much greater than any other gas network. London accounts for 80% of our high-rise building population and 56% of our medium rise building population.

The table below shows our average restoration time for unplanned interruptions across our four networks (for all interruption types).

Table 2: Aggregated annual average duration of unplanned interruptions, 2015/16 to 2018/19

Unplanned interruptions – Average duration (hours)				
	2015/16	**2016/17**	**2017/18**	**2018/19**
EoE	14.29	15.19	15.13	14.63
Lon	90.29	100.71	186.50	185.19

NW	10.11	15.00	10.79	18.66
WM	10.43	12.24	22.96	14.05

The average durations are significantly higher in London; however, this is due to the network containing a much higher proportion of MOBs.

The table below show that the average duration of interruptions significantly decreases when MOBS are excluded.

Table 3: Aggregated and disaggregated average duration of unplanned interruptions, 2015/16 to 2018/19

15/16 to 18/19 Unplanned interruptions average duration (hours)			
	Non-MOBs & MOBs combined	**MOBs only**	**Non-MOBs**
EoE	14.80	358.99	8.27
Lon	138.35	781.47	11.45
NW	13.36	157.33	10.40
WM	14.51	303.71	8.90

Engagement with customers living in MOBs

In the August 2019 deliberative workshops with 41 customers living in MOBs, coordination between us and the Council, landlord or building manager was seen as vital to a positive experience of interruptions.

Participants asked why agreements with councils cannot be prepared in advance to reduce the time of the interruption. Whilst reducing the average time of interruptions was supported by all, there was a challenge to paying for it, and also believing that it would be delivered.

When asked about MOBs interruption times, many agreed that a reduction was a good thing but questioned whether this was realistic. Many also questioned whether a reduction could be achieved given that many factors, such as coordination with building management, are outside of our control. Customers were also divided on whether to accept an increase in their bills to fund this.

During a joint collaboration event with our strategic partners, tRIIO, with 48 MOBs stakeholders, we learned that their priorities were similar to those of other stakeholders at other collaboration events. These were:

- More regular and timely communication with individual stakeholders during work, not just when there is a problem.
- Giving stakeholders such as housing associations visibility of our communication with customers so they can be joined up.
- Improving programme delivery, e.g. making contact details clearer, giving visibility of future works, clarity of responsibilities and joint sign-off of completed work.

To inform the NERA / Traverse report: Revealed Preference Valuation of Avoiding Gas Supply Interruptions, 791 households affected by interruptions were surveyed. The MOBs sample consisted of 18 respondents, interrupted for 8.8 days on average. The shares of respondents mitigating MOBs interruptions was considerably higher compared to other interruption types and therefore the average cost of the interruption was also higher

with an average valuation of £458 per household. Consistent with other interruption types, the valuation is primarily driven by food expenditure.

2. Assessing the measurement options

How is it currently measured?

Unplanned interruptions performance is measured both directly and indirectly in RIIO-1. The direct measures and the total number and duration of unplanned interruptions as well as GSOP 1, all discussed further below. Unplanned interruptions performance is also indirectly measured through the customer satisfaction survey incentive and the complaints metric incentive.

Total number and duration of unplanned interruptions

The RIIO-1 framework includes measures of total numbers and total durations of interruptions. Ofgem set eightyear targets for each GDN, these targets were subsequently revised through the mid-period review parallel works process. These eight-year targets are detailed in the table below.

Table 4: Revised RIIO-1 unplanned interruptions targets by network

Network	Number of unplanned interruptions	Duration of unplanned interruptions (millions of minutes)
EoE	99,608	108
Lon	100,083	428
NW	91,566	63
WM	60,506	47
NGN	103,677	47
Sc	48,164	51
So	162,256	177
WWU	90,169	45

Guaranteed Standard of Performance (GSOP) 1 – Supply restoration

The Guaranteed Standards of Performance (GSOP) set out a minimum level of service that gas distribution networks (GDNs) should deliver to all of their customers and are applied in the same way across all GDNs. Customers are entitled to a compensation payment if their gas network operator fails to deliver against these standards.

For unplanned interruptions, we are required to comply with GSOP 1. This stipulates that If the gas supply of a customer is interrupted as a result of failure, fault or damage to the gas pipeline system they will be compensated where their gas supply is not reconnected at their property within 24 hours. Domestic customers

are compensated £30 whilst non-domestic customers are compensated £50 for each 24-hour period following failure of the standard and is capped at £1,000.

Ofgem in their Sector Specific Framework Decision[3] indicate that the compensation levels will increase in line with inflation to £41 for domestic customers and £69 for non-domestic customers and that the £1,000 cap will be removed.

How do current measures deliver against customer outcome/priority?

Total number and duration of unplanned interruptions:

Strengths – encourages GDNs to reduce the total number of unplanned interruptions to supply and also encourages where an unplanned interruption is experienced, that the gas supply is switched back on as quickly as possible (when it is safe to do so). A networks performance can be compared over time.

Weaknesses – focuses on the total number and duration of unplanned interruptions and does not include any categorisation for the type of interruption, such as non-MOBs / MOBs. Total number of interruption is not comparable between networks due to differing customer numbers (i.e. does not measure the likelihood of an interruption).

Guaranteed Standard of Performance (GSOP) 1 – Supply restoration

Strengths – provides an incentive to keep unplanned interruptions less than 24 hours and as short as possible beyond this.

Weaknesses – Does not provide an incentive to completely avoid interruptions. For the first time, in RIIO-1 Ofgem decided that GSOP payments should not be included within Totex. This approach potentially provides an incentive for GDNs to act inefficiently.

Perverse incentive associated with GSOP

As GSOP payments are paid for solely by shareholders and other costs have a Totex incentive rate of 63%, GDNs are incentivised to spend up to £47 in other costs to avoid a GSOP payment of £30. With the reset of the Totex incentive rate in RIIO-2, along with the removal of the payment cap, this incentive is likely to become greater. (This is discussed further in Appendix 09.21 ‘Cadent’s Regional Factors’)

Any external good practice?

Electricity Distribution – Interruptions Incentive Scheme (IIS)

Electricity DNOs are incentivised on the number and duration of network supply interruptions versus a target derived from benchmark industry performance. The interruption incentive scheme (IIS) has symmetric annual rewards and penalties depending on each DNO’s performance against their targets for the number of customers interrupted per 100 customers (CI) and the number of customer minutes lost (CML). The proportion of revenue exposed under the scheme is 1.2 per cent for CI and 1.8 per cent for CML.

The amount of revenue exposure to quality of service has been informed by a customer survey. DNO interruption performance (CI and CML) are audited each year and an audit report is published detailing the accuracy of measurements and any adjustments if applied to their annual performance.

[3] Ofgem’s Sector Specific Framework Decision

Separate planned and unplanned targets are set to provide clarity for stakeholders with. As customers are inconvenienced less by planned outages, where sufficient notice is given, planned interruptions are weighted at 50 per cent relative to equivalent levels of unplanned interruptions when calculating the incentive.

Interruptions caused by exceptional events are excluded in order to reduce the volatility and impact of these occurrences on performance (and future target setting). Exceptional events are classified as being either a severe weather exceptional event or a one-off exceptional event (25,000 customers interrupted, and two million customer minutes lost).

What options have we considered?

Defining objectives

In their SSMD[4] Ofgem has set out two objectives for their proposed minimum standards measure:

- Ensure that customers are protected against any significant deterioration in the length of unplanned interruptions; and
- Ensure that existing performance issues with multiple occupancy buildings are resolved.

Reflecting on the insights we have received from our customers and stakeholders and best practice across the industry we have defined the following objectives for unplanned interruptions in RIIO-2, the last of which is well aligned with Ofgem's objectives.

Objective	Business insights	Customer and stakeholder insight/feedback	Best practice	Strategy / Policy
Drive reduction in the average time to restore customers gas supply	Analysis of CSAT and interruption duration indicates that satisfaction reduces as durations increase	Customers view an interruption to their gas supply a high priority		
Drive reduction in the volume / likelihood of unplanned interruptions		Customer willingness to pay informs us that they value interruptions being mitigated altogether	The Electricity DNO interruptions incentive scheme encourages networks to reduce interruptions altogether	

[4] RIIO-2 Sector Specific Methodology Decision - Gas, p 30

Ensure focus is given to worst served customers e.g. customers living in MOBs	Our experience in RIIO-1 shows that extra focus needs to be given to our MOBs customers			We have developed a strategy to improve customer experience for customers in MOBs and Ofgem are concerned about the worsening performance for MOBs customers

Measurement options considered

Option 1: Remove measures on unplanned interruptions

- Remove RIIO-1 measures on unplanned interruption numbers and total duration.
- Remove requirement to report major incident unplanned interruption numbers and total duration in annual RRP
- Report GSOP1 performance (with payment cap removed).
- Measure customer satisfaction (C-Sat financial ODI retained with reset, more stretching, targets).
- Measure complaints handling (Complaints financial ODI retained with reset, more stretching, targets).
- Provide written reports to Ofgem provide details of all major incidents leading to 1,000 or more customer supply interruptions.

Assessing the merits and drawbacks

Pros	Cons
• Both complaints and C-Sat incentives protect against deterioration in performance and C-Sat encourages improved performance, especially for worst served customers. • Removal of GSOP1 cap provides incentive to innovate to avoid unplanned interruptions for worst served customers, particularly those living in MOBs. • Removal of GSOP1 cap provides incentive to innovate to reduce unplanned interruption duration of worst served customers, particularly those living in MOBs. • Significant focus on and scrutiny of major incidents impacting supply to 1,000 or more customers. • No further duplication of financial incentives in this area beyond GSOP1 / C-Sat / Complaints.	• No incentive to innovate or drive continuous improvement to avoid shorter unplanned interruptions completely (interruption numbers not reported, GSOP1 applies after 24hrs and emergency element of C-Sat requires interruption to supply). • No explicit focus or incentive on reducing unplanned interruption numbers. • Reduced incentive to innovate or drive continuous improvement to reduce duration of unplanned interruptions under 24hrs. • Reduced focus on major incidents impacting the supply of between 250 and 999 customers. • No explicit focus or incentive on reducing the duration of unplanned interruptions. • No explicit focus or incentive on likelihood or duration of unplanned interruptions by type (i.e. non-MOB or MOB). • Performance not directly comparable between networks (i.e. a network with more MOBs is likely to pay more under GSOP1).

Potential unintended consequences
• Potential disincentive to innovate to avoid shorter interruptions as emergency element of C-Sat requires interruption to supply and shorter ones can receive high scores. • Reduced focus on the overall number and duration of unplanned interruptions may mean whilst performance for worst served customers improves overall performance stagnates and for some customers deteriorates. • Networks' performance compared when not directly comparable due to different numbers of customer and asset populations.

Option 2: Maintain existing measures	
As option 1, but: • Retain reputational ODI to measure and report on total number and duration of unplanned interruptions. ○ Reporting at a combined level (i.e. non-MOBs and MOBs) with no disaggregation of targets. ○ Exclusion of major incidents (>250 customers interrupted). ○ Specific targets set for each network, based on historical performance. • Retain requirement to report major incident unplanned interruption numbers and total duration in annual RRP	
Assessing the merits and drawbacks	
Pros	**Cons**
As option 1 plus: • Maintains focus on the total number and duration of unplanned interruptions. • Maintains focus on major incidents impacting the supply of between 250 and 999 customers. • Simple measure for customers and stakeholders to understand. • A networks performance is comparable over time (but not with others).	• Combined measure does not enable focus on differences between non-MOB and MOB unplanned interruptions. • Does not focus on worst served customers. • Performance not directly comparable between networks (i.e. a network with more customers is likely to experience more interruptions and one with more MOBs is likely to experience a significantly longer duration). • Performance not currently comparable due to inconsistencies between networks recording and reporting methods (including stopping the clock) [This could be addressed for RIIO-2]
Potential unintended consequences	
• Networks' performance compared when not directly comparable due to different numbers of customer and asset populations.	

Option 3: Measure average restoration time (Ofgem decision in SSMD)

As option 1, but:

- Penalty only incentive to measure minimum standard average restoration time for total unplanned interruptions
  - For all networks, excluding London, measure combined average restoration time for unplanned interruptions in non-MOBs, MOBs and major incidents
  - For London network:
    - Measure separate average restoration time for unplanned interruptions in MOBs
    - Measure combined average restoration time for unplanned interruptions in non-MOBs and major incidents
  - Major incidents included but subject to a standardisation adjustment
  - Targets based on a hybrid between individual historic network performance and relative GDN performance (except MOBs)
  - Fixed combined average duration targets based on assumed forecast split in interruption volumes between MOBs, non-MOBs and major incidents.

Assessing the merits and drawbacks

Pros	**Cons**
As option 1, excluding last pro*, plus: • Ensures focus on London MOBs average duration. • Incentive to ensure no deterioration in the average duration of all interruptions. • Some incentive to reduce the duration of all interruptions (to build headroom to minimum standard). • Incentive to avoid unplanned interruptions where duration is likely to be longer than the target average. • Maintains focus on major incidents impacting the supply of between 250 and 999 customers. • Relatively simple measure for customers and stakeholders to understand. One minimum standard target per network except London. Two minimum standard targets for London. *[*Excludes option 1 pro of - no further duplication of financial incentives in this area beyond GSOP1 / CSat / Complaints.]*	• Combined measure in all networks except London does not enable focus on differences between non-MOB and MOB unplanned interruptions. • No measurement of the likelihood of experiencing an unplanned interruption. • No direct incentive to reduce numbers of unplanned interruptions. • No incentive to avoid interruptions where duration is likely to be shorter than the target average. (As this would make performance look worse) • Volatility of volumes between interruption categories, from forecast to actual, could make performance look better/worse even if the outcome delivered was the same. • Volatility of major incidents makes setting a SMART target difficult. • A networks performance is NOT comparable over time (due to different volumes between categories) • Performance not directly comparable between networks (i.e. a network with more MOBs is likely to experience a significantly longer duration and one with more single feed networks is likely to experience longer durations during a major incident). • Performance not currently comparable due to inconsistencies between networks recording and reporting methods (including stopping the clock) [This could be addressed for RIIO-2]

Potential unintended consequences

• Could create incentive to increase the number of interruptions as this could make performance look better. • Could disincentivise the avoidance of interruptions as this could make performance look worse. ○ For example, if a GDN found a way to avoid all interruptions that were shorter than their minimum standard and they implemented it they would receive a financial penalty as all the remaining interruptions would be above the minimum standard. • Volatility between types of interruptions will impact perceived performance (i.e. if MOBs interruptions accounted for 1% of total interruptions in forecast but 1.1% in a specific year then performance would look worse than forecast even if average duration was exactly the same. • These unintended consequences are more likely in the networks with combined non-MOB and MOB targets (i.e. all but London).

Option 4: Measure average restoration time with disaggregation of targets	
As option 1, but: • Penalty only incentive to measure minimum standard average restoration time for unplanned interruptions with separate targets for non-MOBs, MOBs, and unplanned interruptions. • Reputational incentive to measure target aspirational average restoration time for unplanned interruptions with separate targets for non-MOBs, MOBs and major incidents.	
□ Minimum standard targets based on a hybrid between individual historic network performance and relative GDN performance (except MOBs).	
Assessing the merits and drawbacks	
Pros	**Cons**

As option 1, excluding last pro*, plus: • Enables focus on differences between non-MOB and MOB unplanned interruptions. • Ensures focus on London MOBs average duration. • Incentive to ensure no deterioration in the average duration of all interruptions. • Reputational incentive to reduce the duration of all interruptions. • Some financial incentive to reduce the duration of all interruptions (to build headroom to minimum standard). • Incentive to avoid unplanned interruptions where duration is likely to be longer than the target average. • Avoids issues associated with volatility of volumes between interruption categories, from forecast to actual, which could make performance look better/worse even if the outcome delivered was the same. • Maintains focus on major incidents impacting the supply of between 250 and 999 customers. • A networks performance is comparable over time • Relatively simple measure for customers and stakeholders to understand. *[*Excludes option 1 pro of - no further duplication of financial incentives in this area beyond GSOP1 / C-Sat / Complaints.]*	• No measurement of the likelihood of experiencing an unplanned interruption. • No direct incentive to reduce numbers of unplanned interruptions. • No incentive to avoid interruptions where duration is likely to be shorter than the target average. (As this would make performance look worse) [Lower impact than option 3] • Three minimum standard targets for each network. One each for non-MOBs, MOBs and major incidents (compared to one / two in option 2) • Performance not directly comparable between networks (i.e. a network with more high-rise MOBs is likely to experience a significantly longer duration and one with more single feed networks is likely to experience longer durations during a major incident). • Performance not currently comparable due to inconsistencies between networks recording and reporting methods (including stopping the clock) [This could be addressed for RIIO-2]
Potential unintended consequences	
• Could create incentive to increase the number of short interruptions in each category as this could make performance look better. • Could disincentivise the avoidance of short interruptions in each category as this could make performance look worse. ○ For example, if a GDN found a way to avoid all interruptions that were shorter than their minimum standard and they implemented it they would receive a financial penalty as all the remaining interruptions would be above the minimum standard.	

Option 5: Evolve IIS measure from RIIO-ED1

As option 1, but:

- Measure number of customers interrupted per 100 customers (CI) multiplied by the number of customer minutes lost (CML) disaggregated for non-MOBs and MOBs.
- Penalty only financial ODI for minimum standards.
- Reputational ODI for aspirational performance.
- CML elements of minimum standard targets based on a hybrid between individual historic network performance and relative GDN performance (except MOBs).
- Targets for aspirational CML as well as minimum standard and aspirational CI based on historic network performance.
- Retain requirement to report major incident unplanned interruption numbers and total duration in annual RRP.

[More details provided in annex 2 to this document]

Assessing the merits and drawbacks

Pros	**Cons**
As option 1, excluding last pro*, plus: • Measures whole impact on customer – i.e. likelihood and duration. • More comparable across networks than other options. i.e. accounts for customer numbers. • Enables focus on differences between non-MOB and MOB unplanned interruptions. • Ensures focus on London MOBs average duration. • Incentive to ensure no deterioration in the average duration of all interruptions. • Reputational incentive to reduce the duration of all interruptions. • Financial incentive to ensure no deterioration in the number of interruptions. • Some financial incentive to reduce the number of and duration of all interruptions (to build headroom to minimum standard). • Reputational incentive to avoid unplanned interruption. • Maintains focus on major incidents impacting the supply of between 250 and 999 customers. A networks performance is comparable over time *[*Excludes option 1 pro of - no further duplication of financial incentives in this area beyond GSOP1 / C-Sat / Complaints.]*	• Measure is not easily relatable to customers and stakeholders (i.e. not numbers of interruptions or duration minutes etc.) • Multiple targets (i.e. non-MOBs and MOBs) • Performance not directly comparable between networks (i.e. a network with more high-rise MOBs is likely to experience a significantly longer duration and one with more single feed networks is likely to experience longer durations during a major incident). • Performance not currently comparable due to inconsistencies between networks recording and reporting methods (including stopping the clock) [This could be addressed for RIIO-2]

Potential unintended consequences

- Measure could be viewed as complex and potentially inaccessible to customers and stakeholders

Why are these the options?

We have considered a range of options from having no additional specific measures to evolving the IIS measure used in RIIO-ED1. Option 1 is the simplest and to an extent delivers Ofgem's objectives for unplanned interruptions they stated in the SSDM, whilst option 2 maintains the status quo. Option 3 presents Ofgem's proposals for the new unplanned interruptions measure whilst option 4 builds on some of the weaknesses we have identified in their proposal. There is an opportunity to improve the existing interruptions measure established in Electricity Distribution to achieve the key objectives.

We have mapped these options against the defined objectives:

	Option 1	Option 2	Option 3	Option 4	Option 5
Drive reduction in the average time to restore customers gas supply					
Drive reduction in the volume / likelihood of unplanned interruptions					
Ensure focus is given to worst served customers e.g. customers living in MOBs					

No delivery	Weak delivery	Some delivery	Delivery	Strong delivery

Which option is our preference and why?

Although our assessment identifies a number of drawbacks and potential unintended consequences we have chosen to comply with Ofgem's sector specific methodology decision (option 3). We also propose to use the reputational ODI identified as part of option 4 to increase the delivery of the objectives to drive a reduction in the average time to restore customers gas supply and a reduction in the volume / likelihood of unplanned interruptions.

We will, however, continue to engage with Ofgem and other stakeholders to explore, develop and assess options four and five, as well as any other alternatives identified by other stakeholders, as potentially better metrics for measuring the customer impact of unplanned interruptions.

Option 5 could be assessed as strong delivery against all objectives if there were positive incentives to reduce the number of and duration of unplanned interruptions. However, there are known inconsistencies between companies' measurement and reporting of unplanned interruptions that need to be resolved before this could be implemented. This could be re-assessed ahead of RIIO-3.

3. Assessing performance levels

RIIO-1 unplanned interruptions performance summary

This section details our and other GDNs unplanned interruptions performance in RIIO-1. It covers four key aspects:

- Volumes (likelihood) of unplanned interruptions;
- Duration of unplanned interruptions;
- Major incidents; and
- Guaranteed standard of performance (GSOP) 1

Understanding comparability between GDNs RIIO-1 performance:

It will be important that we work with Ofgem and other stakeholders ahead of draft determinations to understand the differences in measurement and reporting between GDNs on unplanned interruptions. Once these differences are clarified it will enable a more effective understanding on the performance delivered for customers during RIIO-1.

It will then be important to reconcile these challenges to enable the setting of unplanned interruptions standards for gas customers across Great Britain in RIIO-2.

Volumes of unplanned interruptions:

The table below shows all GDNs total number of non-MOB and MOB unplanned interruptions and the volume normalised for customer numbers. We have shown this information at a combined non-MOBs / MOBs level as we do not have customer numbers split by non-MOBs and MOBs for other GDNs. We have used the years 2015/16 to 2018/19 for consistency with how we've developed our RIIO-2 targets. We have done this as before 2015/16 the regulatory reporting pack did not separate unplanned interruptions by non-MOBs and MOBs.

Performance between GDNs is broadly comparable. In 2015/16 the likelihood of experiencing an unplanned interruption in our London and North West networks were higher than in other networks. However, the likelihood of experiencing an unplanned interruption has reduced over this four-year period in each of our networks with significant reductions seen in London and North West.

Table 5: Aggregated unplanned interruptions, total number and number per 100 customers by network (2015/16 to 2018/19)

	Aggregated number of unplanned interruptions							
	Total number				Per 100 customers (CI)			
Network	15/16	16/17	17/18	18/19	15/16	16/17	17/18	18/19
EoE	13,451	11,174	11,763	11,947	0.32	0.27	0.29	0.30
Lon	12,661	10,498	10,421	10,716	0.62	0.52	0.46	0.47
NW	12,887	10,348	11,286	10,126	0.49	0.39	0.42	0.38
WM	8,338	6,388	6,089	6,138	0.43	0.33	0.31	0.31
NGN	12,859	12,427	13,714	14,030	0.47	0.45	0.54	0.55
Sc	4,650	4,445	4,324	4,396	0.26	0.24	0.24	0.24
So	17,255	16,537	15,522	15,508	0.42	0.40	0.38	0.38
WWU	8,953	8,861	8,014	8,775	0.36	0.35	0.32	0.35

Duration of unplanned interruptions:

The two tables below show the total and average durations of non-MOB and MOB unplanned interruptions in the period 2015/16 to 2018/19.

The non-MOB average durations across our four networks appear broadly comparable with other GDNs. However, comparability is difficult to assess due to inconsistencies in data recording and reporting between GDNs. For example, other networks have 'stopped the clock' when repair jobs are being undertaken late in to the evening and the customer has requested that they come back to complete the work the following day. We have not done this, so our reporting will include the hours that the customer was off gas overnight.

Table 6: Non-MOB unplanned interruptions, total and average duration by network (2015/16 to 2018/19)

	Duration of Non-MOB unplanned interruptions							
	Total duration (million minutes)				Average duration (hours)			
Network	15/16	16/17	17/18	18/19	15/16	16/17	17/18	18/19
EoE	6.3	7.3	5.6	5.7	7.9	11.1	8.1	8.1
Lon	6.3	6.4	5.5	7.2	9.7	12.0	10.8	13.6
NW	7.1	7.8	6.2	6.2	9.2	12.8	9.5	10.5
WM	4.3	3.7	2.9	3.2	8.7	9.8	8.2	8.9

NGN	4.4	4.8	5.6	6.3	5.7	6.4	6.8	7.5
Sc	3.1	3.5	2.5	3.6	11.3	13.3	9.7	13.6
So	19.7	21.5	21.8	21.5	19.1	21.7	23.5	23.2
WWU	3.9	4.3	3.6	3.0	7.2	8.1	7.4	5.7

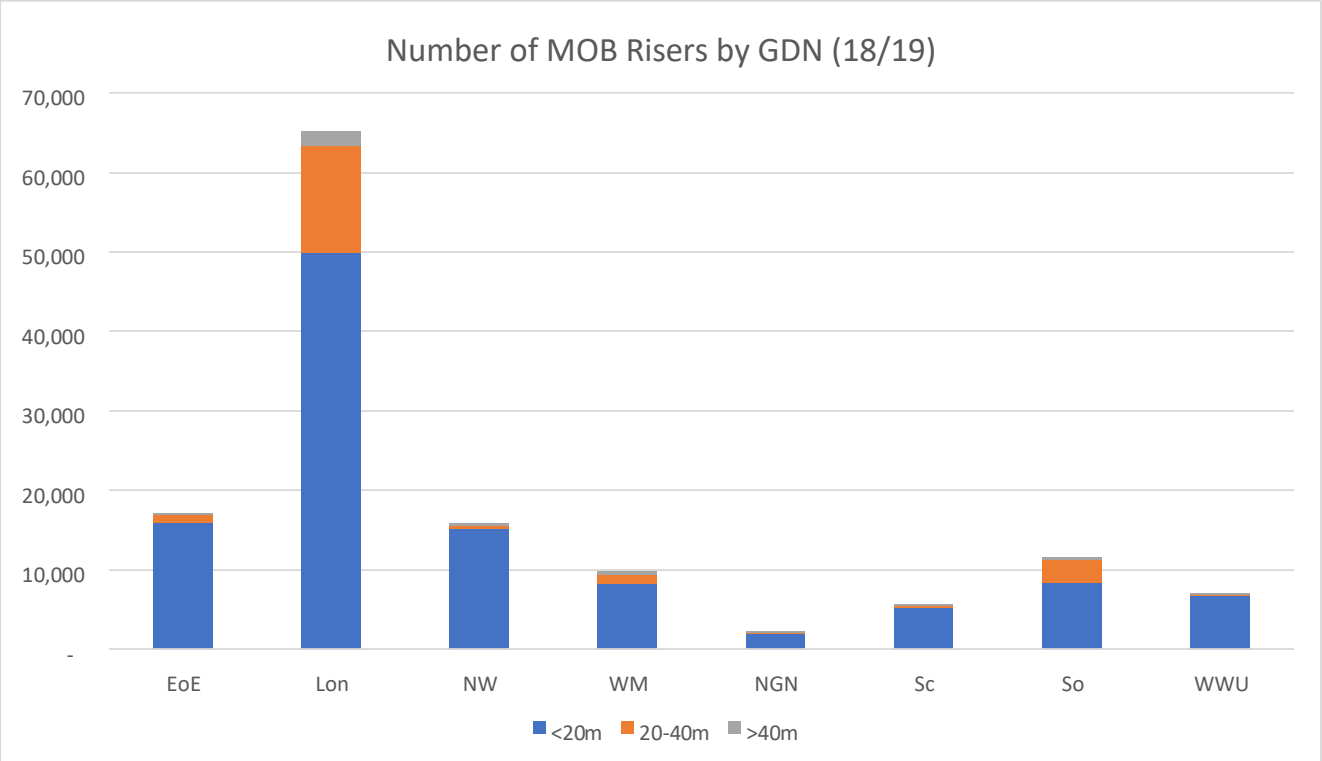
The MOB average durations across our four networks are significantly longer than those of other GDNs. We recognise that our performance in London has not been acceptable in recent years and we have agreed a performance improvement plan with Ofgem to be delivered over the remainder of RIIO-1.

Again, comparability with the other GDNs is difficult due to inconsistencies in data recording and reporting. For example, other networks have 'stopped the clock' when they have been waiting for permissions to undertake works to restore supply to MOBs. We have not done this. Comparability can also be difficult due to the different populations of MOB risers between different networks as shown in the graph below.

Table 7: MOB unplanned interruptions, total and average duration by network (2015/16 to 2018/19)

	Duration of MOBs unplanned interruptions							
	Total duration (million minutes)				Average duration (hours)			
Network	15/16	16/17	17/18	18/19	15/16	16/17	17/18	18/19
EoE	4.1	2.9	6.8	4.8	11.3	13.1	18.0	17.0
Lon	62.3	57.0	111.1	111.9	22.4	25.1	41.7	40.0
NW	0.8	1.5	1.1	5.2	4.0	5.8	2.5	12.4
WM	0.9	1.0	5.5	1.9	6.2	5.3	25.1	10.8
NGN	-	-	-	-	-	-	-	-
Sc	0.0	0.1	0.1	0.0	0.3	1.3	1.3	0.5
So	0.2	0.3	0.4	0.1	1.6	2.7	2.6	1.6
WWU	0.1	0.0	0.0	0.1	2.9	0.2	0.2	2.0

Figure 3: Number of MOB risers by network (2018/19)



Major incidents:

As can be seen in the tables below, major incidents are volatile, both in frequency and impact. They are also predominantly caused by third party interference. As such, it is difficult to assess GDN performance simply through the number and duration of interruptions relating to major incidents. When major incidents, involving interruption to supply for 1,000 of more customers, occur GDNs must provide a report to Ofgem which sets out the full details including how the incident occurred, how customers and stakeholders were engaged and supported, the steps taken to restore supplies, the timescales and the lessons learnt. These reports provide more value to understanding a GDNs performance in responding to a major incident.

Table 8: Annual number of major incidents and associated unplanned interruptions by network (2015/16 to 2018/19)

	Number of major incidents leading to unplanned interruptions							
	Number of major incidents per year				Number of unplanned interruptions			
Network	15/16	16/17	17/18	18/19	15/16	16/17	17/18	18/19
EoE	1	3	1	4	1,331	8,915	548	4,438
Lon	-	-	-	-	-	-	-	-
NW	-	-	-	-	-	-	-	-
WM	-	-	-	-	-	-	-	-
NGN	3	1	2	3	1,430	2,756	765	4,577
Sc	1	3	2	-	378	2,947	745	-
So	1	4	-	2	397	1,713	-	3,091
WWU	3	2	1	-	1,815	567	288	-

Table 9: Total and average duration of unplanned interruptions associated with major incidents (2015/16 to 2018/19)

	Duration of major incidents leading to unplanned interruptions							
	Total interruption duration (million minutes)				Average interruption duration (hours)			
Network	15/16	16/17	17/18	18/19	15/16	16/17	17/18	18/19
EoE	5.0	50.0	2.2	11.6	62.4	93.5	67.7	43.7
Lon	-	-	-	-	-	-	-	-
NW	-	-	-	-	-	-	-	-
WM	-	-	-	-	-	-	-	-
NGN	7.4	4.7	2.0	16.8	86.3	28.7	43.2	61.2
Sc	0.5	8.3	0.6	-	20.3	46.7	13.0	-
So	0.6	4.5	-	17.6	24.0	44.0	-	94.8
WWU	0.9	0.3	0.1	-	7.9	9.3	4.7	-

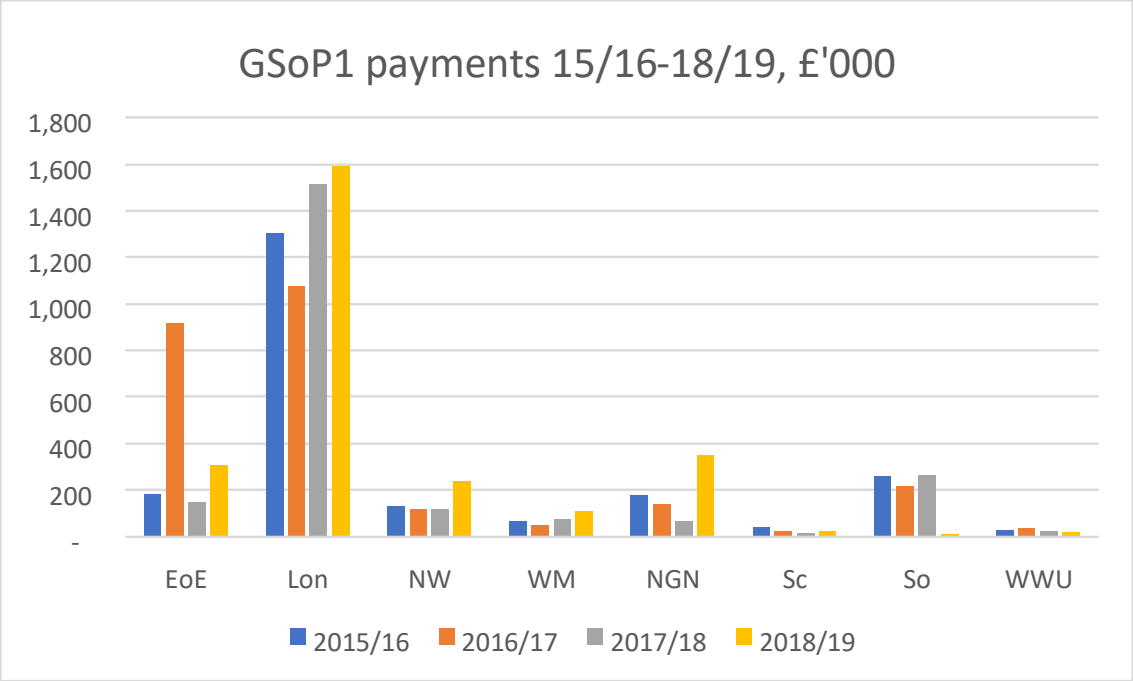
Guaranteed standard of performance (GSOP) 1 – Payments over RIIO-1:

The table below shows the value of the GSOP1 payments made by each GDN over the last four years. Our London network has made significantly more payments than other networks as most GSOP1 payments relate to MOBs. We have acknowledged that the performance delivered for our London MOBs customers has not been at the level we expect and have agreed an improvement plan with Ofgem.

Comparability of payments is difficult due to the different MOB populations across different networks, with the graph of GSOP payments below, looking similar to the previous graph of riser populations. It is also difficult to compare as we understand that other GDNs may stop the clock on GSOP1 payments, for example when they are waiting for permissions to commence works on MOBs, which we do not do. ***Table 10: Annual GSOP1 payments by network (2015/16 to 2018/19)***

Network	GSOP1 payments (£'000)			
	15/16	16/17	17/18	18/19
EoE	180	919	146	310
Lon	1,304	1,073	1,510	1,594
NW	128	116	115	236
WM	64	50	75	111
NGN	174	138	62	350
Sc	37	23	14	25
So	257	214	260	8
WWU	26	35	25	17

Figure 4: Graph of GSOP1 payments by network (2015/16 to 2018/19)



(Note: we believe that there is a formulae error in SGN-So's 2018/19 RRP submission)

What performance levels have we considered for RIIO-2?

In order to deliver the best outcomes for customers who experience an interruption to their gas supply we must set the right standards.

Currently, Ofgem measure the volume and total duration of unplanned interruptions. In the RIIO-2 sector specific methodology decision Ofgem propose to introduce a penalty only output delivery incentive on unplanned interruptions. For London it has been decided to have a penalty-only ODI that relates to multiple occupancy building unplanned interruptions and a separate penalty-only ODI that relates to other unplanned interruptions. For all other networks it has been decided to have a penalty-only ODI to cover all unplanned interruptions. We recognise and support Ofgem's ambition to create an overall measure of GDN unplanned interruptions performance; however, we have identified some challenges relating to the measure that their decision document implements and its effectiveness in assessing GDN performance in this important area. We describe these challenges in detail in annex 1 of this document entitled 'how we have calculated our unplanned interruptions targets'. We also set out our intention to continued engagement with Ofgem and other stakeholders to develop a measure which recognises the customer value in avoiding unplanned interruptions altogether as well as reducing their average duration.

Our Business Plan complies with Ofgem's measure by proposing minimum standard average durations for unplanned interruptions in RIIO-2. However, we also set out a reputational ODI on likely average durations. In addition to this we also described the likelihood of our customers experiencing an unplanned interruption during RIIO-2 and the total duration of unplanned interruptions.

We considered proposing reputational ODIs for these later elements, however we have not as they would create conflicts with the financial ODI set out in the SSMD. For example, if we reduced the number of non-MOB interruptions in East of England it would be recognised as positive performance under the reputational ODI but could be perceived as negative performance, potentially leading to a penalty, under the financial ODI set out in the SSMD.

Likelihood of experiencing an unplanned interruption

Non-MOBs: The best means of reducing the impact of interruptions is stopping them occurring. We have a good understanding of network performance, which assets are most likely to impact on customer supplies and the scale of this impact. Our large upstream installations – Offtakes, Pressure reduction systems and the LTS network have built in resilience and effective maintenance and intervention regimes to minimise the likelihood of failure. However, should a failure occur the impact would be widespread – thousands of customers could lose supplies. Our Distribution mains and services are much more likely to cause an interruption to supply to our customers, but at a much more localised scale.

In managing interruption volumes for RIIO-2 we have focused on maintaining the reliability of our upstream assets whilst improving the reliability of distribution mains and services. This choice focus on intervening on the assets which are most likely to cause interruption.

The IMRRP delivers significant safety benefits for our customers. By replacing long lengths of aged and failing pipework it also, as an additional benefit, significantly improves the reliability of the network, reducing interruptions. Whilst meeting our obligations to improve safety risks we have options about how we target the phasing of mains replacement to maximise benefits to customers. Individual pipes have different benefits for safety, the environment and interruptions to supply. Although our investment models can build CBA based optimisation based on valuations of interruptions (from WTP) and other elements we have also engaged with our customers through qualitative sessions to better understand their preferences.

We presented scenarios in which we showed options of the iron programme which focused on maximising environmental improvements, maximising reliability (reducing interruptions), maximising safety benefits or a balanced approach across all three elements.

For further details on these options and the results from customer testing please see Appendix 09.02 'Distribution Mains and Associated Services (Iron, PE, Steel & Other)'.

MOBs: Our investment in MOBS is primarily focused on reducing process safety risks. The pro-active replacement of higher safety risk risers will, as a secondary benefit, deliver a reduction in interruptions to supply volumes of around 10% over RIIO-2. We also conducted modelling work to examine the costs of reducing interruptions by 20%. We also considered options for how changes in operational practice could be implemented to reduce the duration of MOBs interruption events - engaging with customers to understand how service could best be improved. These options are discussed in Appendix 09.04 'Transforming the Experience for Multiple Occupancy Building Customers'.

Average restoration time – Minimum Standards financial ODI

As part of minimum requirements Ofgem has requested that GDNs set out how they have calculated their minimum standard average durations. Please see annex 1 of this document for our approach.

Average restoration time – Reputational ODI targets

We are, however, confident that we can go beyond these minimum standard and achieve more ambitious levels of performance through greater use of innovative techniques to restore supply.

The majority of our unplanned interruptions occur in non-MOBs and the engineering work involved between each of these interruptions is largely standardised. Interruptions in MOBs and as a result of large incidents can vary significantly depending on several factors involved, many of which are outside of our control. Therefore, we have engaged with our customers on how long we should take on average to restore their gas supply following an interruption in non-MOBs.

Target range and cost to achieve:

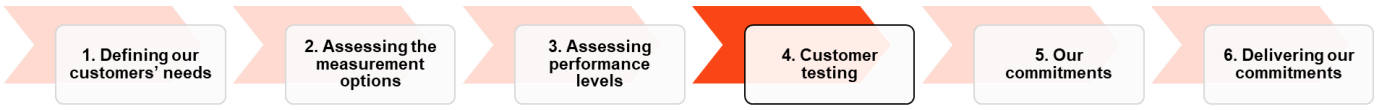
		Package 1: Low	Package 2: Medium	Package 3: High
Reduced durations	**Target/range***	Maintain RIIO-1 level of service	Reduce average length of interruption by 1 hour on average by end of RIIO-2	Reduce average length of interruption by 2 hours on average by end of RIIO-2
	Cost to achieve (RIIO-2 period)	No additional cost	£1,443,850	£2,887,860

	Cost assumptions/ calculation	N/A	Teams requiring serviflex x unit cost (200 x £929.25) = 185,850 Teams requiring service camera x unit cost (200 x £2400) = 480,000 Teams requiring training x cost of 2-day training (200 x £3890) = 778,000	Teams requiring serviflex x unit cost (400 x £929.25) Teams requiring service camera x unit cost (400 x £2400) Teams requiring training x cost of 2-day training (400 x £3890)
Total cost to achieve (RIIO-2 period)		No additional cost	£1,443,850	£2,887,860
Additional costs on customer bill per year*		£0	£0.07 in 2021, £0 thereafter	£0.11 in 2021, £0 thereafter

*Please note the initial target ranges were average length of interruption levels of 10 hours (option 1), 9.5 hours (option 2) and 9 hours (option 3). However, through further analysis we were able to increase our target levels to the levels shown. **Please note all price figures indicate the amount any bill could rise above regular inflation

Ahead of business options testing, our business insights and early engagement informed us that we should be making efforts to reduce and minimise the length of interruptions. Therefore, our preference was for our targets to be in the high target range in order make significant improvements to the customer experience by reducing the average time to restore their supply by 2 hours by the end of RIIO-2.

4. Customer testing



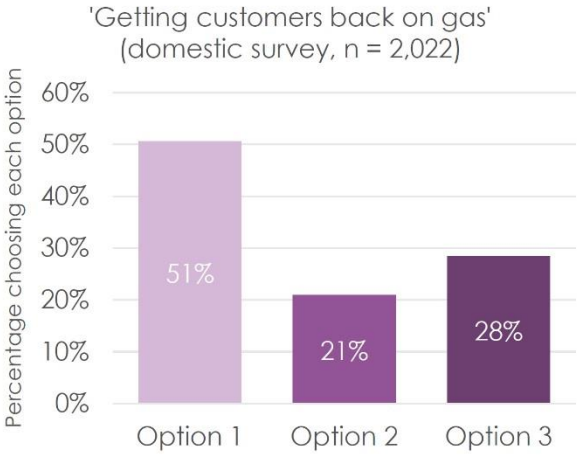
We have tested our commitments in a variety of ways to ensure we have both quantitative and qualitative responses across a broad segmentation of customers and stakeholders. We have tested the output measures that we are proposing and gathered feedback where options exist. This phase was called business options testing. Alongside customer testing, we have targeted specific groups such as hard to reach, seldom heard, future generations, those in fuel poverty and businesses such as micro businesses. We really wanted to understand if had heard correctly what our customers and stakeholders wanted and needed from us.

During options testing we shared the bill impacts to ensure our customers and stakeholders were fully informed before making choices.

Once we had gathered all the feedback from the options testing phase, we conducted acceptability testing to test our Plan in readiness for our final Plan submission in December.

Business options testing (BOT)

During our quantitative domestic survey with 2,022 customers, three options were presented in terms of average duration of unplanned interruptions. Option 1 was maintaining current average performance at 10 hours whilst options 2 and 3 showed increasing reductions in the average durations that households are interrupted by investing in new technology and making improvements in how engineers work.

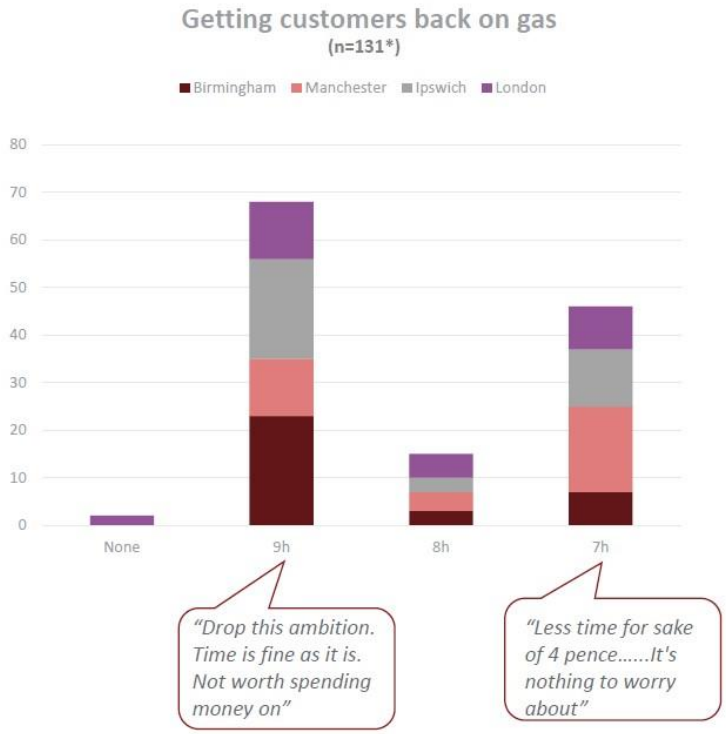


Of these, option 1 - the zero cost, status quo option was most popular with 51% of the votes compared to 21% and 28% for options 2 and 3 respectively. Customers in vulnerable situations and fuel poor customers also supported option 1 (51% and 54% respectively).

Qualitative workshops backed up this finding, with option 1 being the most preferred in each of the three locations we tested it in. Businesses surveyed also favoured option 1 with 51% choosing it. Zero employee businesses were very strongly in favour, with 62% choosing option 1.

Note: During the quantitative survey we described existing average performance as 10 hours, which was the average duration in the period 2015/16 to 2017/18, whereas in the qualitative workshops we described existing average performance as 9 hours, which was the average duration for 2017/18. Subsequently we have submitted our 2018/19 RRP which confirms an average duration for the period 2015/16 to 2018/19 as 10 hours.

During business options testing the low target option (maintain at 9 hours) was the most popular option in all workshops except for Manchester where customers preferred the high target option (2 hour reduction). Those who opted for the low target option indicated three key factors: Paying for a two-hour reduction through increased bills did not feel like good value for money, Focus should be on those who need extra support e.g. customers registered on the Priority Services Register (PSR), improvements didn't feel ambitious enough to warrant an increased bill.



At the customers in vulnerable situations (CIVS) qualitative business options testing workshops, reducing the time without gas by 30-60 mins was not seen as good use of money/worthwhile. The 65 participants generally were fairly unconcerned about reducing average reconnection time and selected the low target option for this aspect. Reasons included that the amount of time is minimal and therefore 'not worth it', it's better to do the job well than to rush or 'cut corners' and that interruptions don't affect them very much. However, some customers felt that it was worth reducing the time by 30 minutes or an hour, and spending the 11p, as some people are impacted heavily by interruption or it reduces inconvenience, which is of value.

Some of the 85 customers present at our fuel poverty workshops recognised that some interruptions were unavoidable, and most people felt that a proposed reduction in average duration of 2 hours was not enough to make a real difference to them. There was a general willingness to "make do" but it was acknowledged that duration would be a bigger factor for the vulnerable and in winter.

All of the 31 participants across the three workshops for ESL and non-English speakers agreed that information and communication regarding safety and timelines would be the first thing needed during interruptions, including details of expected timelines. Participants also saw it as important that we provide regular updates and communication such as text messages or leaflets. Some commented that they should be able to contact us directly. Others emphasised the need for a range of flexible communication options so that customers can choose how to receive updates. Many participants believed that providing heating for the elderly and help for those with medical conditions should be a priority within the first six hours.

At the business customer workshops with 74 people, minimising the disruption from our works had the highest importance rankings among business customers. This was due to inconvenience and travel, and because they result in shut-down of operations and direct financial impacts for some businesses. Participants felt that the impacts experienced would depend when the interruptions occur and that some businesses may experience minor impacts, especially smaller businesses that are not in catering or restaurant trade. Although they noted that with minimum operating temperatures these impacts could be more serious in winter. While, for other businesses an interruption of any length would have severe impacts. For example, restaurants that could not operate without gas and would have to close, hospices where heating is essential and electric heating would come at a very high cost, and schools which have to close if lacking hot water.

Triangulation

Our business insights and the early customer and stakeholder comments we collected supported a reduction in restoration time following an unplanned interruption, such as the feedback from customer deliberative workshops and the stated preference and revealed preference WTP studies which suggested that customers were willing to pay for a decrease in the hours of unplanned interruptions to supply.

However, once we developed costed options to actually deliver this during business options testing, we found that the majority (51%) actually preferred the lower cost, low target option to maintain current levels of service. This trend still applied when only customers in vulnerable situations or in fuel poverty were considered alone. This view was also supported in follow up quantitative follow up workshops where the majority of customers (68%) indicated that they didn't see much value in reducing interruptions by a few hours, but rather focus should be on restoring supply at a convenient time.

When combining this with results from our early engagement we believe there is still benefit in improving performance and therefore we propose to set output targets which go beyond the minimum requirement without any additional funding or impact on customer bills.

Customers also highlighted the importance of effective communication during the interruption. Our proposals on improving and enhancing our communication during and after unplanned interruptions form part of our commitments to measure and enhance accessibility and inclusivity (see 07.03.05 'Measuring and enhancing accessibility and inclusivity'). During workshops with fuel poor customers and those harder to reach, it was highlighted that priority should be provided to customers in vulnerable situations. We have responded to this insight through our commitment to provide enhanced welfare provisions and additional services beyond the meter for customers in vulnerable situations. Our output case 07.03.12 'Going beyond to never leave a customer vulnerable without gas' provides detail on how we developed our proposals.

Acceptability testing of our Quality Experience customer outcome

In the October acceptability testing, run by Traverse, the quantitative acceptability testing of business customers showed 49% of our business customers saying that they found the quality customer experience aspects of our Business Plan "very important" and 37% " fairly important" (86% in total). 30% of business customers found these aspects of the Plan "very acceptable" and 55% "acceptable" (85% in total). The breakdown across business sizes was broadly consistent, but overall acceptability increased with business size.

As part of the Traverse quantitative acceptability testing of domestic customers (October 2019), 83% of those surveyed found the quality experience section of the Plan acceptable, and only 1% found it unacceptable. When asked what would make it acceptable, those who had answered that they found it neither acceptable nor unacceptable suggested a further reduction in process (14%) or wanted more detail on how it would be implemented (6%). This was broadly consistent across the regions.

Overall, customers in our acceptability testing focus groups with CIVS were supportive of the Quality Experience commitments outlined by us, particularly the additional support for customers in vulnerable situations. This was in line with feedback from participants that attended fuel poor specific focus groups, however, they felt that we would need to make it clearer how customers should access this support if needed.

As part of the Verve Business Plan consultation, engaging a pop-up community of 25 customers, a quality experience was seen as a critical obligation for any organisation. In fact, some saw it as an expectation, and were surprised it formed a prominent part of the Plan. Providing detail of what the commitments should entail provided comfort, though failure to deliver will quickly harm trust.

During the Verve stakeholder interviews, it was generally perceived that targets were sensible; however, it was unclear how we were planning to focus on the most significant delays would be achieved. Another mentioned that it was difficult to fully assess the target due to the lack of benchmark or context for comparison. Finally, one of the stakeholders mentioned the positive trend of reducing restoration costs but noted the key challenge of collaboration between network owners.

5. Our commitments

Over the RIIO-2 period we will measure and report on the following commitments related to unplanned interruptions leading to benefits to our current and future customers.

Output commitment	Measure definition	Benefits to current customers	Benefits to future customers	SROI/WTP value over RIIO-2 period
Unplanned interruptions – minimum standard for EoE, NW and WM	Average supply restoration time (minimum)	Measure will ensure that customers are protected and will receive at least a set minimum standard of service	As techniques and technology improves, future customers should continue to receive an improved service and further enhancements in engineering techniques	N/A – Minimum level
Unplanned interruptions (minimum standard) for London	Average supply restoration time (minimum) bespoke for London	A London specific measure will ensure that interruptions within MOBs are treated appropriately and it will give us the foundation to deliver an improved customer experience during an interruption	As techniques and technology improves, future customers should continue to receive an improved service, particularly with MOBs	N/A – Minimum level

Unplanned interruptions (targeted likely levels) for EoE, NW and WM	Average restoration time (reputational / likely) for EoE, NW and WM	Measure will drive networks to reduce the average length of a supply interruption	As techniques and technology improves, future customers should continue to receive an improved service	N/A
Unplanned interruptions (targeted likely levels) for London	Average restoration time (reputational / likely) for London	Measure will drive networks to reduce the average length of a supply interruption	As techniques and technology improves, future customers should continue	
			to receive an improved service	
Guaranteed standard of performance (GSOP) 1	Report the number and value of payments made under GSOP1	Directly compensates worst served customers Will incentivise avoidance, and reductions in duration, of longer unplanned interruptions.	As techniques and technology improves, future customers should continue to receive an improved service	

Assessment of how to treat commitments

We have evaluated these proposals against our outputs framework to determine the most appropriate and effective option for this output:

Regulatory treatment	Criteria	Rating	Further explanation of assessment
Reputational ODI	Demonstrate this is important to customers and/or stakeholders		Our engagement for RIIO-2 on this output shows customer support for minimising interruptions
	Funded elsewhere in our plan, or inappropriate for funding		This is not funded elsewhere in the plan. Although customers support reduced duration of interruptions, there was not a strong willingness to pay to achieve this.
	Can robustly measure performance improvement		Our preferred option for this output can be easily measured.

Financial ODI	Demonstrate this is important to customers and/or stakeholders and they are willing to pay		Our engagement for RIIO-2 on this output shows customer support for minimising interruptions
	Not funded elsewhere in our plan		This output is not funded elsewhere in the plan. Although customers support reduced duration of interruptions, there was not a strong willingness to pay to achieve this. They did however value, no significant deterioration in service.
	Can robustly measure performance improvement		As described for Reputational ODI.
Price control deliverable	Specific deliverable with clear timeline and targets		Our preferred option for this output does not contain a specific deliverable. Instead it focused on delivering a targeted level of performance in RIIO-2.
	Demonstrable benefit to customers which they support		Our engagement for RIIO-2 on this output shows strong customer support for minimising disruptions and offering support to those affected.
Licence Obligation	Absolute minimum, with significant customer harm if we do not deliver it		This output is not suited to a Licence Obligation. We are proposing service improvements above our current level, and already comply with associated GSOPs. We are proposing to make advanced GSOP payments where we identify customers will be interrupted for longer than 1 week.
	Applicable to all GDNs		For this output, we have undertaken work specifically to understand the challenges and needs of customers in our area.
Business Plan Incentive	Adds to the quality of our plan, but not a specific deliverable or performance measure		Our preferred option for this output includes specific performance targets.
	Funded elsewhere in our plan, or inappropriate for funding		This output is not funded elsewhere in the plan.

Doesn't meet criteria	Weakly meets criteria	Partially meets criteria	Meets criteria	Strongly meets criteria

We are supportive of Ofgem setting a penalty-only financial ODI for output performance below the minimum standard. We propose setting a reputational ODI to achieve aspirational levels of performance. This output is can work with the application of an ODI incentive at a network specific level and performance can be easily measured and tracked over time in a standardised format. There is, however, current inconsistency between how different companies measure and report in this area.

Understanding comparability between GDNs RIIO-1 performance:

It will be important that we work with Ofgem and other stakeholders ahead of draft determinations to understand the differences in measurement and reporting between GDNs on unplanned interruptions. Once these differences are clarified it will enable a more effective understanding on the performance delivered for customers during RIIO-1.
It will then be important to reconcile these challenges to enable the setting of unplanned interruptions standards for gas customers across Great Britain in RIIO-2.

Average duration – Minimum Standard targets

In compliance with Ofgem's proposals in the Sector Specific Decision Methodology we will propose minimum targets for unplanned interruptions average restoration time. For all networks except London this combines interruptions in non-MOBs, MOBs, and major incidents (standardised at 250 interruptions per incident). For London, two bespoke outputs are proposed. One output combining non-MOBs and major incidents (standardised at 250 interruptions per incident) and another output for MOBs interruptions only. Our approach to developing these targets is described in the annex: **how we have calculated our RIIO-2 interruptions targets.** This includes 'headroom' calculations to account for a challenge arising from this measure relating to setting a fixed combined average duration based on the assumed forecast split in interruption volumes between MOBs, non-MOBs and major incidents. Even if the individual average durations remained the same for each of MOBs, non-MOBs and major incidents but the split between them in volumes differed from the forecast it would impact perceived performance.

Table 11: Our RIIO-2 unplanned interruption minimum standard financial ODI average duration targets

Network	Measure	Unplanned interruption minimum standard average duration targets (minutes)				
		21/22	22/23	23/24	24/25	25/26
EoE	Non-MOB, MOB & major incident combined	1,852	1,852	1,852	1,852	1,852
NW		1,848	1,848	1,848	1,848	1,848
WM		2,505	2,505	2,505	2,505	2,505
Lon	MOB	36,078	36,078	36,078	36,078	36,078
	Non-MOB & major incident combined	1,493	1,493	1,493	1,493	1,493

Average duration - Reputational targets

We will also set reputational targets for unplanned interruptions average duration.

As explained in section 4 our customers have indicated that they are not willing to pay for improvements in nonMOB interruption durations. As such, we have set each of our networks targets to improve performance without requiring any additional expenditure. Our approach in calculating these targets described in annex 1 of this document**.**

Table 12: Our RIIO-2 non-MOBs unplanned interruption reputational ODI average duration targets

	Non-MOBs unplanned interruption reputational average duration targets (minutes)				
Network	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**
EoE	513	503	492	482	471
Lon	673	660	646	632	618
NW	611	599	586	574	562
WM	523	513	502	491	481

Table 13: Our RIIO-2 MOBs unplanned interruption reputational ODI average duration targets

	MOBs unplanned interruption reputational average duration targets (minutes)				
Network	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**
EoE	21,109	20,678	20,247	19,816	19,385
Lon	32,302	31,979	31,659	31,343	31,029
NW	9,440	9,440	9,440	9,440	9,440
WM	17,858	17,494	17,129	16,765	16,400

Number / likelihood of interruptions

We will continue to engage with Ofgem and other stakeholders to explore, develop and assess alternative metrics for measuring the customer impact of unplanned interruptions which take account of the value customers attribute to avoiding interruptions completely.

We are targeting the reductions shown in the two tables below. On non-MOBs this is a 17% reduction in interruption volumes from the average seen in the period 2015/16 to 2018/19. On MOBs it is a 32% reduction over the same period.

Table 14: Our RIIO-2 non-MOBs forecast number of unplanned interruptions

Network	Reputational forecast number of non-MOBs unplanned interruptions				
	21/22	22/23	23/24	24/25	25/26
EoE	11,189	10,928	10,659	10,326	10,027
Lon	8,487	8,284	8,082	7,856	7,644
NW	10,218	9,968	9,712	9,409	9,141
WM	5,891	5,746	5,596	5,414	5,254

Table 15: Our RIIO-2 MOBs forecast number of unplanned interruptions

Network	Reputational forecast number of MOBs unplanned interruptions				
	21/22	22/23	23/24	24/25	25/26
EoE	212	207	203	199	195
Lon	1,219	1,195	1,171	1,147	1,125
NW	220	216	212	207	203
WM	126	123	121	118	116

Total duration of interruptions

When the targeted reductions in unplanned interruption numbers and our reputational commitments on average duration of unplanned interruptions are combined it shows significant reductions in the total duration of unplanned interruptions that our customers will experience. The table below shows the reductions we plan to deliver by the end of RIIO-2 from the average annual totals seen in the period 2015/16 to 2018/19.

Table 16: Our forecast reduction in annual total duration of unplanned interruptions by end of RIIO-2

Network	Reductions in total annual unplanned interruptions durations delivered by end of RIIO-2 from average of period 2015/16 to 2018/19		
	Non-MOBs	MOBs	Non-MOBs + MOBs
EoE	24%	19%	22%
Lon	26%	59%	57%
NW	25%	10%	21%
WM	28%	19%	25%
Cadent	25%	55%	49%

The waterfall diagrams below show the reduction in total duration of unplanned interruptions from the last reported year, 2018/19, and our forecast for the last year in RIIO-2, 2025/26. The diagrams show the reductions in total duration attributed to reductions in the numbers and the average duration of unplanned interruptions.

Figure 5: Total duration of non-MOB unplanned interruptions, 2018/19 actual vs 2025/26 forecast (mins)

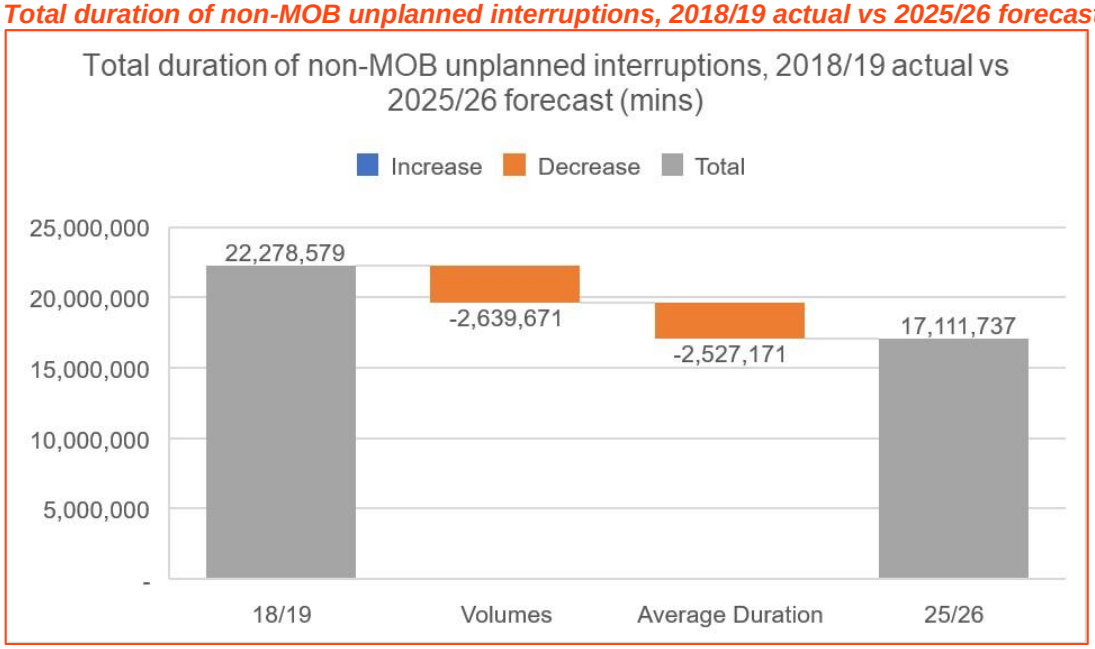
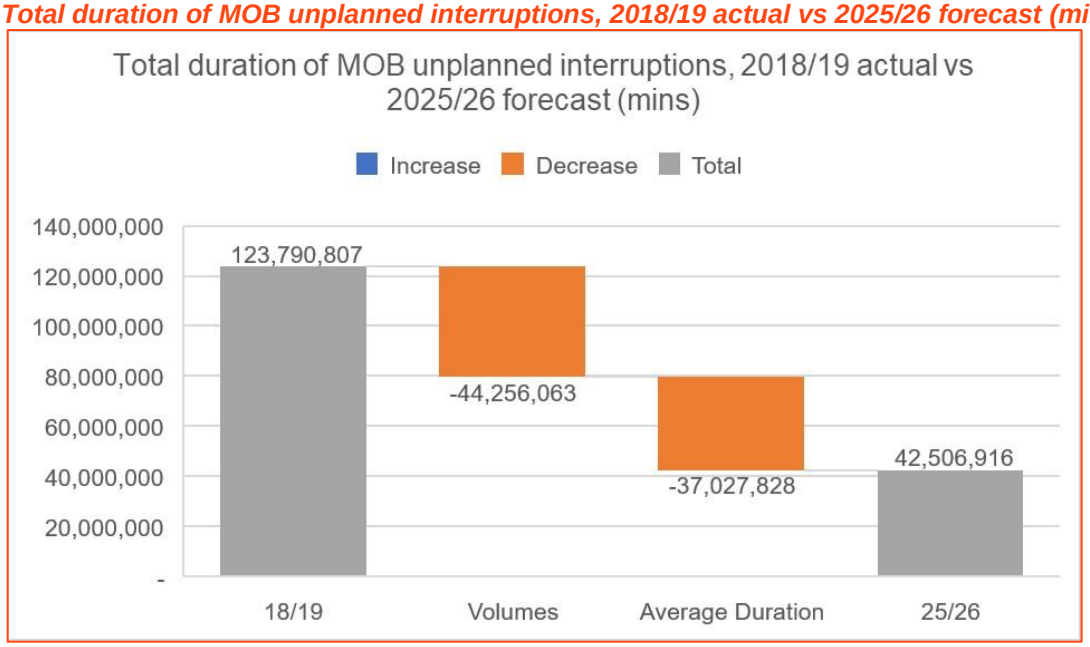


Figure 6: Total duration of MOB unplanned interruptions, 2018/19 actual vs 2025/26 forecast (mins)



How do we know that we're being ambitious

Whilst we tested options to invest in equipment to reduce the average duration of non-MOB unplanned interruptions customers provided feedback that for the benefit they could deliver they were not willing to pay for them and chose to maintain current performance at zero incremental cost. As such, we challenged ourselves to assess what could be delivered for no additional cost, based on experience, sharing best practice, innovation, known improvements in train or planned and an additional level of stretch.

Our MOBs targets represent a huge stretch for our London network, where they must deliver a 40% improvement in average duration before the end of RIIO-1 and then continually improve through RIIO-2. To deliver this improvement in RIIO-1 requires us to deploy all of the ideas and innovations that we are aware of now. We believe the London MOBs ongoing improvement through RIIO-2 is absolutely stretching because it follows a major shift in performance and requires us to find further new, better approaches after we have spent a lot of time exploring all angles. We therefore do not expect to find lots of new areas for step changes in improvement given how hard we've explored this recently.

Our North West MOBs target looks lower because performance is already relatively strong and there is simply less opportunity to improve this further.

In other Networks, we are building stretching improvement levels; to go any further would require significant cost (lots more resources and/ or investment in assets), which does not align with customers willingness to pay.

Unfortunately, it is not possible to undertake a robust like-for-like comparison with other GDNs to assess the ambition of our average durations as we know that we are not measuring and reporting interruptions in the same way (for example the use of clock stopping).

How we are incentivised Average restoration time following an unplanned interruption – Financial penalty only ODI

In the Sector Specific Methodology Decision, Ofgem proposed a penalty only ODI (F) for unplanned interruptions average restoration time, if the target is breached. With a separate bespoke ODI for North London (separating for MOBs and non-MOBs).

The ODI will be worth up to 0.5% of base revenue to provide a strong incentive for GDNs to maintain their response to unplanned interruptions.

Incentive rate calculation (based on Ofwat formula)

Marginal cost = expect cost of £1.44m to reduce by 1 hour, and £2.89m to reduce by 2 hours. Both work out to £1.44m per hour. Therefore marginal cost = £1.44m per hour (RIIO-2 total) = **£0.29m per hour** (annual)

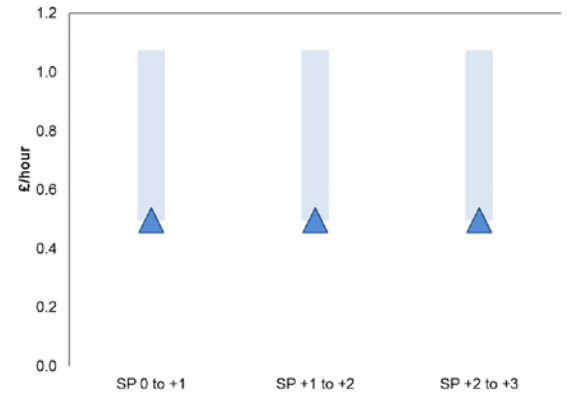
Marginal benefit = triangulated result of £0.50 per hour per customer (domestic) and £0.00 (non domestic). Around 80% of our revenue is from domestic customers, so infer a marginal benefit of 0.8 * 0.50 = £0.40 in bill impact terms = **£5.5m** in spend per year.[5]

P = 0.6

Therefore incentive rate is £5.5m – (0.6 x £0.29m) = **£5.326m per hour**

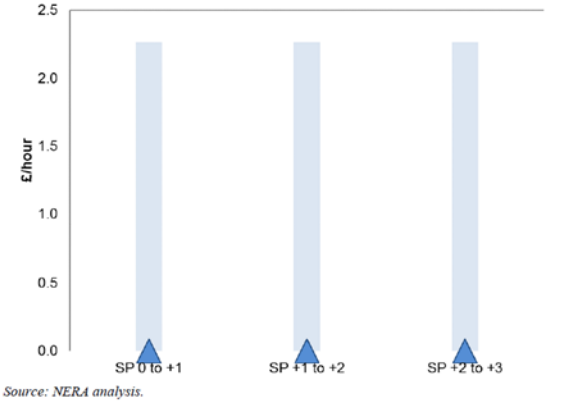
[5] this has been calculated using the bill impact calculator to deliver a bill impact of £0.04 on average in RIIO-2 across all four regions. The costs were apportioned in a 46% non-load capex, 54% controllable opex, in line with the opex/capex split of the costs in the output case.

Figure 5.3: Short Unplanned Interruption Duration Valuation (Domestic)



Source: NERA analysis.

Figure 5.4: Short Unplanned Interruption Duration Valuation (Non-domestic)



Source: NERA analysis.

Ofgem comparison to our measure

Based on total RIIO-2 revenue of around £9,600m, Ofgem's 0.5% of revenue is around £48m = £9.6m per year.

If we were to take our proposals of reducing average duration by 2 hours, Ofgem's proposal would equate to around £4.8m per hour. This is broadly in line with the £5.326m we calculate based on the Ofwat formula. Therefore, the results of our WTP research and Ofwat's formula suggest that Ofgem's 0.5% of revenue is well calibrated.

Cap and Collar

Ofgem's proposal of 0.5% of revenue forms a minimum level for this ODI (i.e. the maximum penalty).

Since this is penalty-only, the maximum level is zero.

Sense checks

	Working	**Pass/fail**
Marginal benefit > incentive rate (consumers get something)	Ofgem's proposal of 0.5% of revenue is roughly in line with the benefit of reduced interruptions, so they are compensated for their loss in benefit.	
Incentive rate > marginal cost (Cadent gets something)	Penalty only so not relevant	
Percentage of revenue is reasonable	Ofgem figure of 0.5%	

Funding our commitments

We are not requesting any specific incremental cost to deliver this outcome over RIIO-2 however it is underpinned by our resilience plans. This results in no change in the annual customer bill impact for an average customer.

6. Delivering our commitments

We will deliver our commitments through the following improvements:

Area	What we will do to deliver commitments
Customer communications	• We will regularly communicate with customers and individual stakeholders during works to keep them informed of progress and minimise the impact of unplanned interruptions • We will improve the range and inclusivity of our communications to improve the experience of customers impacted by an interruption • We will establish a MOBs 'hotline' so that high rise building owners or their building managers can contact us straightforwardly to find out key information about their building and our work plans • We will have a dedicated MOBs team in London to keep customers on gas and engage with customers as soon as possible to deliver an improved customer service
Processes / systems	• We will continuously improve our working practices, policies and technologies to minimise the time our customers are off gas following interruptions and share and adopt best practices in the industry in reducing the likelihood and duration of unplanned interruptions. • We will accelerate the application of innovations to enable riser repairs without the need for an interruption. We will develop our systems and applications to offer and manage timebound appointments.
Partnerships	• We will partner with housing authorities, residents' associations, and local councils to ensure work is completed efficiently and customers are kept informed

Engagement	• We will improve our engagement with local authorities and building owners to ensure we are able to restore the gas supply in MOBs as soon as possible • During major incidents we will engage with local community leaders, stakeholders and other utilities (where required) to maintain the great customer service we provide in these situations • We will take a more proactive approach to stakeholder engagement at senior levels within London's Mayoral and Local Authority constituencies to help us target our efforts where they are most needed and to better understand opportunities to improve

Protecting against non-delivery

Regulatory tool	How it will help in protecting customers from non-delivery
Guaranteed standards of performance (GSOP 1) – Supply restoration	If the gas supply of a customer is interrupted as a result of failure, fault or damage to the gas pipeline system they will be compensated where their gas supply is not reconnected at their property within 24 hours.
Unplanned interruptions ODI – Penalty only incentive	Non-delivery against minimum targets for unplanned interruptions average restoration time will result in a penalty worth up to -0.5% of revenue.
Customer satisfaction incentive	The financial CSAT incentive rewards/penalises GDNs for performing above/below the agreed target level. +/- 0.5% of revenue.
Complaint handling incentive	The financial Complaints incentive penalises GDNs for performing below the agreed minimum level. -0.5% of revenue.
Reputational	Non-delivery against the reputational incentives proposed will have a negative reputational impact

7. Annex 1: How we have calculated our unplanned interruptions targets

1. Purpose

This document sets out how we have calculated the interruptions targets within our Business Plan. It is intended to supplement the information presented in Chapter 7, Our Commitments, and earlier in this output case appendix.

This document also supports delivery against Ofgem's Business Plan minimum requirements. On 1st November 2019, it was confirmed that our Plan must provide a description of how our minimum standard targets and 'headroom' numbers have been developed.

2. Background

Since Ofgem published their sector specific methodology decision (SSMD) we have been working to develop our RIIO-2 annual targets against the proposed interruptions measure. In doing this we have identified some challenges with the measure which would have been difficult for Ofgem to identify when reviewing a larger data set (i.e. all GDNs).

Subsequently we have also identified two alternative measures that may better measure the customer impact of unplanned gas supply interruptions.

Upon realisation of these challenges and opportunities we engaged Ofgem on potential courses of action. Understandably, Ofgem noted that these have been identified post-SSMD and close to Business Plan submission. We recognise that exploring and engaging on these challenges and opportunities now would be difficult for the sector ahead of Business Plan submission. Ofgem instead proposed that we seek to mitigate the issues through our proposed targets (headroom and major incident impact lines of Business Plan Data Table 5.09) and we intend to continue engaging with them on assessing alternative options ahead of draft determinations.

As such, we have submitted targets that comply with the measure proposed in the SSMD and this document explains how we have mitigated the challenges we have identified.

We have also set out descriptions of the alternative approaches that we have identified in Annex 2 of this document. We are committed to working with Ofgem and other stakeholders to explore and develop these measures ahead of draft determinations.

3. RIIO-2 sector specific methodology decision (SSMD) on unplanned interruptions

The SSMD document sets out a decision to introduce a penalty only output delivery incentive on unplanned interruptions. For London it is proposed to have a penalty-only ODI that relates to multiple occupancy building unplanned interruptions and a separate penalty-only ODI that relates to other unplanned interruptions. For all other networks it has been decided to have a penalty-only ODI to cover all unplanned interruptions. The SSMD describes the purpose of the incentive as ensuring GDN customers "are protected against any significant deterioration in the length of unplanned interruptions, and that existing performance issues with multiple occupancy buildings are resolved."[6]

[6] RIIO-2 Sector Specific Methodology Decision - Gas, p 30

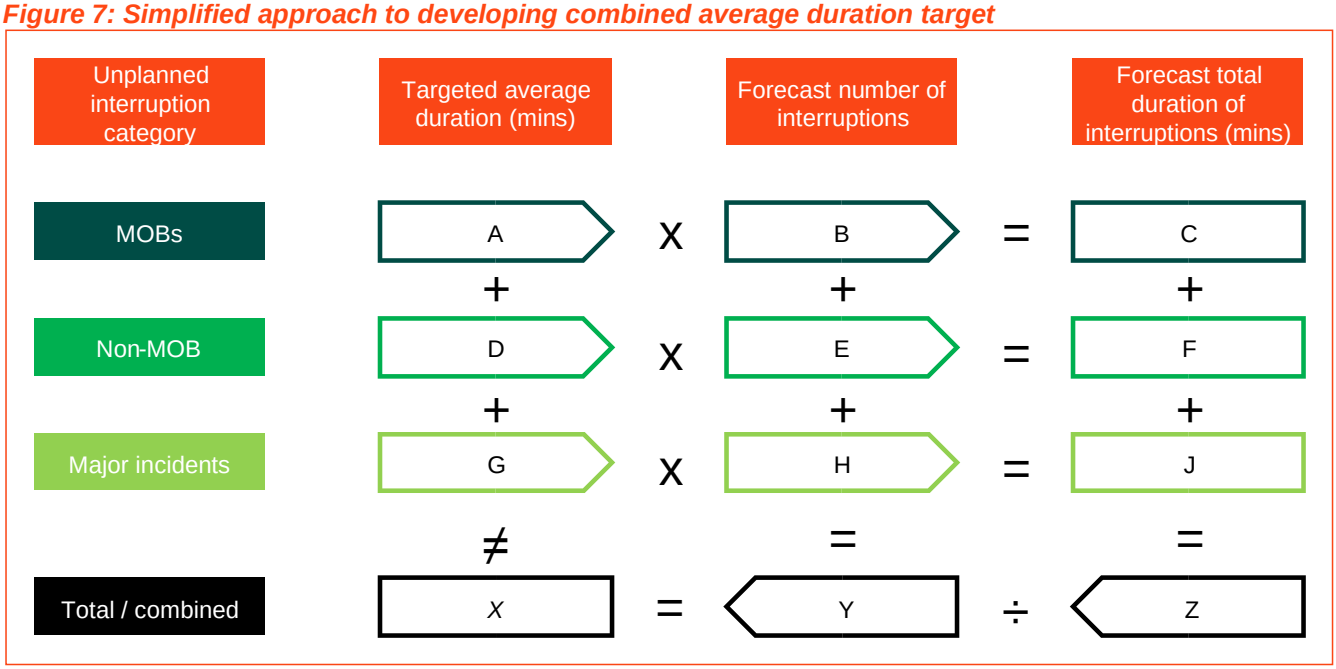
4. Challenges identified post-SSMD relating to the use of a combined unplanned interruptions average duration target

We recognise and support Ofgem's ambition to create an overall measure of GDN unplanned interruptions performance; however, after the publication of the SSMD, whilst developing our targets for RIIO-2, we have identified some challenges relating to the measure. These challenges are likely to impact its effectiveness in assessing GDN performance in this important area for customers.

This section sets out the challenges we have identified and how we propose to mitigate them whilst complying with the SSMD.

To set a combined average duration for MOBs, non-MOBs and major incident unplanned interruptions we must first look at them individually. Once forecast average durations are set for each of MOBs, non-MOBs and major incident unplanned interruptions then they can be applied to the forecast number of interruptions for each of them to calculate a total duration of interruptions. This can then be divided by the total number of interruptions to provide a combined average duration. A simplified example of this is shown below.

Figure 7: Simplified approach to developing combined average duration target



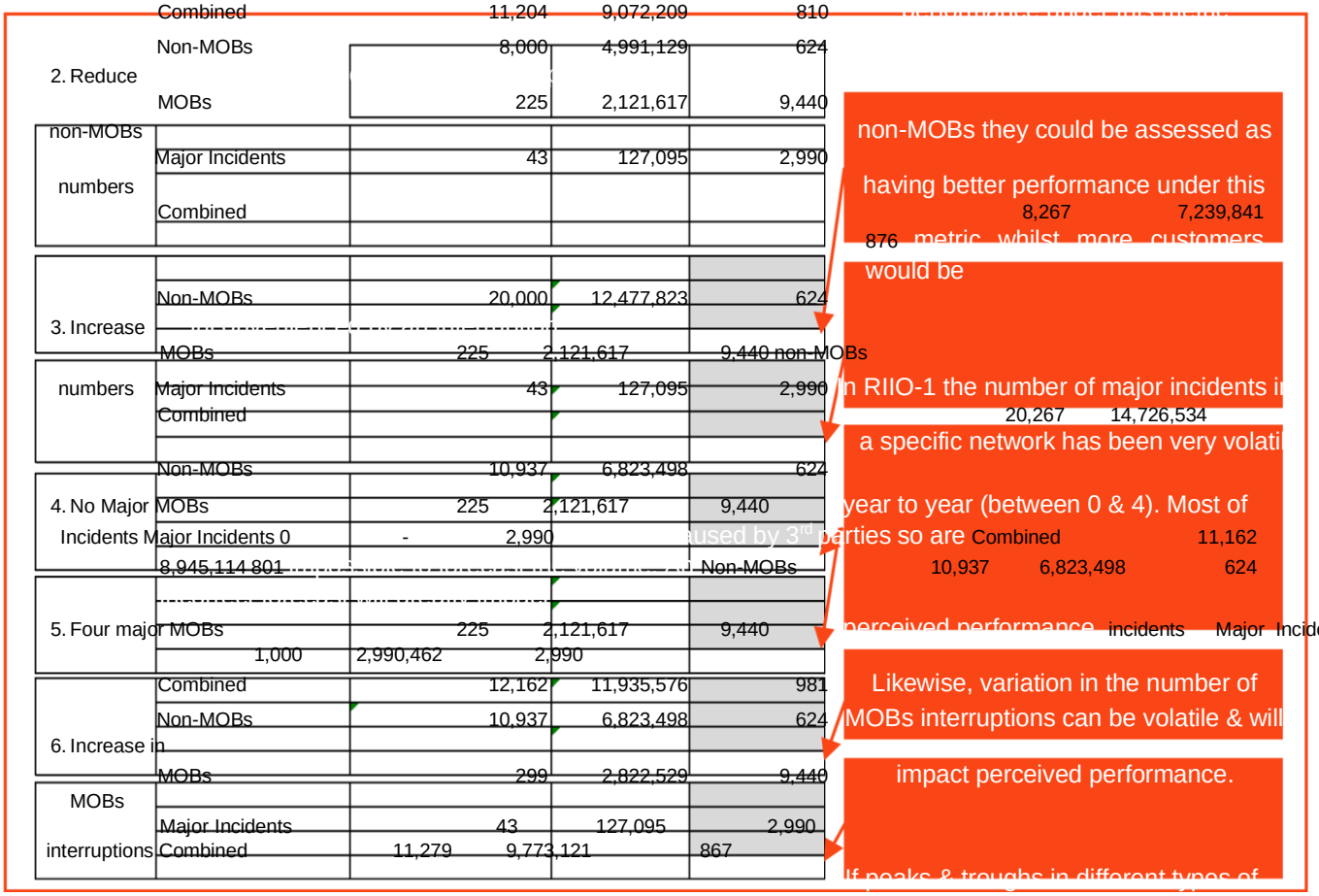
The major challenge with this measure arises from setting a fixed combined average duration based on the assumed forecast split in interruption volumes between MOBs, non-MOBs and major incidents. Even if the individual average durations remained the same for each of MOBs, non-MOBs and major incidents but the split between them in volumes differed from that forecast it would impact perceived performance.

For example, if a GDN innovated or invested to find a way to half the number of non-MOB interruptions experienced on their network it would make their performance against this measure look worse even though the avoidance of the interruptions would provide a positive customer outcome. Conversely, if the actual number of non-MOB interruptions was higher than forecast it would make a GDNs performance against this measure look better.

For the purposes of this document we have referred to this movement in interruptions volumes between forecast and actual and the portion made up by the different categories (MOBs, non-MOBs and major incidents) as

intercategory volume volatility. The diagram below shows some worked examples of the impact of inter-category volume volatility on perceived combined average duration performance.

Figure 8: Demonstration of the impact of inter-category volume volatility on combined unplanned interruption average duration performance



In summary, under this measure if a GDNs numbers of non-MOBs unplanned interruptions is higher than forecast or either of their MOBs or major incident unplanned interruptions numbers are lower than forecast then their performance will look better even if the average duration within each category is as forecast (or potentially worse).

Likewise, if a GDNs numbers of non-MOBs unplanned interruptions are lower than forecast or either of their MOBs or major incident unplanned interruptions numbers are higher than forecast then their performance will look worse and they could face a penalty under the incentive.

When we have discussed this challenge with Ofgem they have advised that we should account for, and explain / justify our approach to mitigating, this volatility risk in our minimum standard targets.

The following sections of this annex will provide more detail on how we have set our average duration targets but in summary we have:

Output	Approach
Unplanned interruptions – minimum standard for EoE, NW and WM	• Developed minimum standard average durations for MOBs, nonMOBs and major incident unplanned interruptions in each network based on a combination of our and other networks' historic data. • Included the lowest plausible volume of non-MOB unplanned interruptions.
	Included the highest plausible volume of MOB and major incident unplanned interruptions. We have needed to take this approach to forecasting volumes to mitigate the inter-category volume volatility issues associated with the proposed measure.
Unplanned interruptions – minimum standard for Lon	Developed minimum standard average durations for MOBs, nonMOBs and major incident unplanned interruptions. Included our best forecast of MOBs unplanned interruptions volumes. Included the lowest plausible volume of non-MOB unplanned interruptions. Included the highest plausible volume of major incident unplanned interruptions. We have needed to take this approach to forecasting non-MOBs and major incident volumes to mitigate the inter-category volume volatility issues associated with the proposed measure.
Unplanned interruptions – reputational targets for EoE, NW and WM	Developed target average durations for MOBs and non-MOBs unplanned interruptions based on improving the customer experience delivered in each network in RIIO-1 (or maintaining where already optimised). Developed target average durations for major incident unpanned interruptions based on a combination of our and other networks' historic data. Included our best forecast of MOBs and non-MOBs unplanned interruptions volumes – based on historic data, operational improvement and our investment programme.

	▯ Included no major incident unplanned interruptions. Thus essentially have created a combined non-MOBs and MOBs likely average duration.
Unplanned interruptions – reputational targets for Lon	▯ Proposed target average durations for non-MOBs unplanned interruptions based on improving the customer experience delivered in RIIO-1. ▯ Proposed target average durations for MOBs unplanned interruptions based on significantly improving the customer experience delivered in years 17/18 and 18/19 of RIIO-1; returning to performance levels seen in 15/16. ▯ Developed target average durations for major incident unpanned interruptions based on a combination of our and other networks' historic data. ▯ Included our best forecast of MOBs and non-MOBs unplanned interruptions volumes – based on historic data, operational improvement and our investment programme. ▯ Included no major incident unplanned interruptions. Thus essentially have created separate non-MOBs and MOBs likely average durations.

The minimum standard targets for non-MOBs, MOBs and major incidents at least meet, and in some cases exceed the objective of ensuring no significant deterioration from performance seen in RIIO-1.

Our minimum standard targets for London MOBs also address the performance issues tackled by Ofgem in RIIO-1 and are aligned to our RIIO-1 improvement plan commitments. They commit us to penalties for any performance worse that that seen in the year 2016/17 which is almost 40% better than the average durations seen in 2017/18 and 2018/19.

5. Data used to develop our unplanned interruption average duration targets

We have used interruptions data submitted by all GDNs through the RRP process to develop our targets. This data is included at the end of this document.

For multiple-occupancy building ('MOB') and standard ('non-MOB') interruptions we have used RRP data from the four years 2015/16 to 2018/19.

For major incident interruptions we have used RRP data from the six years 2013/14 to 2018/19.

We have taken this approach because unplanned interruptions data relating to MOBs began to be separated out in 2015/16, whilst major incident interruptions have been reported on a consistent basis throughout RIIO-1.

There is currently inconsistency in reporting across GDNs which means performance is not comparable. As such, there is a need for Ofgem to work with GDNs to understand the inconsistencies and work to ensure consistency in RIIO-2. To support this, and as stated in our 2018/19 RRP, we are currently undertaking a review of our historic data. This review will be completed ahead of submitting our 2019/20 RRP.

6. Setting minimum standards

This section sets out how we have calculated our RIIO-2 minimum standard combined average durations. It includes how we have arrived at disaggregated minimum standard average durations and how we have used historical actual and forecast volumes of interruptions to calculate the combined average duration minimum standards.

Average durations by category

The tables below set out how we have used our and other networks' historic interruptions RRP data to calculate disaggregated minimum standard average durations for RIIO-2.

Figure 9: Approach to setting non-MOB minimum standard average durations

Network	Approach to set non-MOB minimum standard average duration
East of England	Target is weighted 50/50 between EoE historic data and other networks historic data. For EoE we have used the slowest annual mean duration seen in the period 15/16 to 18/19. [This is 664 minutes in year 16/17] For all other networks we have used the lower quartile of their averages for the period 15/16 to 18/19 [This is 703 minutes] **This calculates as 684 minutes**. This meets the objective of no significant deterioration in performance from RIIO-1 levels.
London	Target is weighted 50/50 between Lon historic data and other networks historic data. For Lon we have used the slowest annual mean duration seen in the period 15/16 to 18/19. [This is 817 minutes in year 18/19] For all other networks we have used the lower quartile of their averages for the period 15/16 to 18/19 [This is 672 minutes] **This calculates as 744 minutes**. This sets minimum standards above the performance seen in RIIO-1, so exceeds the objective of no significant deterioration in performance from RIIO-1 levels.
North West	Target is weighted 50/50 between NW historic data and other networks historic data. For NW we have used the slowest annual mean duration seen in the period 15/16 to 18/19. [This is 769 minutes in year 16/17]
	For all other networks we have used the lower quartile of their averages for the period 15/16 to 18/19 [This is 703 minutes] **This calculates as 736 minutes.** This sets minimum standards above the performance seen in RIIO-1, so exceeds the objective of no significant deterioration in performance from RIIO-1 levels.
West Midlands	Target is weighted 50/50 between WM historic data and other networks historic data. For WM we have used the slowest annual mean duration seen in the period 15/16 to 18/19. [This is 585 minutes in year 16/17] For all other networks we have used the lower quartile of their averages for the period 15/16 to 18/19 [This is 703 minutes] **This calculates as 644 minutes**. This meets the objective of no significant deterioration in performance from RIIO-1 levels.

Figure 10: Approach to setting MOB minimum standard average durations

Network	Approach to set MOB minimum standard average duration

East of England	Target is weighted 100% to EoE historic data. We have taken this approach as MOBs population varies greatly by network. MOBs reporting has also been inconsistent across companies in RIIO-1 with other GDNs 'stopping the clock'. We have used the slowest EoE annual average (mean) in the period 15/16 to 18/19. **This is 25,937 minutes** in 17/18. This exceeds the objective of no significant deterioration in performance from RIIO-1 as it does not allow any deterioration without penalty.
London	Target is weighted 100% to Lon historic data. We have taken this approach as MOBs population varies greatly by network. MOBs reporting has also been inconsistent across companies in RIIO-1 with other GDNs 'stopping the clock' We have used the second fastest Lon annual average (mean) in the period 15/16 to 18/19. **This is 36,078 minutes** in 16/17. This meets Ofgem's objective of addressing MOBs performance issues seen in RIIO-1 and is aligned to our RIIO-1 performance improvement plan.
North West	Target is weighted 100% to NW historic data. We have taken this approach as MOBs population varies greatly by network. MOBs reporting has also been inconsistent across companies in RIIO-1 with other GDNs 'stopping the clock'. We have used the slowest NW annual average (mean) in the period 15/16 to 18/19. **This is 17,906 minutes** in 18/19. This exceeds the objective of no significant deterioration in performance from RIIO-1 as it does not allow any deterioration without penalty.
West Midlands	Target is weighted 100% to WM historic data. We have taken this approach as MOBs population varies greatly by network. MOBs reporting has also been inconsistent across companies in RIIO-1 with other GDNs 'stopping the clock'. We looked to use the slowest WM annual average (mean) in the period 15/16 to 18/19. This is 36,172 minutes in 17/18. However, this is longer that the minimum standard set for London, so we have adjusted it down to **36,078 minutes**. This exceeds the objective of no significant deterioration in performance from RIIO-1 as it does not allow any deterioration without penalty.

Figure 11: Approach to setting major incident minimum standard average durations

Network	Approach to set major incident minimum standard average duration
East of England	As major incidents are unpredictable and are predominantly caused by third actions we have taken the same approach across all of our networks. We have used the slowest average (mean) duration seen across any GDNs major incidents in RIIO-1 to date. This is **7,212 minutes**. This occurred in SGN's Southern network in 2018/19 during a major incident in Sidcup.
London	
North West	

West Midlands	Incidents can be very different and their low volume / high impact nature means that for the purposes of them being included in the unplanned interruptions target the worst case must be assumed. Typical sources are: third party damage, water ingress and asset failure. In the case of water ingress particularly, the level of work required before customers can be reconnected safely can be very considerable. With an increasingly plastic network, water ingress is more likely due to the propensity for burst water mains to cause damage and ingress.

Interruptions volumes

As the measure set out in the SSMD requires GDNs to propose a combined average duration we need to weight the disaggregated average durations we have created for non-MOBs, MOBs and major incident unplanned interruptions.

To do this we need to use forecasts of numbers of interruptions. Due to the impact of setting a fixed minimum standard in advance of the price control and the potential for inter-category volume volatility during the price control period we need to use:

- The lowest plausible volume of non-MOB interruptions;
- The highest plausible volume of MOB interruptions (except in London); and The highest plausible volume of major incident interruptions.

The three tables below show RIIO-1 actuals[7] and our best forecasts[8] of RIIO-2 interruptions numbers for nonMOBs, MOBs and major incidents. The figures in green are the numbers of unplanned interruptions, by category, that we propose to use to create a weighted combined minimum standard average duration.

[7] Years 15/16 to 18/19 for non-MOBs and MOBs and 13/14 to 18/19 for major incidents
[8] From our October Plan. This is still to be updated for our December Plan once all of Totex has been finalised.

Table

17: Our non-MOBs RIIO-1 actual and RIIO-2 forecast of unplanned interruptions

	Number of non-MOB unplanned interruptions								
	RIIO-1 Actuals				RIIO-2 Forecast				
Network	15/16	16/17	17/18	18/19	21/22	22/23	23/24	24/25	25/26
EoE	13,198	11,022	11,499	11,752	11,189	10,928	10,659	10,326	**10,027**
Lon	10,732	8,918	8,573	8,773	8,487	8,284	8,082	7,856	**7,644**
NW	12,753	10,170	10,987	9,838	10,218	9,968	9,712	9,409	**9,141**
WM	8,236	6,253	5,938	6,013	5,891	5,746	5,596	5,414	**5,254**

As a bespoke disaggregated measure in proposed for MOBs in London we do not need to mitigate for intercategory volume volatility. As such, the best forecast of unplanned interruptions can be used.

Table 18: MOBs RIIO-1 actual and RIIO-2 forecast of unplanned interruptions

	Number of MOB unplanned interruptions								
	RIIO-1 Actuals				RIIO-2 Forecast				
Network	15/16	16/17	17/18	18/19	21/22	22/23	23/24	24/25	25/26
EoE	253	152	**264**	195	212	207	203	199	195
Lon	1,929	1,580	1,848	1,943	**1,219**	**1,195**	**1,171**	**1,147**	**1,125**
NW	134	178	**299**	288	220	216	212	207	203
WM	102	135	**151**	125	126	123	121	118	116

As major incidents are rare, in comparison to other interruptions, we have used historic data from across all eight GDNs. Two separate networks, EoE and SGN-So, have experienced four major incidents in a single year during RIIO-1. As such, we have used this as the basis for our minimum standard calculations.

The SSMD sets out a proposal to standardise major incidents. For the purposes of calculating measured performance against the overall average unplanned restoration time targets, each major incident will be treated as though it consisted of 250 individual interruptions.

We have used this approach in stating historic ‘actuals’ and our forecasts. (i.e. four major incidents equals 1,000 interruptions).

19: Major incident RIIO-1 actual and RIIO-2 forecast of unplanned interruptions

Table

Network	Number of standardised[9] major incident unplanned interruptions										
	RIIO-1 Actuals						RIIO-2 Forecast				
	13/14	14/15	15/16	16/17	17/18	18/19	21/22	22/23	23/24	24/25	25/26
EoE	250	250	250	750	250	**1,000**	-	-	-	-	-
Lon	-	-	-	-	-	-	-	-	-	-	-
NW	-	250	-	-	-	-	-	-	-	-	-
WM	-	-	-	-	-	-	-	-	-	-	-
NGN	-	-	750	250	500	750					
Sc	250	-	250	750	500	-					
So	500	500	250	**1,000**	-	500					
WWU	-	500	750	500	250	-					

The following three tables summarise the numbers of unplanned interruptions we have used, by category, to calculate our minimum standard average durations.

Table 20: Number of non-MOB interruptions used to calculate our RIIO-2 minimum standard average durations

Network	RIIO-2 minimum standard number of non-MOB interruptions					
	21/22	22/23	23/24	24/25	25/26	Total
EoE	10,027	10,027	10,027	10,027	10,027	50,135
Lon	7,644	7,644	7,644	7,644	7,644	38,220
NW	9,141	9,141	9,141	9,141	9,141	45,705
WM	5,254	5,254	5,254	5,254	5,254	26,270

[9] Standardised as described in Ofgem SSMD

Table 21: Number of MOB interruptions used to calculate our RIIO-2 minimum standard average durations

Network	RIIO-2 minimum standard number of MOB interruptions					
	21/22	22/23	23/24	24/25	25/26	Total
EoE	264	264	264	264	264	1,320
Lon	1,219	1,195	1,171	1,147	1,125	5,857
NW	299	299	299	299	299	1,495
WM	151	151	151	151	151	755

Table 22: Number of standardised major incident interruptions used to calculate our RIIO-2 minimum standard average durations

Network	RIIO-2 minimum standard number of standardised major incident interruptions					
	21/22	22/23	23/24	24/25	25/26	Total
EoE	1,000	1,000	1,000	1,000	1,000	5,000
Lon	1,000	1,000	1,000	1,000	1,000	5,000
NW	1,000	1,000	1,000	1,000	1,000	5,000
WM	1,000	1,000	1,000	1,000	1,000	5,000

Combined average duration

Now that we have disaggregated minimum standard unplanned interruptions average durations for non-MOBs, MOBs and major incidents along with forecasts for the number of interruptions in each category (which mitigate the inter-category volume volatility issues identified with the proposed measure) we can now calculate the minimum standard combined average durations for each network. The table below summarises these RIIO-2 targets.

Table

23: Our RIIO-2 unplanned interruption minimum standard financial ODI average duration targets

Network	Measure	Unplanned interruption minimum standard average duration targets (minutes)				
		21/22	22/23	23/24	24/25	25/26
EoE	Non-MOB, MOB & major incident combined	1,852	1,852	1,852	1,852	1,852
NW		1,848	1,848	1,848	1,848	1,848
WM		2,505	2,505	2,505	2,505	2,505
Lon	MOB	36,078	36,078	36,078	36,078	36,078
	Non-MOB & major incident combined	1,493	1,493	1,493	1,493	1,493

7. Our targeted likely performance (reputational ODI)

This section sets out how we have calculated our targeted likely average durations for unplanned interruptions. It includes how we have arrived at disaggregated target likely average durations and how we have used forecast volumes of interruptions to calculate the implied combined targets.

Average durations by category

The tables below set out how we have targeted our proposed performance for RIIO-2 across non-MOB, MOB and major incident unplanned interruptions.

As discussed earlier in this output case, our customers have indicated that they are not willing to pay for the iterative performance improvements in non-MOB interruption durations that we have identified as possible. However, we have still set each of our networks targets to improve performance without requiring any additional expenditure.

Figure 12: Approach to setting our RIIO-2 non-MOBs reputational ODI average durations

Network	Approach to set non-MOB reputational ODI average durations
East of England	By the end of RIIO-2 we are targeting a **10% improvement** on the average performance delivered in the four years 15/16 to 18/19. **This is 471 minutes in 2025/26.**
London	By the end of RIIO_2 we are targeting a **10% improvement** on the average performance delivered in the four years 15/16 to 18/19. **This is 618 minutes in 2025/26.**
North West	By the end of RIIO-2 we are targeting a **10% improvement** on the average performance delivered in the four years 15/16 to 18/19. **This is 562 minutes in 2025/26.**
West Midlands	By the end of RIIO-2 we are targeting a **10% improvement** on the average performance delivered in the four years 15/16 to 18/19. **This is 481 minutes in 2025/26.**

Table

We recognise that our unplanned interruptions performance for London customers living in MOBs has not been at an acceptable level. We have agreed a performance improvement plan with Ofgem and our unplanned interruptions targets for these customers for RIIO-2 are aligned to, and build on, this Plan.

We believe that by sharing learning from our London network we will also be able to deliver a 10% improvement in performance in our East of England and West Midlands networks over the course of RIIO-2 at no additional cost to customers.

The average unplanned interruption duration experienced by a MOBs customer in the North West is significantly shorter than in our other networks. This relates to the MOBs asset base in North West, which is predominantly medium rise buildings which, in general, take less time to restore supplies in compared to high rise buildings. However, when a high-rise building does experience an unplanned interruption it can significantly impact North West's performance, as seen in 2018/19 where the average duration was almost 18,000 minutes compared to the 9,440 proposed for RIIO-2. As such, we are committed to maintaining this level of performance during RIIO2.

Figure 13: Approach to setting our RIIO-2 MOBs reputational ODI average durations

Network	Approach to set MOB reputational ODI average durations
East of England	By the end of RIIO-2 we are targeting a **10% improvement** on the average performance delivered in the four years 15/16 to 18/19. **This is 19,385 minutes in 2025/26.**
London	We are committed to returning to the best average (mean) delivered in the four-year period 15/16 to 18/19. Which was 15/16 at **32,302 minutes**. This is a c. 40% reduction from 18/19 and c. 45% reduction from 17/18. We will then improve our performance by 1% year on year through RIIO-2 down to **31,028 minutes in 2025/26**.
North West	We are targeting to **maintain** the average performance delivered in the four years 15/16 to 18/19. **This is 9,440 minutes**.
West Midlands	By the end of RIIO-2 we are targeting a **10% improvement** on the average performance delivered in the four years 15/16 to 18/19. **This is 16,400 minutes in 2025/26.**

As major incidents are rare, in comparison to other interruptions, we have used historic data from across all eight GDNs. As they are unpredictable and are predominantly caused by third party actions we have taken the same approach across all of our networks.

Figure 14: Approach to setting our RIIO-2 major incidents reputational ODI average durations

Network	Approach to set major incident reputational ODI average durations
East of England	If we were to include volumes of major incidents within our likely targets then we would use the average (mean) of all major incidents across all GDNs in RIIO-1 to date (13/14 to 18/19). **Which is 3,555 minutes.**
London	
North West	
West Midlands	

All of these reputational ODI average durations are shown in the tables below.

Table 24: Our RIIO-2 non-MOBs unplanned interruption reputational ODI average duration targets

Network	Non-MOBs unplanned interruption reputational ODI average duration targets (minutes)				
	21/22	22/23	23/24	24/25	25/26
EoE	513	503	492	482	471
Lon	673	660	646	632	618
NW	611	599	586	574	562
WM	523	513	502	491	481

Table 25: Our RIIO-2 MOBs unplanned interruption reputational ODI average duration targets

Network	MOBs unplanned interruption reputational ODI average duration targets (minutes)				
	21/22	22/23	23/24	24/25	25/26
EoE	21,109	20,678	20,247	19,816	19,385
Lon	32,302	31,979	31,659	31,343	31,029
NW	9,440	9,440	9,440	9,440	9,440
WM	17,858	17,494	17,129	16,765	16,400

Table 26: Our RIIO-2 major incidents unplanned interruption reputational ODI average duration targets

Network	Major incident unplanned interruption reputational ODI average duration targets (minutes)				
	21/22	22/23	23/24	24/25	25/26
EoE	3,555	3,555	3,555	3,555	3,555
Lon	3,555	3,555	3,555	3,555	3,555
NW	3,555	3,555	3,555	3,555	3,555
WM	3,555	3,555	3,555	3,555	3,555

Interruptions volumes

Whilst the issues with inter-category volume volatility are still present in developing our targeted likely average durations we have chosen not to mitigate them by assessing the full range of plausible interruptions volumes. We will instead use our best forecast of interruptions volumes, these are shown below.

Table 27: Our RIIO-2 non-MOBs forecast number of unplanned interruptions

Network	Reputational forecast number of non-MOBs unplanned interruptions				
	21/22	22/23	23/24	24/25	25/26
EoE	11,189	10,928	10,659	10,326	10,027
Lon	8,487	8,284	8,082	7,856	7,644
NW	10,218	9,968	9,712	9,409	9,141
WM	5,891	5,746	5,596	5,414	5,254

Table 28: Our RIIO-2 MOBs forecast number of unplanned interruptions

Network	Reputational forecast number of MOBs unplanned interruptions				
	21/22	22/23	23/24	24/25	25/26
EoE	212	207	203	199	195
Lon	1,219	1,195	1,171	1,147	1,125
NW	220	216	212	207	203
WM	126	123	121	118	116

As major incident unplanned interruptions are rare, unpredictable and predominantly caused by third party actions we have made the decision not to forecast how many we will experience during RIIO-2 and to recognise that our target is zero.

Combined average duration

Now that we have disaggregated minimum standard unplanned interruptions average durations for non-MOBs, MOBs and major incidents along with forecasts for the number of interruptions in each category we can now calculate the targeted likely combined average durations for each network. The table below summarises these RIIO-2 targets.

Table 29: Our implied combined average duration targets based on our disaggregated reputational ODI average durations

Network	Measure	Unplanned interruption implied combined average duration targets based on disaggregated reputational ODI average durations (minutes)				
		21/22	22/23	23/24	24/25	25/26
EoE	Non-MOB & MOB combined	896	878	862	847	832
NW		797	786	776	765	754
WM		886	869	854	838	825

	MOB	32,302	31,979	31,659	31,343	31,029
Lon	Non-MOB	673	660	646	632	618

8. Implied 'headroom'

In Ofgem's final RIIO-2 Business Plan Data Template (BPDT) instructions and guidance they direct that in data table 5.09 (Reliability) GDNs should "enter the headroom between the sum of forecast average duration plus major incident impact, and the minimum performance level target." **Approach taken**

Data table 5.09 calculates and auto-populates the unplanned interruptions average duration using the input interruptions numbers and total duration. It also calculates and auto-populates the major incident impact using the unplanned interruptions and major incident volumes and total durations that have been input.

The data table calculates the TOTAL (minimum standard) figure by summing the unplanned interruption, headroom and major incident impact average durations. As we have already calculated our combined minimum standards, see section 6 of this annex, but do not know the headroom figure we can subtract the unplanned interruptions and major incident impact numbers from our minimum standard.

Table 30: East of England BPDT 5.09, Ofgem approach to calculating headroom

East of England	Unplanned interruption average durations for BPDT 5.09 (mins)				
	21/22	22/23	23/24	24/25	25/26
Unplanned interruptions	896	878	862	847	832
Headroom	447	453	456	453	452
Major incident impact	509	522	535	552	568
TOTAL (minimum standard)	1,852	1,852	1,852	1,852	1,852

Table 31: London MOBs BPDT 5.09, Ofgem approach to calculating headroom

London MOBs	Unplanned interruption average durations for BPDT 5.09 (mins)				
	21/22	22/23	23/24	24/25	25/26
Unplanned interruptions	32,302	31,979	31,659	31,343	31,029
Headroom	3,776	4,099	4,419	4,735	5,049
TOTAL (minimum standard)	36,078	36,078	36,078	36,078	36,078

Table 32: London non-MOBs & major incidents BPDT 5.09, Ofgem approach to calculating headroom

London non-MOBs & major incidents	Unplanned interruption average durations for BPDT 5.09 (mins)				
	21/22	22/23	23/24	24/25	25/26
Unplanned interruptions	673	660	646	632	618
Headroom	130	127	124	117	111
Major incident impact	689	706	723	743	763
TOTAL (minimum standard)	1,493	1,493	1,493	1,493	1,493

Table 33: North West BPDT 5.09, Ofgem approach to calculating headroom

North West	Unplanned interruption average durations for BPDT 5.09 (mins)				
	21/22	22/23	23/24	24/25	25/26
Unplanned interruptions	797	786	776	765	754
Headroom	490	487	483	476	470
Major incident impact	561	575	589	607	624
TOTAL (minimum standard)	1,848	1,848	1,848	1,848	1,848

Table 34: West Midlands BPDT 5.09, Ofgem approach to calculating headroom

West Midlands	Unplanned interruption average durations for BPDT 5.09 (mins)				
	21/22	22/23	23/24	24/25	25/26
Unplanned interruptions	886	869	854	838	825
Headroom	717	713	705	691	678
Major incident impact	901	923	947	976	1,003
TOTAL (minimum standard)	2,505	2,505	2,505	2,505	2,505

Alternate approach to calculating headroom

The tables below show an alternate, more simple, approach to calculating the headroom by calculating the total minimum standard and then subtracting the likely forecast from this.

Table 35: East of England, simple approach to calculating implied headroom

East of England	Unplanned interruption average durations (mi ıs)				
	21/22	22/23	23/24	24/25	25/26
Minimum standard	1,852	1,852	1,852	1,852	1,852
Implied combined reputational target	896	878	862	847	832
Implied headroom	956	975	991	1,005	1,020

Table 36: London MOBs, simple approach to calculating implied headroom

London MOBs	Unplanned interruption average durations (mins)				
	21/22	22/23	23/24	24/25	25/26
Minimum standard	36,078	36,078	36,078	36,078	36,078

Implied combined reputational target	32,302	31,979	31,659	31,343	31,029
Implied headroom	3,776	4,099	4,419	4,735	5,049

Table 37: London non-MOBs & major incidents, simple approach to calculating implied headroom

London non-MOBs & major incidents	Unplanned interruption average durations (mi ıs)				
	21/22	22/23	23/24	24/25	25/26
Minimum standard	1,493	1,493	1,493	1,493	1,493
Implied combined Reputational target	673	660	646	632	618
Implied headroom	819	833	847	860	874

Table 38: North West, simple approach to calculating implied headroom

North West	Unplanned interruption average durations (mi ıs)				
	21/22	22/23	23/24	24/25	25/26
Minimum standard	1,848	1,848	1,848	1,848	1,848
Implied combined Reputational target	797	786	776	765	754
Implied headroom	1,051	1,062	1,073	1,083	1,094

Table 39: West Midlands, simple approach to calculating implied headroom

West Midlands	Unplanned interruption average durations for BPDT 5.09 (mins)				
	21/22	22/23	23/24	24/25	25/26
Minimum standard	2,505	2,505	2,505	2,505	2,505
Implied combined Reputational target	886	869	854	838	825
Implied headroom	1,619	1,636	1,651	1,667	1,680

9. Impact of consistency of interruptions RRP data between GDNs on setting and comparing RIIO-2 targets

A challenge facing Ofgem and GDNs in setting and comparing RIIO-2 unplanned interruptions average duration performance across networks is the consistency of data between companies.

An example being the scale of use of clock stopping during interruptions where an element of the interruption period is outside of the companies control or at the request of the customers.

We know that other companies have used clock stopping on MOB unplanned interruptions where they have been waiting for permissions to work and on non-MOB interruptions where a customer has requested that the repair work be undertaken the following day rather than late in to the evening.

We have not stopped the clock for these reasons in RIIO-1 which makes it difficult to compare our RIIO-1 performance and RIIO-2 targets to other companies'.

It will be important that we work with Ofgem and other stakeholders ahead of draft determinations to understand the differences in measurement and reporting between GDNs on unplanned interruptions. Once these differences are clarified it will enable a more effective understanding on the performance delivered for customers during RIIO-1.

It will then be important to reconcile these challenges to enable the setting of unplanned interruptions standards for gas customers across Great Britain in RIIO-2.

10. Stopping the clock for periods of interruptions outside of GDN control

In order to provide more consistency between companies reporting of unplanned interruptions durations we are proposing to stop the clock in a number of situations for the remainder of RIIO-1. However, our supporting narrative will also include the durations without stopping the clock (consistent with our approach in years one to six of RIIO-1).

Based on this data we intend to work with Ofgem to restate our RIIO-2 targets on the basis of clock stopping so that they are more comparable to other companies.

8. Annex 2: Alternative approaches to measuring unplanned interruptions performance

1. Introduction

As detailed in the attached output case, we have identified two alternative approaches to measuring unplanned interruption performance. The first is a build on Ofgem's proposal and would set disaggregated average duration targets for non-MOBs, MOBs and major incidents to mitigate any inter-category volume volatility. The second is a build on the Interruptions Incentive Scheme (IIS) used in RIIO-ED1.

This section provides some information about how these alternatives could be implemented. We are committed to continuing to work with Ofgem and other stakeholders through to final determinations to identify the most effective way of measuring unplanned interruptions performance in RIIO-2.

2. Disaggregated average duration targets

Setting fixed disaggregated average duration targets and using actual interruptions volumes

In this approach we would commit to fixed annual targets for likely performance and a fixed minimum standard average duration for non-MOBs, MOBs and major incidents.

If it was desirable to still present a combined average, then an indicative one could be established in advance of the control using forecast numbers of interruptions.

We could then report our actual number of interruptions annually in our RRP submission. These actual volumes could be applied to the fixed disaggregated average duration targets to create the combined targets (likely and minimum standard). The actual duration of interruptions would also be submitted through the RRP process and these would be used with the actual volumes to calculate the actual performance. This can then be compared to the targets.

An example of what this could like is shown below. As can be seen, the indicative combined minimum standard is over eleven hours lower in 2025/26 than we have currently proposed (1,166 minutes compared to 1,852 minutes). This is due to us not needing to mitigate the potential impact of inter-category volume volatility on the downside-only incentive, including no need to factor in major incident volumes. This also reiterates how changing volume splits between categories greatly impacts the combined duration – as the disaggregated minimum standard average durations are the same in both cases.

Table 40: East of England 2025/26 example targets when using fixed disaggregated average duration targets

East of England	SSMD approach		Disaggregated approach	
	Number of interruptions	Average duration	Numbers of interruptions	Average duration
Non-MOBs	10,027	684	10,027	684
MOBs	264	25,937	195	25,937
Major Incidents	1,000	7,212	-	7,212
Combined / Total	11,291	1,852	10,222	1,166

Key:

Fixed minimum standard
Indicative minimum standard

Whilst this approach would mitigate some of the issues with the SSMD proposal, it still does not fully recognise the customer value of avoiding interruptions altogether. As such, it would provide a disincentive to avoid shorter interruptions within each category. For example, a GDN could identify a key root cause of many shorter interruptions and find a solution that would avoid them. However, if they delivered this solution and avoided the shorter interruptions their average duration would increase and this would be perceived as poor performance which could potentially be penalised under a penalty-only incentive.

3. Measuring likelihood of unplanned interruption as well as average duration

This approach seeks to recognise the customer value of avoiding interruptions, or reducing the likelihood of experiencing one, alongside the customer benefits of reducing the duration of any interruptions that do occur.

Evolving the Interruptions Incentive Scheme (IIS)

In RIIO-ED1 the DNOs have an interruptions measure, the Interruptions Incentive Scheme (IIS), which measures the number of customer interruptions per 100 customers and the average length of time per interruption. A snapshot from Ofgem's 2017/18 RIIO-ED1 annual report is shown below.

Figure 15: Interruptions Incentive Scheme performance report from Ofgem RIIO-ED1 2017/18 annual report

Table A2.1: Interruptions Incentive Scheme performance, 2017-18

	Customer Interruptions (CIs)[1]	Customer Minutes Lost (CMLs)[2]		Customer Interruptions (CIs)[1]	Customer Minutes Lost (CMLs)[2]
ENWL	33.23	34.63	LPN	14.22	16.74
NPgN	51.82	44.63	SPN	46.69	37.57
NPgY	48.13	36.40	EPN	48.52	41.79
WMID	55.64	31.02	SPD	41.31	31.19
EMID	46.94	24.07	SPMW	30.50	32.99
SWALES	48.47	28.41	SSEH	57.35	55.24
SWEST	62.04	42.78	SSES	55.13	47.56

1. CIs are the number of customer interruptions per 100 customers on the network.
2. CMLs are the average length of time customers are without power per interruption.

This measure could be focussed solely on unplanned interruptions, evolved and applied to gas distribution networks. This potential evolution could involve multiplying CI by CML to give an overall customer interruptions impact metric. This would recognise that both removing interruptions altogether and reducing the duration of interruptions will improve the customer experience. This measure would be particularly useful at assessing a networks performance over time.

Figure 16: Customer interruptions impact measure

Customer interruptions impact = Customer interruptions (CI*) X Customer minutes lost (CML**)

** CIs are the number of unplanned customer gas supply interruptions per 100 customers.*
*** CMLs are the average duration per gas supply interruption.*

All elements of this measure could be set at a disaggregated or combined level. The advantage of setting at a combined level would be just having one performance figure per network. However, setting at a disaggregated level would keep focus on the key different types of interruptions (i.e. non-MOBs or MOBs) and on the worst served customers (i.e. those living in multiple occupancy buildings). We would advocate setting at a disaggregated level, however we are committed to exploring this further with Ofgem and other stakeholders.

Further work also needs to be undertaken to explore how to measure unplanned interruptions during major incidents. Applying RIIO-1 performance to this measure shows that the year to year volatility of major incidents make them difficult to include in this approach on an annual basis (they are excluded from IIS in RIIO-ED1 for this reason), although they could be factored in to the minimum standard, although we believe this adds little, if any, value. GDNs already provide detailed major incident reports which Ofgem can use to review the standard of response delivered by the company. We would advocate continuing with this approach.

Customer interruptions (CI)

Interruptions per 100 customers is a better measure than total number of interruptions as it normalises between the different populations seen across GDNs and increases comparability. For example in 2018/19 our East of England network experienced 11,947 unplanned interruptions (excluding major incidents) compared to 6,138 in

our West Midlands network. This appears like customers in East of England are more likely to experience an unplanned interruption than those in West Midlands, however under the CI measure their performance is very similar, as shown in the table below. Once this metric has adjusted for customer populations it supports understanding of, and discussions around, any significant variance in unplanned interruptions between networks.

Table 41: East of England and West Midlands 'CI' performance 2018/19

2018/19 (Combined non-MOB and MOB)	East of England	West Midlands
Number of unplanned interruptions	11,947	6,138
Numbers of customers (end of year)	4,023,899	1,965,207
'CI' (unplanned interruptions per 100 customers)	0.30	0.31

Companies could use their best forecasts of interruptions to propose their likely performance for a reputational ODI. To set the minimum standard for the penalty-only financial ODI they could use the highest number of interruptions seen in a single year during RIIO-1. This would ensure that there was no significant deterioration in performance from RIIO-1.

Customer minutes lost (CML)

We would propose to take the same approach as we have earlier in this document to set disaggregated likely and minimum standard average durations (customer minutes lost) for a reputational ODI and the financial ODI respectively.

Customer impact - multiplying customer interruptions (CI) by customer minutes lost (CML)

To enable one measure that recognises the customer value in reducing the likelihood and / or the duration of an unplanned interruption CI can be multiplied by CML. This could potentially be developed further to recognise the higher value that customers attribute to avoiding interruptions completely. For example, if customers valued avoiding an interruption completely twice as much as they valued reducing the duration the calculation could be (2 x CI) x CML.

A worked example of this measure using dummy data is shown below. For ease we have locked the number of customers across all years. In the example it shows the likelihood of interruption and the average duration falling and this shows a significant positive customer impact.

Table 42: Worked example of CI x CML using dummy data

		RIIO-1 Actual				RIIO-2 Forecast				
Worked example of CI x CML		15/16	16/17	17/18	18/19	21/22	22/23	23/24	24/25	25/26
Customer numbers ('000)		1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
No. of interruptions	Reputational					5,600	5,500	5,400	5,300	5,200
	Min. Std.	6,000	5,950	5,900	5,850	6,000	6,000	6,000	6,000	6,000
Total duration of interruptions ('000 mins)	Reputational					3,210	3,089	2,969	2,852	2,738
	Min. Std.	3,540	3,570	3,363	3,393	3,600	3,600	3,600	3,600	3,600
CI	Reputational	0.40	0.40	0.39	0.39	0.37	0.37	0.36	0.35	0.35

	Min. Std.					0.40	0.40	0.40	0.40	0.40
CML (mins)	Reputational	590	600	570	580	573	562	550	538	527
	Min. Std.					600	600	600	600	600
Impact	Reputational	236	238	224	226	214	206	198	190	183
	Min. Std.					240	240	240	240	240

9. Annex 3: Historic unplanned interruptions performance

Table 43: Non-MOBs RRP unplanned interruptions data (2015/16 - 2018/19)

Number of interruptions					
15/16	16/17	17/18	18/19	Total	Average annual
13,198	11,022	11,499	11,752	47,471	11,868
10,732	8,918	8,573	8,773	36,996	9,249
12,753	10,170	10,987	9,838	43,748	10,937
8,236	6,253	5,938	6,013	26,440	6,610
12,859	12,427	13,714	14,030	53,030	13,258
4,617	4,411	4,288	4,381	17,697	4,424
17,191	16,454	15,420	15,453	64,518	16,130
8,924	8,856	8,013	8,730	34,523	8,631

T	
15/16	16/17
6,283,216	7,321,8
6,277,249	6,429,4
7,051,161	7,820,3
4,305,895	3,658,5
4,400,000	4,800,0
3,135,307	3,530,2
19,685,433	21,450,3
3,850,627	4,317,2

Average duration of interruptions (mins)					
15/16	16/17	17/18	18/19	Average	Average of averages
476	664	483	485	524	527
585	721	647	817	687	692
553	769	568	628	624	630
523	585	493	537	534	534
342	386	411	451	399	398
679	800	584	814	720	719
1,145	1,304	1,412	1,390	1,308	1,313
431	487	443	344	426	426

Table 44: MOBs RRP unplanned interruptions data (2015/16 - 2018/19)

Number of interruptions					
15/16	16/17	17/18	18/19	Total	Average annual
253	152	264	195	864	216
1,929	1,580	1,848	1,943	7,300	1,825
134	178	299	288	899	225
102	135	151	125	513	128
-	-	-	-	-	-
33	34	36	15	118	30
64	83	102	55	304	76
29	5	1	45	80	20

15/16	16/17
4,114,768	2,860,8
62,310,936	57,003,4
766,811	1,495,6
909,727	1,032,0
-	-
13,707	65,3
151,772	324,6
119,460	1,6

Average duration of interruptions (mins)					
15/16	16/17	17/18	18/19	Average	Average of averages
16,264	18,821	25,937	24,549	21,539	21,393
32,302	36,078	60,101	57,593	46,888	46,518
5,722	8,402	3,569	17,906	9,440	8,900
8,919	7,645	36,172	15,555	18,222	17,073
-	-	-	-	-	-
415	1,923	1,853	709	1,326	1,225
2,371	3,911	3,751	2,234	3,230	3,067

4,119	326	240	2,815	3,100	1,875

Table 45: Major incident RRP unplanned interruptions data (2013/14 - 2018/19)

Year	Network	Incident	Number of customers interrupted as a result of the incident	Total interruptions duration in each incident (minutes)	Average (mean) duration
18/19	EoE	Saxilby	1,178	3,714,869	3,154
18/19	EoE	Deanshanger	1,546	4,106,359	2,656
18/19	EoE	Eye	803	2,147,747	2,675
18/19	EoE	Wilstead	911	1,663,163	1,826
18/19	NGN	Silsden	3402	12,665,485	3,723
18/19	NGN	Menston	408	1,105,025	2,708
18/19	NGN	Netherton	767	3,032,935	3,954
18/19	So	Sidcup	1869	13,478,855	7,212
18/19	So	Rye	1222	4,107,070	3,361
17/18	EoE	Rawmarsh	548	2,227,413	4,065
17/18	NGN	Burmantofts	302	1,306,115	4,325
17/18	NGN	Helmsley	463	678,408	1,465
17/18	Sc	Torphichen	295	229,500	778
17/18	Sc	Blairhall	450	349,544	777
17/18	WWU	WWU/17/2648	288	82,080	285
16/17	EoE	Ampthill	5,113	31,860,872	6,231
16/17	EoE	Oundle	2,413	9,779,097	4,053

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16/17	EoE	Welham Green	1,389	8,377,857	6,032
16/17	NGN	Withernsea	2756	4,748,970	1,723
16/17	SC	Torphichen	263	407,715	1,550
16/17	SC	Scone	1400	5,671,904	4,051
16/17	SC	Musselburgh	1284	2,175,440	1,694
16/17	So	Farnham	290	725,889	2,503
16/17	So	Oxted	415	661,476	1,594
16/17	So	Sedlescombe	296	479,770	1,621
16/17	So	Bramley	712	2,652,117	3,725
16/17	WWU	WWU16-2487	313	213,112	681
16/17	WWU	WWU16-2523	254	102,108	402
15/16	EoE	Laceby	1,331	4,984,920	3,745
15/16	NGN	Consett	748	4,205,138	5,622
15/16	NGN	Hull	410	2,523,689	6,155
15/16	NGN	Maryport	272	679,021	2,496
15/16	Sc	(Glasgow) Greenfarm Road, Ladeside Close and surrounding streets Glasgow G77 6TZ	378	461,009	1,220
15/16	So	(West Kent) Leigh Village, Tonbridge, TN11 8**	397	572,314	1,442
15/16	WWU	WWU15-2365	1268	600,245	473
15/16	WWU	WWU15-2378	286	154,440	540
15/16	WWU	WWU15-2251	261	109,620	420
14/15	EoE	Hatfield	305	523,570	1,717
14/15	NW	Elswick	1,072	3,205,775	2,990
14/15	So	(Poole) Marshwood Road Poole Dorset BH17	580	2,617,899	4,514
14/15	So	(Poole) Preston Weymouth Area DT3	456	767,065	1,682
14/15	WWU	Nantyglo	703	4,307,490	6,127

14/15	WWU	Bryn, Port Talbot	395	805,800	2,040
13/14	EoE	Watford	257	561,203	2,184
13/14	Sc	Scotland, Greenock Supply Incident, Water Ingress	313	474,147	1,515
13/14	So	Southern, Lytchett Matravers Dorset BH16 6EA	1210	2,960,564	2,447
13/14	So	Southern, Elliot Bank Sydenham, SE23	266	979,090	3,681