RIIO GD2 Business Plan Appendix

Emergency Service

December 2019

SGN
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Contents

1 Overview

Scope of this appendix

We provide a 24-hour, seven days a week emergency service. Emergency activities are about responding rapidly to potentially unsafe situations and making them safe so that the situation no longer poses a direct risk to the customer or members of the public. The provision of our gas emergency service function forms part of our licence to operate and is necessary to ensure the safe operation of our network. This appendix sets out the resourcing requirements to deliver our emergency service.

There are strong links between this appendix and the Repair appendix (014), as an incident initially attended as an emergency may require a subsequent, permanent, repair. Similarly, there are also links with the Repex appendix (019), as replacement of our assets will result in reduced leaks and will impact the type of leaks that are more likely to occur. It also links through to the Customer Strategy and Vulnerability Plan appendix (023) and the time demands placed on the resources which deliver the emergency service, and the Workforce Management appendix (009), ensuring that appropriately trained operatives are available to respond to the situations that may arise.

Our emergency service contributes towards our primary responsibility of delivering a safe and reliable network. As such, our emergency service contributes to all customer priorities identified through our stakeholder engagement and discussed in our Enhanced Engagement appendix (022).

For example, by maintaining our resources to ensure that we are quickly able to respond to emergency visits, we are 'acting safely' as well as 'supporting communities'. Where possible, our emergency service also endeavours to 'keep the gas flowing' by keeping the supply to a property live to avoid customer disruption. Our triage desk engages with customers to arrange mutually convenient appointments, thus demonstrating that we are 'providing excellent customer service'. Our re-utilisation of First Call Operative (FCO) waiting time with complementary activities contributes to 'keeping costs down'.

Impact

The emergency response service is a frontline service that operates on a continuous basis, 24 hours per day, 365 days per year, responding to any suspected or actual gas escapes, taking steps to make safe as required. Our primary concern is always to safeguard the life and property of our customers and we take our responsibility for this service very seriously. Depending on the nature of the escape, the emergency service may make safe immediately, or there may be the requirement for the emergency service to arrange attendance of the Repair Service to make safe.

Approach to GD2

In our approach to GD2 we will be maintaining a safe and reliable network that has customer service at its core. We will continue to deliver the 97% standard of service on our response to gas emergencies, as stakeholder feedback tells us this is important, and we will continue to respond quickly to customers reporting gas emergencies to meet the legislative requirements of the Gas Safety (Management) Regulations 1996 (GS(M)R) and the Pipelines Safety Regulations 1996 (PSR). This will be supported by providing upper quartile customer satisfaction, responding quickly to changing customer demands and the uncertainties that go hand in hand with running an emergency service. In doing this we will also be keeping our costs efficient, by continuing to utilise, wherever possible, our FCOs' waiting time to undertake other productive work to minimise downtime and reduce the overall cost of providing the emergency service.

This strategy builds on the successes that we delivered over the course of GD1, which include:

- **Responding to gas escapes**. Throughout every year of the GD1 period to-date, both our Scotland and Southern networks have achieved the 97% standard for attending public reported escapes (PREs) within one or two hours (dependent on priority). Our performance in this area directly supports our ability to

achieve the target associated with our GS(M)R 12-hour gas escape prevention output – a RIIO measure and legislative requirement.

- **Improving customer satisfaction.** For every year of the GD1 period to-date, both our Scotland and Southern networks have delivered a level of customer service in the Emergency Response workstream rated as more than 9/10 in the Ofgem Customer Satisfaction survey. We have achieved six-year average scores of 9.40 and 9.28 for our Scotland and Southern networks respectively, within very challenging demographical areas.
- **Reducing complaints.** Ofgem also sets targets to reduce the number of customer complaints throughout the GD1 period. The metric covers all Gas Distribution Network (GDN) work, however, both of our networks have been successful in reducing our Ofgem complaints metric score year on year throughout the GD1 period to-date. We have delivered complaints metric reductions in our combined emergency and repair functions of 60% in Scotland and 63% in Southern from 2013 to 2019.
- **Operating at the efficiency frontier**. While achieving our primary and secondary safety outputs and delivering excellent customer satisfaction both networks' performance is within the upper quartile of emergency regression analysis. This demonstrates SGN has delivered stretching safety and customer outputs while remaining efficient.

Forecast investment

Table 1: below demonstrates our proposed investment for the GD2 period, by network and at an SGN level.

Table 1: GD2 investment proposal

SGN (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Net Staff Costs	14.2	14.1	16.5	16.7	15.9	17.1	21.3	21.0	22.0	22.4	22.5	23.3	23.3
Commercial Confidentiality													
Materials	0.2	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Non Salary Staff Costs	0.3	0.0	0.5	0.5	0.5	-	0.6	0.5	0.7	0.7	0.7	0.7	0.7
Transport and Plant	2.8	2.9	3.9	3.6	3.5	3.7	3.8	3.9	3.5	3.5	3.5	3.7	3.6
Commercial Confidentiality													

Scotland (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Net Staff Costs	4.6	4.6	5.3	5.4	5.0	5.6	5.6	5.4	5.9	6.0	6.2	6.4	6.7
Commercial Confidentiality													
Materials	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Non Salary Staff Costs	0.1	0.0	0.2	0.2	0.3	-	0.3	0.3	0.3	0.3	0.3	0.3	0.4
Transport and Plant	1.1	0.8	1.2	1.2	1.1	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.2
Commercial Confidentiality													

Southern (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Net Staff Costs	9.5	9.5	11.1	11.3	10.9	11.5	15.7	15.7	16.1	16.3	16.4	16.9	16.6
Commercial Confidentiality													
Materials	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Non Salary Staff Costs	0.2	0.0	0.3	0.3	0.2	-	0.3	0.3	0.3	0.3	0.3	0.4	0.3
Transport and Plant	1.7	2.0	2.7	2.5	2.4	2.5	2.6	2.6	2.3	2.3	2.4	2.4	2.3
Commercial Confidentiality													

References to the Business Plan Data Templates (BPDTs) can be found in section 6.11.

2 Emergency service within the business plan

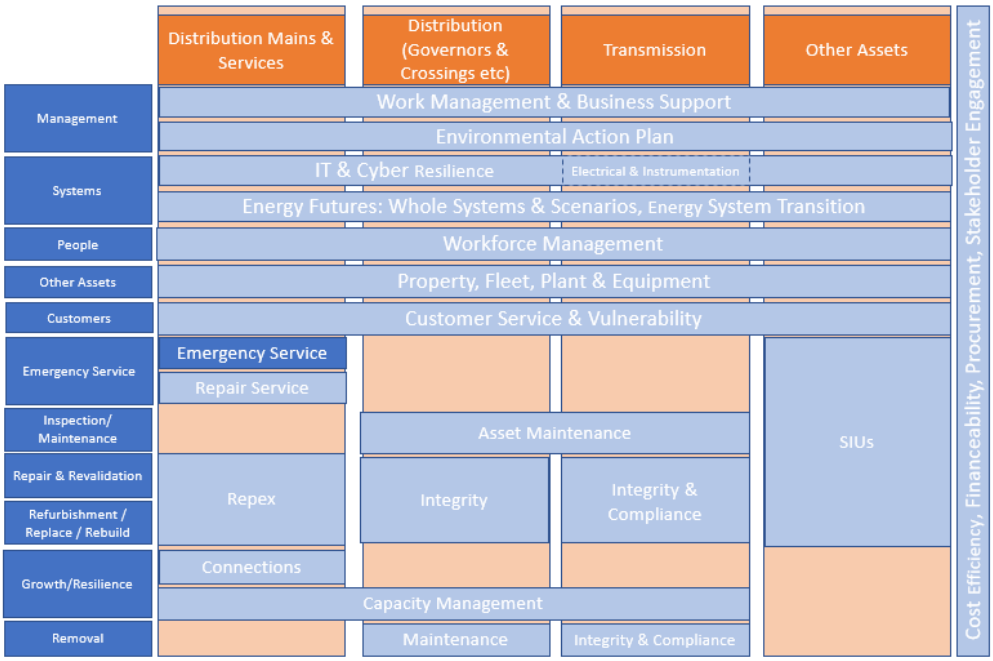
This emergency service appendix provides an explanation of the service that we provide to all our customers, whereby SGN responds in an emergency to any reported gas escape within our licence area at any time.

This is distinguishable from repair work as the priority of emergency service is to make a situation safe; a more permanent repair may follow as required and could require specialist teams and skills to return the customer to full service. As such, repair activities, while originating from an emergency visit, are a separate activity from emergency and are therefore covered in a separate appendix.

This emergency appendix sets out the workload that arises, how this is managed in the most efficient manner, and how we minimise the costs of delivering that emergency service to our customers.

Figure 1 highlights how this emergency service appendix relates to others within our business plan.

Figure 1: Appendix structure



To minimise the cost of delivering the emergency service, we divert waiting time into other complementary activities that our competent emergency resources have the skills and capacity to undertake. While these emergency resources overlap into the workload of maintenance, repex and connections functions, they primarily undertake ancillary activities such as surveys or downstream pipework installation that may otherwise be contracted, as seen in the other GDNs. This approach creates a cost efficiency in two ways:

- Reduces the cost of waiting time held within the emergency function
- Avoids incurring additional contractor expenditure to undertake the same function.

There is also a business benefit as a wider range of skills are retained within the organisation, enhancing the resilience of our workforce.

Our mains replacement programme has a positive impact on our distribution assets by replacing at risk pipes which in turn means there are fewer gas escapes reported on our network requiring attendance by our emergency service function to investigate. However, it should be recognised that most gas emergencies attended by SGN continue to be reported as internal gas escapes as seen in Figure 5: and that the mains replacement programme has little influence over these.

Over the course of GD1 the provision of our emergency service accounted for approximately 4% of SGN total expenditure.

3 GD1 performance and learnings

We deliver a 24 hours per day, 365 days per year emergency service, free at the point of delivery and available across our geographical footprint, to respond promptly to all reported gas emergencies. This response to a reported gas escape follows a well-established process.

3.1 Service overview

The process of receiving an emergency call can be split into two key stages:

Stage one: National Gas Emergency Service (NGES)

A call to the NGES reporting a gas emergency is known as a Public Reported Escape (PRE). The call handlers who resource the line are trained to ask a series of Health and Safety Executive (HSE) approved questions to establish details of the report. Call handlers will then refer the PRE via an integrated IT system to the relevant GDN based on the location of the escape. The PRE can be categorised as 'Controlled' or 'Uncontrolled' in addition to 'Outside' or 'Priority' (where the leak is at a priority premises e.g. school, hotel etc).

Stage two: Operations Control Centre (OCC)

Calls falling within our footprint are referred from the NGES to SGN's OCC. Our Operations Controllers will then use our scheduling system, to assign the call to the most appropriate FCO. The scheduling system follows a defined prioritisation algorithm to optimise attendance at each escape consistent with the agreed timescales (see section 3.3 below), ensuring SGN delivers on its safety related licence conditions, while minimising cost and disruption to our customers. An Operations Controller within the OCC monitors this system to ensure standards of service are being achieved and will manually intervene when necessary to deploy additional resources during workload peaks.

Our emergency workloads can be impacted by a range of incidents that are often beyond our control. For example:

- Our depots that are in coastal regions, such as Solent and Isle of Wight, regularly experience environmental odours that elevate gas escape reports
- Third-party damage to our network or damage to Independent Gas Transporter (IGT) networks that our FCOs will attend
- Emergencies beyond the extent of our network (within our footprint), such as carbon monoxide in a property with no mains gas
- The attendance of any suspected gas escapes which might occur on the National Transmission System
- Providing support to neighbouring GDNs in the event of a large-scale incident on their network

We maintain a level of resource that allows us to respond to such events, as each report must be investigated and contributes to our 97% standard of service. Where the gas escape is on an IGT network, or caused by third-party damage, the costs can often be recovered.

Furthermore, the team also undertakes other emergency related activities which are not categorised as a PRE, such as:

- Checks for safety – for example, an inaccessible gas meter or exposed polyethylene (PE) pipework
- Exchanging of Emergency Control Valve (ECV)
- Suspected theft of gas situations
- Inoperable ECV, for example, where the handle is stiff or inaccessible
- Smart metering interventions, for example where a customer has requested a smart meter to be fitted and the smart meter installer has discovered a situation that requires our involvement. An example of this would be a built over service pipe, where smart meter installers have an obligation to report this to the

GDN or where the ECV is inoperable. We also receive intervention calls post-installation, where a smart meter fault may have created a 'no-gas' situation

Triage team

The triage team is a part of the OCC and consists of employees that provide a customer point of contact for the above non-emergency jobs which could otherwise impact on emergency standards of service. The workload is scheduled into a normal planned work pattern in conjunction with contacting the customer. This prioritisation function helps to reduce the impact on our emergency FCOs and enhances the customer experience, by scheduling the required visits for a morning or afternoon period, up to two weeks in advance. This approach also allows for a more efficient resource-to-workload plan. Prior to the triage process being introduced, these jobs would have been system generated into the emergency workloads and classified as a four-hour response, meaning we would not have been able to liaise with the customer to identify a convenient time to visit. As such, the process has not only improved the customer experience but has also enabled a more efficient use of resources, which leads to a reduced operating expenditure.

First Call Operatives (FCOs)

Our emergency response visits are undertaken by FCOs, Gas Safe Registered engineers with the experience of working in an emergency service provider role. They have the training, experience and competency to attend gas emergencies, work on gas meter installations, visually inspect appliances and install pipework downstream of a customer's gas meter.

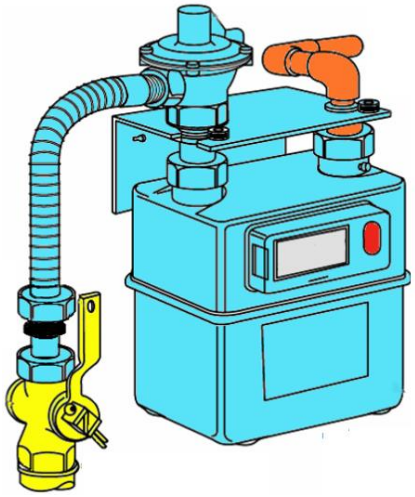
On gas emergencies, the FCO's role is 1) to safeguard life 2) to safeguard property 3) to locate and secure the escape 4) to carry out final site investigation.

Site attendance

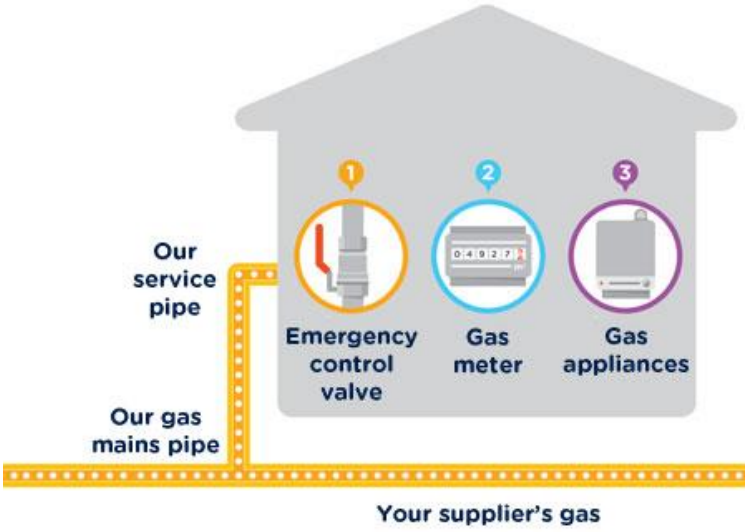
While we have a duty to respond to reported gas emergencies, the actions we take will differ depending upon the circumstances. The most common situations we encounter when attending gas emergencies are:

- **Gas leak on customer pipework, unsafe customer appliance or an active alarm on a carbon monoxide detector.** We would look to make the situation safe by isolating the unsafe appliance and advising the customer about repairs. If the customer is considered vulnerable, we offer temporary heating or cooking facilities to ensure they are not placed in hardship due to our safety actions, and may also offer temporary accommodation, such as hotels. Where practical, we will undertake minor repairs to pipework to minimise customer disruption.
- **Gas leak or fault on meter installation.** Like other GDNs, we have commercial Post Emergency Meter Service (PEMS) work agreements with several gas suppliers to provide an enhanced level of service where a gas leak or fault is traced to the meter installation. These agreements allow us to replace meter installation components while onsite, allowing the customer supply to be promptly restored. Where no such agreement exists, the situation is made safe and any vulnerable customers offered alternative heating and cooking appliances. The customer would then need to contact their gas supplier to arrange for a repair the meter installation.
- **Gas leak or fault located on SGN's network.** The leak or fault may be traced to the ECV, service pipe, pressure regulating equipment or gas main. In these instances, we will endeavour to remedy the situation during one visit using a range of well-established work procedures. Where the issue requires further work, the FCO will request the support of a repair or maintenance team who will typically support work on network components upstream of the ECV.
- **No trace.** We have completed a thorough site investigation and can find no gas readings or an unsafe situation.

Figure 2: Domestic supply and meter responsibility



[1]



Schematic illustration of SGN's responsibilities for instigating a repair. Yellow items show SGN's assets and responsibilities. The gas supplier owns the gas transported through our pipes and is responsible for the maintenance of gas meters. Property owners are responsible for maintaining internal pipes leading from the meter to their gas appliances such as boilers, cookers and heaters, and for making sure all gas appliances in the home are checked and serviced annually.

Workforce

In GD1 our emergency response team was comprised predominantly of directly employed (direct labour) FCOs, supplemented by contract labour. This labour mix was consistent across our Scotland and Southern networks until 2018, when the Scotland activities were brought entirely in-house and the reliance on contract labour was removed. In Southern, given the difficulty recruiting and retaining resources in urban areas and a highly competitive employment market, contract labour has historically throughout GD1 provided approximately 18% of the emergency hours.

The qualifications and competencies required by an FCO are typically unique, and not shared by any other operational resources. The training period for an FCO is one year, and they are required to hold the following qualifications:

- Core Gas Safety Qualification (CCN1)
- Core domestic and non-domestic emergency service provider (CSEP1)
- Gas Metering Qualifications (MET 1 – 4)
- Domestic Medium Pressure Regulators (REGT1)

They may also require other bespoke training, such as working at heights and use of specialist tools. While few non-emergency resources will hold the required qualifications to work as an FCO (for example CSEP1), many of the FCO's qualifications are common with other non-emergency work (CCN1, MET 1 – 4, REGT1), and as such FCOs are competent to undertake complementary business activities.

Emergency workload profiles

Our workload profiles discussed below have been subject to assessment by Arup, the independent assurance provider for our opex related activities. Arup has reviewed our workload model and critically challenged our base assumptions. Its assessment included:

[1] Image from ENA Gas Engineering Recommendation GER1 Issue 5.1 – 2018. Available at http://www.energynetworks.org/assets/files/GER1%20Version%205.1%20February%202018.pdf

- Discussion of the assumptions and how they feed into the relevant models
- Consideration of whether the assumptions are clearly explained and justified throughout business plan appendices, engineering justification papers and CBAs (Cost Benefit Analysis)
- Consideration of whether the assumptions seem responsible and robust, based on industry knowledge and SGN's approach in deciding how to apply them

As a result of its analysis, Arup provided a Red-Amber-Green assessment of our assumptions, with suggestions as to how these could be further justified and demonstrated. In its report, Arup did not raise any concerns with our workload model or the consequent forecasts.

The workload of our emergency resources is driven by the number of gas escapes (PREs) which we receive. Historic PREs, as well as future projections to the end of GD2, are shown in Figure 3: and figure 4 below:

Figure 3: Scotland uncontrolled and controlled workload profile

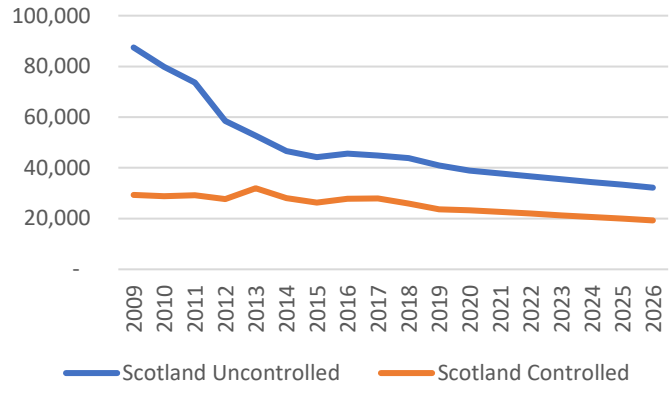
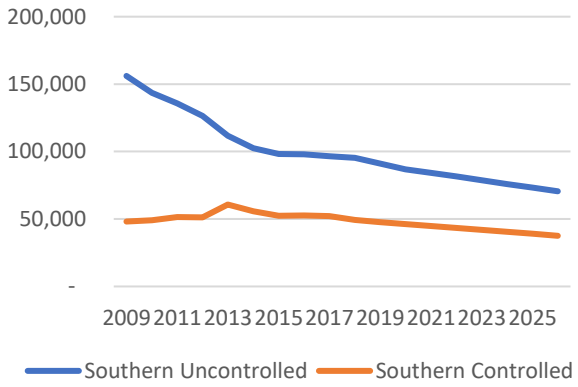


Figure 4: Southern uncontrolled and controlled workload profile



Future workloads are estimated based on previous trends, in addition to any upward and downward pressures that we anticipate. As shown in Figure 3: and Figure 4:, the workload trend demonstrates that both Scotland and Southern have seen major reductions in reported escapes since 2009, with the most significant reduction in the years leading up to 2014/15. At this point, the pace of decline in uncontrolled PREs has reduced as the most significant drivers of escapes have been addressed. In both networks, summing across years, workloads are seen to be trending downwards overall, due to:

- **Replacement (repex) programme**. Reducing the volume of metallic mains and services consequently reduces network leakage.
- **Winter peaks.** The peaks in winter workload, especially within the GD1 period to date, have been less severe than anticipated due to generally milder winter periods. However, it should be noted that this is slightly mitigated by increasing instances of extreme weather – either hot or cold – prolonged periods of which can cause ground movement leading to fractures in services or mains.
- **External policy**. Boiler scrappage scheme incentives and targets to improve the energy efficiency of social housing have led to the replacement of many older appliances and associated internal pipework, reducing internal escapes.
- **Fewer appliances**. New homes are built with fewer gas appliances – typically a central heating boiler and hob – reducing the opportunity for internal escapes or unsafe appliance situations to occur.
- **Flexible connectors.** The new meter installations having new flexible connectors, regulators and meters – reducing the likelihood of leakage.

Two key factors which are mitigating the trajectory of this downward trend in workloads are:

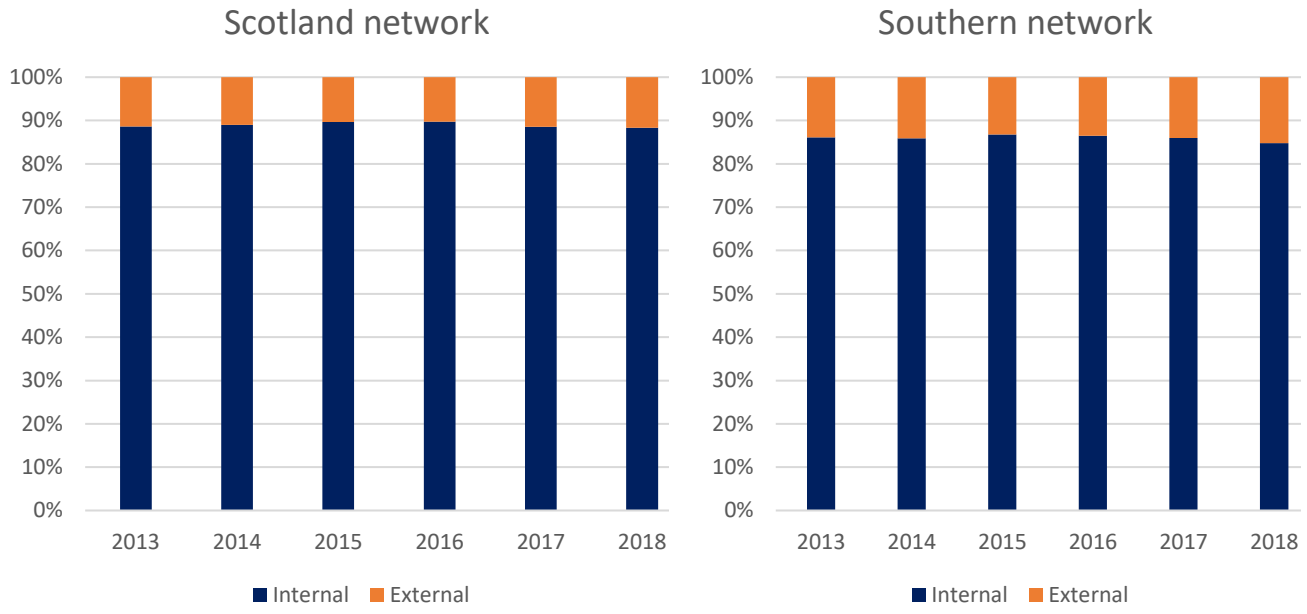
- **Smart meter roll-out.** Since the roll-out began in 2012, we have been undertaking an increasing number of

'Smart Interventions' due to a smart meter being installed and an issue being reported. We are forecasting that interventions will continue in line with the roll-out, with an increasing volume as the programme's intensity and the complexity of installations rises. This is further discussed in section 6.8.

- **Carbon monoxide (CO) alarms.** As a result of successful campaigns to increase awareness, the number of households installing and maintaining CO alarms has increased. This leads to an increase in workload as we respond to calls where the CO alarm has been triggered, caused by the presence of CO, a faulty alarm or battery replacement.

Mains replacement investment, which forms part of our business plan submission, can influence the volume of externally reported gas escapes that may be traced to our network. However, it must be acknowledged that only around 10% of reported gas emergencies are reported as being external so the influence of the mains replacement programme on emergency workload is limited.

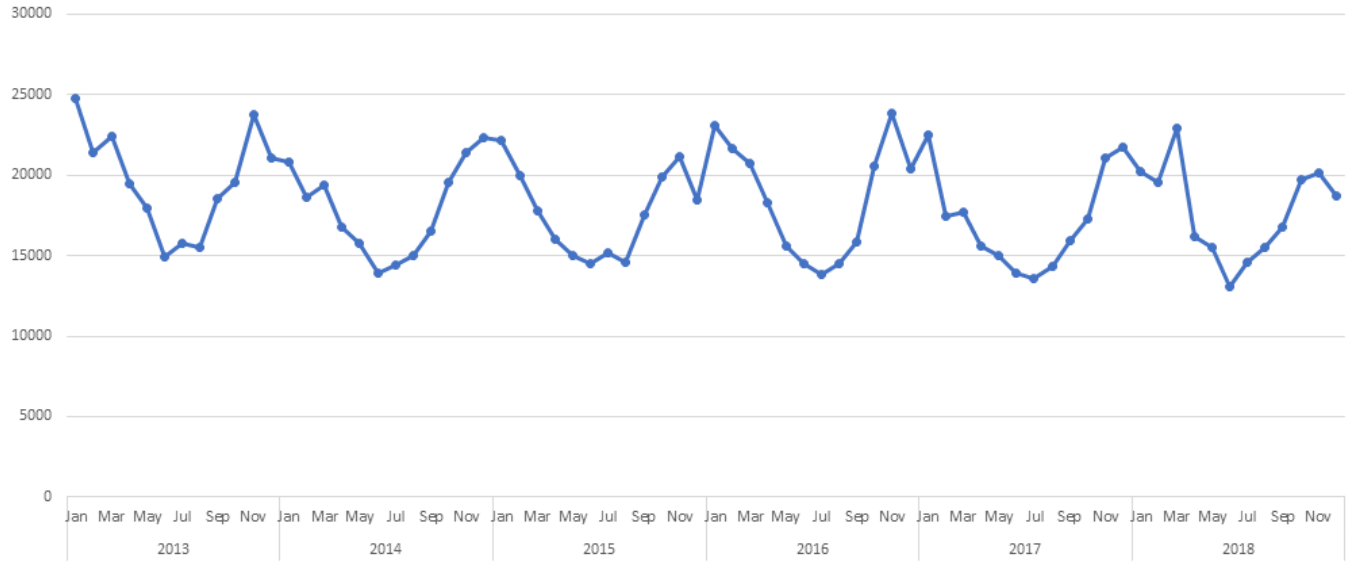
Figure 5: Relative percentages of internal and external public reported gas escapes by network



Intra-year, emergency workloads are typically seasonal, with a higher incidence of calls being received in the winter months. This is due in part to the increased use of domestic appliances and heating systems in the colder weather, leading to increased internally reported emergencies and the emergence of fractures and faults on our own network. Additionally, the colder winter weather typically results in the reduction of natural ventilation, for example keeping doors and windows closed, and as such the smell of gas may be more noticeable as it does not disperse as easily.

The profile shown below illustrates the high frequency of the peaks in workload during the winter months, and the challenge of forecasting in the mid-term as to when those peaks are likely to arise. We need to maintain a competent resource level on a year-round basis to ensure that we can respond to increased workloads, regardless of when they arise.

Figure 6: SGN emergency workload profile during GD1



As discussed above, the winters within GD1 have been milder than the seasonal norm, however they have included some extreme weather events, such as the Beast from the East in 2018. Such events can create a short-term surge in reported PREs, and as such we must plan our resources to handle the increase while maintaining our performance standards.

Case Study: Beast from the East

Each year, beginning in July, in readiness for the winter workload peak both of our operations teams, Scotland and Southern, compose a Winter Plan that sets out actions to take in case of extreme workloads.

The objective of this plan is to ensure we deliver our licence obligations and RIIO output measures in relation to attending controlled and uncontrolled gas emergencies, residual risk primary output measures following repair activities and several other key output measures. There are various interdependencies both externally and internally that require performance delivery in the role of Meter Provider of Last Resort and metering agreements through efficient use of resources during the winter workload period. The plan also provides details of our operational winter resource levels, escalation and pinch point processes which underpin our communication and contingency strategies.

The Winter Plan defines pre-winter actions, focussed around getting the required training delivered to our employees, and ensuring that the correct resources are in the optimum locations, should extreme weather, workload, or both be experienced. A non-exhaustive list of pre-winter actions is:

- All 4x4 vehicle locations identified and additional 4x4 vehicles are hired
- Provision of snow socks for all remaining commercial and staff vehicles to improve mobility during poor weather conditions
- All depot plant and equipment checked to ensure readiness for winter
- Any winter recruits on-boarded and trained throughout the winter
- Identify and fulfil any training requirements for first call team managers

During the winter period, operations teams hold a daily teleconference which is attended by all operational depot general managers, the Head of Operations, team managers from our OCC, and the senior managers who will be on standby that evening/weekend. The purpose of this call is to create escalation routes and discuss current emergency, repair, and planned workload along with resource availability. This results in movement of resources between depot geography to best equip for the workload and weather forecasts.

We also define workload shedding priorities based on ratios of resource to workload. Workload shedding is based upon safety criteria, with workload with zero risk being shed first; for example, planned commercial metering work, followed by routine maintenance, mains replacement and connections, with more safety critical work always being prioritised. The priority is always to have sufficient resources to attend all gas emergencies within agreed standards of service.

During the Beast from the East extreme weather event at the end of February and beginning of March 2018 the Winter Plan was fully in effect. Due to the travel disruption and associated workload spike, all available resources were called on to deliver standards of service and prioritise uncontrolled and controlled gas escapes. Workload shedding was invoked to the point that repair work was postponed with site check frequencies increased to ensure the ongoing safety of the network.

To assist with the workload, all Competent Persons throughout SGN, regardless of job role or directorate, were called upon to manage the workload and ensure that our high safety standards were maintained, thus invoking our emergency winter contingency arrangements.

Within SGN we have a procedure known as the 'First Call Team Manager' procedure whereby suitably trained and competent managers can attend public reported gas escapes and make the site safe, prior to a fully qualified and equipped FCO or repair team attending site to complete any further on-site action required. During the Beast from the East we fully utilised this process to ensure our customers were kept safe.

In addition to standard emergency workload, we also received increased numbers of reports of 'no gas' from customers. This is a work type that increases as the population of condensing central heating boilers within customer homes increases. The problem is that many of these boiler installations have external condensate pipes that freeze during cold weather. This is a recognised industry problem. To counter this, we use social media channels to provide customers with guidance on how this problem can be fixed without the need to report to the NGES. Through our commercial metering contract, we also experienced a high volume of faulty pre-payment meters as the colder weather can impact battery life, frozen card slots or seized valves. While our response to these jobs is not deemed a gas emergency, we continue to recognise that these customers are without gas until the fault is repaired and endeavour to prioritise vulnerable customers during such extreme weather events.

In the above example, the impact of the additional PREs as well as the increased operational challenges, such as employee travel and extra equipment, were accommodated within existing expenditure and performance standards. This was achievable through the tactical steps and proactive planning described above.

We also experience daily peaks on Monday and Friday (in comparison to mid-week) and hourly peaks around 9.00am and 2.00pm each day, as shown in Figure 7: below:

Figure 7: Typical daily profile by work order type

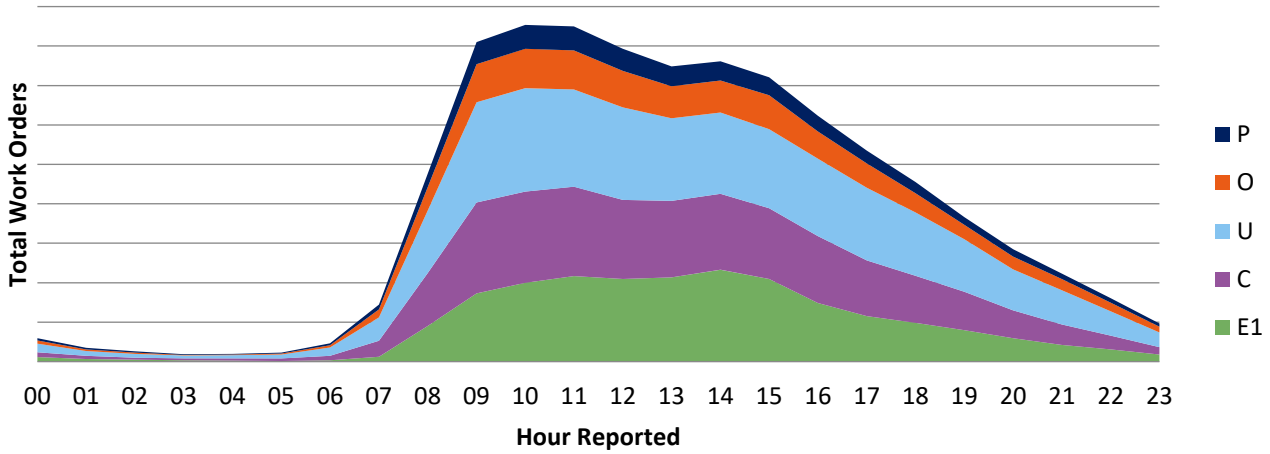


Figure 7: shows the occurrence of work orders, categorised as:

- Priority (P) – priority premises, for example a school or hospital
- Outside (O) – suspected escape is not within a contained environment and as such can disperse
- Uncontrolled (U) – suspected escape has not been controlled (defined further in section 3.3)
- Controlled (C) – suspected escape has been controlled (defined further in section 3.3)
- (E1) – non-emergency jobs, such as a check for safety, or missing ECV handle (see 3.1 above)

Regional impacts of delivering an emergency service

To cover these peaks, we operate standby and stagger patterns, with a greater proportion of time reserved for emergency work in the winter season compared to the summer. We employ a bespoke operating model with a greater or lesser degree of centralisation, depending on the requirements of the local area. As such, each local depot is able to develop its own working patterns with differing combinations of stagger, standby and overtime according to the density of the surrounding population and any associated geographic challenges, while also considering working frequencies and employee welfare.

- **Sparsity.** In the Scottish borders, Inverness in the Highlands, and Moray in the north-east, the emergency workload may not be sufficient to utilise a significant portion of our FCOs' time. However, we must retain the resources in the area in order to ensure that we can manage peak periods and deliver our one-hour and two-hour standards of service. Their geographic remoteness means resources must be permanently posted in these locations to ensure emergency standards of service are maintained. In addition, there is a requirement for additional sub-depot sites for storage of equipment and materials in these areas. We can mitigate some, but not all, of these costs by cross-skilling our resources to undertake multiple work types, increasing their productivity while maintaining their availability to support the standby rota. By operating a relatively more decentralised organisational model in Scotland we are able to create more rapid and

empowered decision-making at a depot level[2] in order to best serve the specific requirements of the local customer demographic. Given that we are required to take bespoke strategic and operational decisions to reflect the specific requirements of the geographic area, such areas can be described as subject to a 'sparsity' factor. An update to the figures from the GD1 independent report by Deloitte on Sparsity can be found in the Cost Efficiency appendix and supporting evidence in relation to our decentralised operational model can be found in our supporting evidence provided by Arup.

- **Urbanity.** In Southern, within the M25 region of our network, we must take account of the increased travelling times caused by traffic and potential travel restrictions such as pedestrianisation. This requires us to hold a higher ratio of resources to PREs than would be seen in a less densely populated environment. Working in a city such as London also drives increased costs, through both labour and operating expenditure, and requires us to flex to a more centralised operating model in order to manage the relatively higher workloads. For example, we have three operational depots located within the M25 to service customers located south of the River Thames. Each of these depots covers a smaller geographic area than any of our other depots due to the population, travel and workload constraints. Given that we are required to take bespoke strategic and operational decisions to reflect the specific requirements of the geographic area, such areas can be described as subject to an 'urbanity' factor.
- **Isolated points of the network.** There are certain territories which are unique to SGN and are not seen in other networks. These are the Isle of Wight in our Southern network and the Cowal Peninsula and Isle of Bute in our Scotland network. Such territories have idiosyncrasies which are not captured purely through a sparsity description and instead create specific challenges (such as poor road infrastructure), create specific cost drivers (such as high ferry charges for crossing), and create specific risks (such as potential delays in crossing in storm conditions). These areas have specific operational requirements, such as the need to maintain a minimum in-situ workforce and ensure a higher degree of cross-skilling, again reflecting a more decentralised local operating model. Given that we are required to take bespoke strategic and operational decisions in order to reflect the specific requirements of the geographic areas, such areas can be described as subject to an 'isolation' factor, this can be seen in our Cost Efficiency appendix (005).
- **Weather.** Extreme weather temperatures not only impact our own assets, it also impacts those of our customers. We know that freezing of condensate pipes on new central heating boilers is an industry problem and we experience increased reports of customers having 'no gas' as a result, again driving cost into our emergency service. This also presents a significant challenge to achieve our 97% emergency standard. We recognise that all GDNs are affected by weather conditions but believe that the impact is most pronounced in our Scotland network, as can be seen from the average days of ground frost, shown in Figure 8: below.

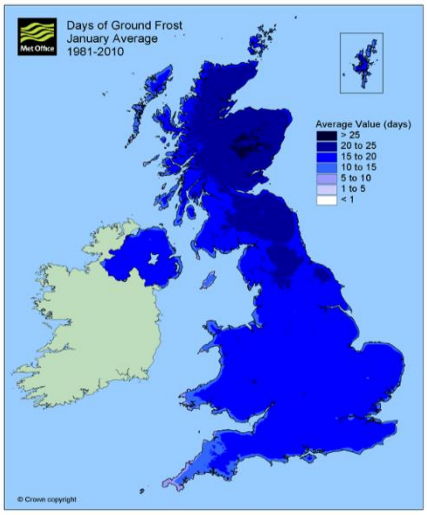
[2] Demonstrated by independent assessment of our Work Management and Business Support strategy, undertaken by Arup (August 2019)

We consider cold weather conditions to be a regional factor that impacts our Scotland network when compared to other GDNs. If our Scotland network were to experience weather conditions as seen nationally, we estimate that emergency workload volumes would decrease, thus impacting our associated operating costs.

We have developed a modelling tool in partnership with third-party analysts to simulate the impact various weather conditions such as temperature and precipitation can have on emergency workload. The predictive model, trained using machine learning on historic data, shows that the impact of weather on the number of PREs is substantial. The ratio of PREs in Scotland for Scottish weather over that for weather in southern England is around 1.15, with limited variation between summer and winter. This means that a weather driven decrease in PREs of around 15% could be expected if Scotland experienced the weather conditions of southern England.

The cost of delivering the emergency service in more challenging weather conditions is already reflected in our Scotland network GD1 cost base and we will continue to absorb this with no requirement for additional funding. We believe this approach is in the best interest of our customers.

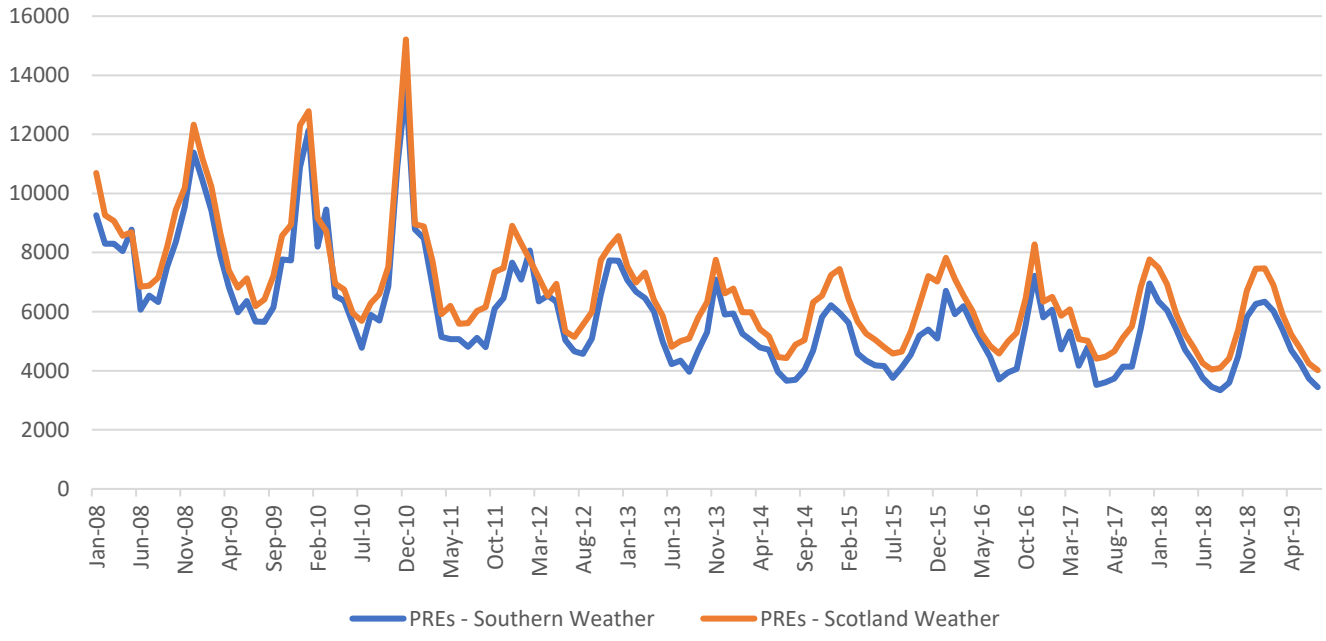
Figure 8: Average days of ground frost – January



[3]

Figure 9: highlights the impact of applying southern England weather conditions to historic Scotland workload.

Figure 9: Modelled regional weather impact – Scotland PRE workload with Scotland weather conditions versus Scotland PRE workload with southern England weather conditions



[3] https://www.metoffice.gov.uk/research/climate/maps-and-data/

The impact of these factors on population density, sparsity, and on costs are discussed in more detail in the Cost Efficiency appendix (005).

Emergency resource utilisation

Wherever possible, we seek to match our resourcing to the available workloads to maximise the amount of productive time our workforce can deliver. An FCO's time can be split into working time and waiting time. Working time is the time spent attending a PRE (including travelling) and is dictated by the above workloads. Waiting time is the balancing figure, where the FCO is not undertaking an emergency activity, but is available to respond when a job is received. We are committed to utilising our resources as efficiently as possible, and therefore we seek to minimise waiting time by re-deploying FCOs onto complementary business or commercial activities, each of which results in the associated time and overhead costs coming out of the overall emergency expenditure. We schedule such activities whilst retaining the ability to prioritise emergency calls as and when they are received. An FCO's time therefore typically comprises the following:

- **Emergency time.** Time dedicated to working on PREs.
- **Depot/other.** Safety meetings, re-fuelling of vehicles, collecting tools and materials from stores.
- **Repair.** Time spent supporting and undertaking repair activities.
- **Training.** External safety training to maintain legal competency to undertake duties and internal training such as customer service training, dementia awareness, IT training, updates to SGN policies and procedures.
- **Waiting time.** A minimum amount of waiting time retained to ensure that the FCO can prioritise and attend an emergency if required.
- **Repex support.** Purging customer pipework and relighting appliances following completion of service replacement, installing steel risers, extending customer pipework where the meter has had to be relocated following the renewal of the gas service pipe.
- **Metering support.** Time contracted out of the regulated business to support commercial metering contracts (operated by an unregulated business) to support the maintenance and exchange of traditional gas credit and prepayment meters for the Meter Asset Manager (MAM). The ability to support this work is determined by the success of that unregulated business in winning the relevant competitive tenders. This work will diminish as a result of the smart metering roll-out, as the programme replaces the traditional meters with smart equivalents.
- **Maintenance support**. Service regulator maintenance, Mains Risk Prioritisations System (MRPS) surveys, riser surveys (in accordance with SGN REP/3 procedure).
- **Capital projects support.** Customer connections work.

In Table 2: below we have set out how in GD1 our cross-skilling approach has further enabled us to reduce waiting time within the emergency function, reducing overall emergency costs. This has also allowed us to utilise our direct labour resource on other totex activities. The efficiency benefits to our operating expenditure of such an approach is further discussed in our Work Management and Business Support appendix (015) and has been independently verified. However, such an approach must be balanced, as over reliance on FCOs for these projects can introduce inefficiencies and disruption, as the FCO must always prioritise emergency response work. Table 2 shows utilisation of total hours worked – i.e. covering both normal and premium time.

Table 2: FCO utilisation rates on core and additional services

	Southern						Scotland					
	13/14	14/15	15/16	16/17	17/18	18/19	13/14	14/15	15/16	16/17	17/18	18/19
Emergency	28%	28%	28%	30%	31%	31%	29%	29%	28%	28%	31%	29%
Repair	9%	7%	5%	6%	5%	6%	3%	2%	2%	2%	2%	2%
Depot/Other	14%	13%	12%	12%	13%	13%	7%	10%	11%	10%	10%	10%
Training	7%	13%	16%	13%	13%	7%	4%	4%	8%	12%	8%	11%
Core Services	57%	61%	61%	61%	62%	58%	44%	45%	50%	52%	50%	52%
Waiting Time	5%	4%	3%	3%	3%	3%	4%	4%	4%	4%	4%	4%
Repex Support	11%	10%	9%	8%	8%	9%	18%	17%	17%	14%	14%	12%
Metering Support	17%	16%	16%	16%	14%	15%	25%	25%	19%	21%	22%	21%
Maintenance Support	9%	8%	10%	10%	11%	12%	7%	6%	7%	6%	7%	8%
Capital Project Support	2%	2%	3%	2%	2%	2%	2%	3%	3%	2%	3%	3%
Additional Services	**43%**	**39%**	**39%**	**39%**	**38%**	**42%**	**56%**	**55%**	**50%**	**48%**	**50%**	**48%**

Where there is short duration work, it fits well with our emergency service provider duties, meaning we can promptly respond to gas emergencies as they are reported. This allows us to utilise time that would otherwise have been categorised as unproductive waiting time to divert our resources to work that aligns with our FCOs' core skills. It is evident that this workforce utilisation strategy minimises waiting time within the emergency function allowing us to be in the upper quartile on emergency regression analysis and helps deliver a customer priority of 'keeping costs down'.

By utilising the FCO resource in this way we have improved utilisation by undertaking work that would otherwise have to be undertaken by other employees. We estimate that this improved utilisation has created a productivity improvement of approximately £11m/year of FCO normal and premium time in Southern and £6m/year of FCO normal and premium time in Scotland. Of this, an important component is metering support which generates an annual reduction in emergency opex of Commercial Confidentiality across both networks.

3.2 Legislative background

All legislative requirements that are currently in place in GD1 will remain unchanged into GD2, including, but not exclusively:

- The Gas Act 1986
- Gas Safety (Management) Regulations 1996 (GS(M)R)
- The Gas Safety (Installation and Use) Regulations 1998 (GS(I&U)R)
- The Gas Safety (Rights of Entry) Regulations 1996
- The Pipelines Safety Regulations 1996 (PSR)
- The Pressure Systems Safety Regulations (2000) (PSSR)
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)
- The Construction (Design and Management) Regulations 2007 (CDM)
- Health and Safety at Work etc. Act 1974 (HASAWA)
- New Roads and Street Works Act (1991) (NRSWA)
- Traffic Management Act (2004)
- Transport (Scotland) Act 2005

3.3 GD1 output delivery

Outputs govern the majority of the emergency process. These include:

Emergency response

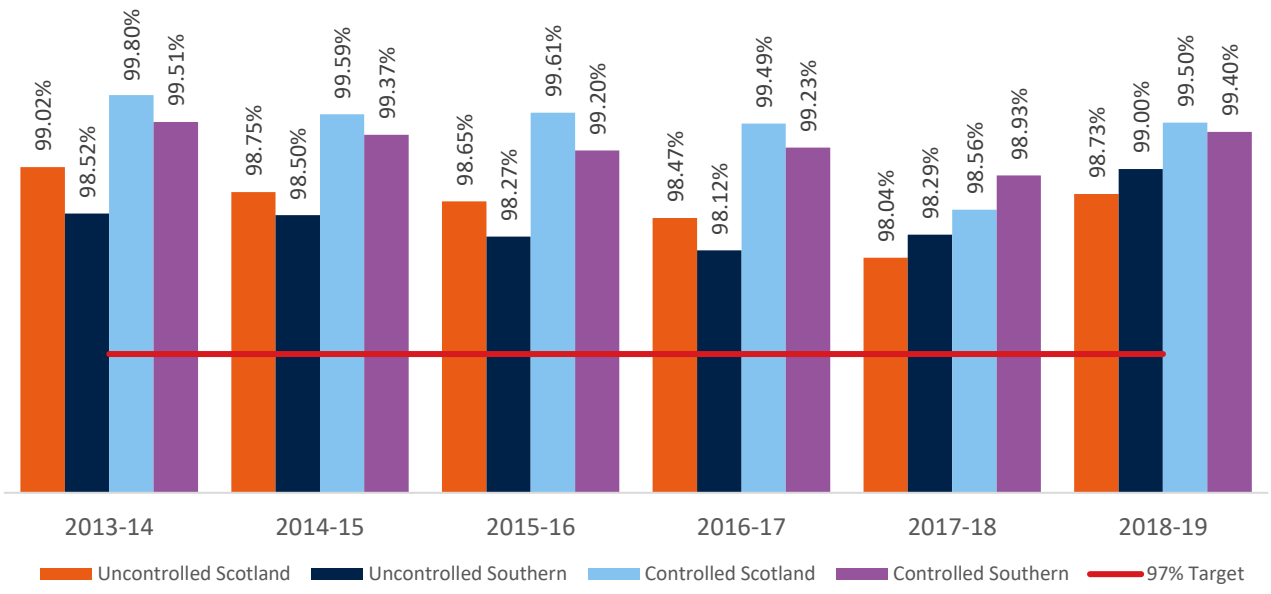
We have a licence obligation to attend all gas emergencies within exacting timescales – Standard Special Condition D10[4] of our Gas Transporters Licence:

- *A gas escape is considered to be controlled when the person reporting the escape, or someone on their behalf, has taken all the actions advised by the emergency call centre agent and can no longer smell gas. This must be attended within two hours in 97% of cases.*
- *A gas escape is considered to be uncontrolled when the person reporting the escape, or someone on their behalf, has taken all the actions advised by the emergency call centre agent, or is unable to take the actions advised, and can still smell gas. This must be attended within one hour in 97% of cases.*

The 3% tolerance is a recognition that we may be hindered from always responding within the targeted timescale, due to elements which are outside of our control, such as extreme weather events, traffic conditions or loss of gas supply incidents. We plan based on attending 100%, as any gas escape could represent a potential safety risk.

We have out-performed the 97% standard in all years of GD1, responding within the defined timescale in more than 98% of occasions in all years for uncontrolled escapes and 98.5% for all uncontrolled escapes.

Figure 10: Delivery of gas escape attendance over GD1



[4] P11 https://epr.ofgem.gov.uk//Content/Documents/Standard%20Special%20Conditions%20-%20PART%20D%20Consolidated%20-%20Current%20Version.pdf

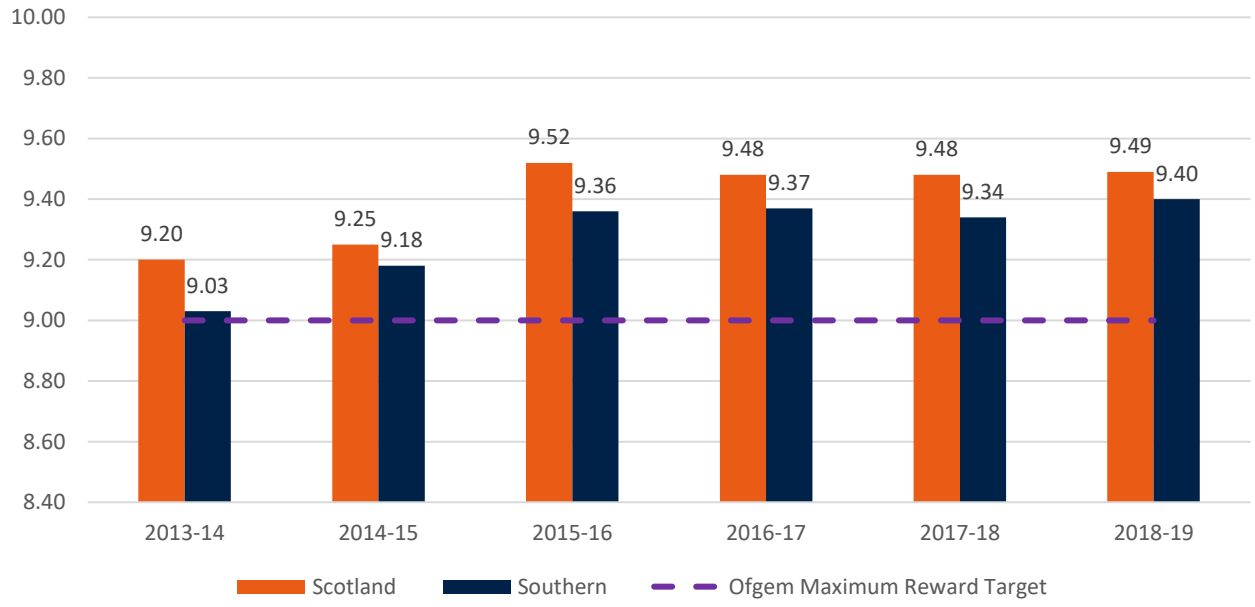
Emergency telephone service

Under Condition 6 of our Gas Transporters Licence[5] we have an obligation to establish, operate and maintain a continuous emergency telephone service for the reporting of any gas escape or incident likely cause danger in relation to the supply of gas through our network. The networks jointly procure this service from Cadent who operate the telephone line, 24 hours a day, seven days a week. This line is known as the 'emergency line' or '0800 number' and is promoted to, and used by, customers to report a PRE.

3.4 GD1 customer experience

Delivery of sector-leading customer service has been a primary objective throughout GD1 and our efforts are reflected in our customer satisfaction scores.

Figure 11: Emergency and repair customer satisfaction



To deliver a sector leading customer experience, our teams involved in operational delivery have participated in extensive training delivered by our dedicated customer experience training team. This training has taken the form of face-to-face classroom-based learning utilising real-life customer experiences, role play scenarios and onsite support from the customer experience team.

In addition, this training has been supported by investment in technology to help measure the impact our employees are having while working in the communities we serve. Our 10/10 app was developed to allow collection of real-time customer feedback enabling us to know what our customers think about our work before our engineers have left their homes. This feedback can quickly be acted upon to either praise colleagues for providing excellent service or address any concerns the customer has raised. To enhance our service offering, we included a button on the app to allow our most vulnerable customers to quickly and easily opt-in to the Priority Services Register.

[5] Standard Condition 6 - https://epr.ofgem.gov.uk//Content/Documents/Gas_transporter_SLCs_consolidated%20-%20Current%20Version.pdf

Our customers tell us that the safety and security of their gas supply is most important to them. This is never more apparent than when we face interruptions to large numbers of customers during a gas supply incident. These incidents can be caused by a range of factors including damage to our network by third parties. Regardless of the reason for the interruption, our primary focus is on ensuring the safety of our customers and getting their gas back on as quickly as possible. The development of our mobile command unit aids our response to such incidents and helps us support our most vulnerable customers when they need us most.

Ofgem agreed Guaranteed Standards of Performance (GSoP) underpin our customer commitments; however, we always endeavour to exceed these requirements. We have always aimed to provide a customer experience that is beyond the minimum expected from us. Our engineers and local management teams are empowered to make decisions that deliver the best outcomes for every one of our customers supported by the responsiveness that is associated with a de-centralised organisational structure. Every hour of every day, our local teams make decisions that are aligned with providing the best outcomes for our customers.

Our Emergency FCOs act as first responders not only to gas emergencies identified by customers connected to our network but also to those connected to many IGT networks. An increasing number of homes and businesses are connected to these third-party networks and we provide the same high standards of service to these customers.

Further details of the level of customer service provision can be found in our Customer and Vulnerability Plan appendix (023).

3.5 GD1 allowances and expenditure

This section discusses our annual expenditure versus the allowances for emergency service that were set by Ofgem for the GD1 period. These allowances are largely constant from 2014/15 onwards, and we have maintained a lower level of expenditure due to our prioritisation of workloads.

Table 3: Emergency expenditure versus allowances £ms (2018/19 Prices)

		2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	GD1
SGN	Expenditure	21.9	20.3	24.8	24.4	23.5	24.3	26.0	25.7	190.8
	Allowance	41.0	42.1	42.2	42.0	42.1	42.1	42.2	42.1	335.9
	Variance	**19.1**	**21.9**	**17.5**	**17.6**	**18.6**	**17.8**	**16.2**	**16.4**	**145.0**
Scotland	Expenditure	6.5	5.6	7.0	7.0	6.7	6.9	7.2	7.0	54.0
	Allowance	12.2	12.8	12.8	12.7	12.7	12.7	12.7	12.6	101.1
	Variance	**5.7**	**7.1**	**5.8**	**5.7**	**6.0**	**5.8**	**5.5**	**5.7**	**47.1**
Southern	Expenditure	15.4	14.6	17.8	17.4	16.8	17.4	18.8	18.7	136.9
	Allowance	28.8	29.3	29.5	29.3	29.4	29.4	29.5	29.5	234.7
	Variance	**13.4**	**14.7**	**11.7**	**11.9**	**12.6**	**12.0**	**10.7**	**10.7**	**97.9**

The forecast in later years of GD1 reflects our assumption that as legacy meter work levels continue to decrease each year, we will be able to divert less FCO waiting time into this area. Consequently, as the waiting time retained in our emergency costs increases, it is fed back into the overall emergency expenditure.

As discussed above, we have been successful in re-utilising a significantly higher portion of our non-emergency time, in excess of 15%, by taking the strategic decision to retain metering skills within our workforce. This has enabled us to win and retain commercial metering contracts in a highly competitive market. As above, we have also sought to re-utilise our FCOs where common qualifications and workload scheduling allow. These strategic successes have enabled us to drive efficiencies into our emergency costs and therefore create a saving against our allowances. This has been delivered by the following:

- **Efficient working practices**. During summer months where core emergency workload is forecast to be lower, FCOs will be issued with alternative totex or commercial work that can be completed when periods of waiting time are being experienced. As such, the time which would otherwise be funded by the emergency costs as waiting time, becomes productive time. Inevitably, our ability to respond promptly to gas emergencies will always rely on a level of waiting time within our operation but we strive to minimise this while continuing to have sufficient skilled resources able to quickly respond when emergency workload increases. Our OCC has oversight of all FCO resources and can move them across depot boundaries when workload demands shift.
- **Management focus**. Daily Key Performance Indicator (KPI) reports are used to track performance against emergency standards of service. In addition, employees in the OCC are in regular contact with local depot management teams and provide standard of service and manpower updates throughout the day to ensure resource levels are adjusted to meet emergency work as it is being received.
- **Innovation (GeoField, eLIS (reduced site searches), minibag ECV exchange kits and self-amalgamating tape).** The development of innovation is documented more fully in the Innovation appendix (008) but innovations such as the minibag ECV exchange tool have meant FCOs are able to complete more ECV exchange work without needing to request a repair team to attend site. This innovation has reduced the time an FCO spends waiting for a repair team to arrive, saving money and improving customer outcomes by avoiding repeated visits.
- **Cross-skilled resources.** Enable us to re-deploy resources into other business areas creating a saving in our emergency costs and avoiding the need for additional resources to cover work.
- **Resource workload mapping.** The operations teams comprehensively review resource requirement twice per year to take account of the seasonal variations in emergency workload, adjusting working patterns to take account of these changes and identifying other suitable work that can be undertaken during the summer. Proactive management and planning help optimise the level of resources dedicated to emergency work we regularly review depot boundaries to ensure our scheduling system can optimise resources against the changes demands on the business.
- **Non-formula work and metering contracts**. By leveraging allowances that were provided to us during GD1

for non-formula work and successfully winning and retaining commercial metering contracts in a highly competitive market, we have been able to remove the associated costs from emergency, opex and totex costs completely.

- **Triage desk.** By intercepting a range of non-safety-critical workload that would have historically been passed to an FCO for a site visit, we have been able to challenge the need for a site visit in the first instance. Where there is a need for a visit to the property, we can schedule this work in co-operation with the customer, enabling us to avoid premium time and minimise the number of abandoned visits, while also improving the customer experience.

Because of these measures we believe that the benchmarking demonstrates that we are the first and third most efficient GDNs for delivering an emergency service.

Our southern network is typically the third most efficient network, despite this territory including London, which is subject to a challenging operating environment, described above and discussed more fully in our Cost Efficiency appendix (005).

Our Scotland network is also seen to be within the most efficient networks, despite the challenges with sparsity as discussed above and within our Cost Efficiency appendix (005). This demonstrates that, despite geographical challenges, our emergency resource utilisation and operating strategy delivers consistently good value for customers.

Table 3: Emergency benchmarks

	Standardised Efficiency Score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	0.96	0.99	0.90	1.03	0.99
Lon	1.42	1.45	1.40	1.30	1.19
NW	1.21	1.16	1.15	1.01	1.05
WM	1.04	1.07	1.00	1.02	1.02
NGN	0.84	0.88	0.89	0.93	1.05
SC	0.82	0.72	0.90	0.93	0.89
SO	0.79	0.79	0.95	0.95	0.93
WWU	0.91	0.94	0.80	0.84	0.88

3.6 GD1 Lessons learned

Non-formula work and waiting time

One of the lessons learned in our emergency workstream throughout the GD1 period has been the utilisation of our FCOs' time to perform value adding work to divert the waiting time that would have been otherwise costed to opex activities. By maintaining a broad range of skills in our FCO workforce, we have been successfully able to minimise waiting time, which has delivered cost benefits to our customers' bills. We have also maintained a skilled workforce delivering wider benefits to our customers through cost reductions, and to SGN and our workforce by maintaining a skilled competent workforce.

We will be continuing to maintain this approach throughout GD2, building on the lessons learned throughout GD1 to continue to deliver cost efficiency, benefiting our customers, and maintaining a skilled workforce, delivering the wider social benefit of a skilled competent workforce.

Improved customer focus – 10/10 app, customer training

As shown in Figure 11: above, our customer experience scores have trended upwards throughout the GD1

period for both of our networks. Through our stakeholder engagement throughout GD1 and in preparation for GD2 we are aware of our customers' prioritisation of good customer service and we constantly endeavour to deliver a 10/10 experience. The upward trends in our customer satisfaction scores have been supported by several factors: enhanced customer focussed training to our FCOs; the introduction of our 10/10 app (including registration on the priority service register); and a focus on supporting vulnerable customers. This training and focus from our FCOs on supporting our most vulnerable customers will be built upon throughout the remainder of GD1 and into GD2 to ensure we are continuously improving the experience our customers have when interacting with SGN.

Embracing innovation

While most innovation projects are aimed towards the higher cost activities of repair and replacement, there have been several successful innovation projects that have been embraced within operations which have delivered benefits to our customers in terms of reducing operating expenditure and improving customer experience through reduced interruption times and a swifter interaction with SGN. For example, the introduction of electronic leakage investigation sheets has delivered a benefit by reducing the amount of time required on site when performing certain site checks, while also increasing our data fidelity.

A further example of embracing innovation is the ECV exchange kit which reduces the duration of a customer interruption, enabling a single FCO to exchange an ECV, without the assistance of a repair team and associated repair opex costs. Further information on this can be found in our Innovation appendix (008).

Our operations management teams and FCOs appreciate the benefits in reducing the customer interruption time, time on site, expenditure and enhanced customer satisfaction that comes with embracing innovation and we have positive innovation culture embedded within our emergency teams and will continue to develop and embrace innovation throughout GD2.

4 Stakeholder insight

We have undertaken a comprehensive programme of engagement and research during the development of our GD2 business plan, helping us to understand our customers' and stakeholders' priorities. This is described in more detail in chapter 4 of our business plan and the Enhanced Engagement appendix (022).

As detailed below, our emergency service impacts most directly upon two of the three commitments at the heart of our business plan; making a positive impact and delivering a safe and efficient service. The majority of customer priorities identified through our programme of research and engagement are directly impacted by the delivery of our emergency service function. For example:

- By continuing to deliver outstanding levels of performance on gas emergency attendance within one and two hours we are *acting safely* and able to *keep the gas flowing*
- By diverting FCO waiting time towards other productive activities we are able to reduce the cost of providing the emergency service function, *keeping costs down*
- By continually assessing the changing demands of our customers through the measures detailed in section 3.4 we are able to *provide excellent service* to our customers
- By prioritising our most vulnerable customers we are *supporting those vulnerable in our communities*

4.1 Positive impact

Our customers would like us to keep our costs down, maintain excellent levels of service and support those vulnerable in our communities.[6] [7]

Our front-line emergency engineers provide an important role in safeguarding customers at risk, in particular by recognising the signs of vulnerability and helping refer people to additional support services. We have engaged extensively with stakeholders at workshops and specialist panels to gather views on how we can best support customers in vulnerable circumstances.[8] [9]

One suggestion provided by our stakeholders, which we enacted, was to survey our own front-line engineers to identify the top-five issues they encounter in customers' homes from which they don't like to walk away. The results of this survey have helped shape our vulnerable customer strategy. Our programme of customer research has also demonstrated high levels of agreement that we should take steps to support those vulnerable in the community.[10] [11] This is further detailed in the Customer and Vulnerability Plan appendix (023).

Additionally, our model of having local depots close to the point of service delivery supports local employment in the communities that we serve. Stakeholders are supportive of us providing STEM career opportunities for current and future employees.[12] Our first wave of willingness to pay research showed that 79% of customers would support paying an additional 30p per year to invest in staff training[13], and our second wave showed that domestic customers would be willing to pay an additional £1.78 per year for us to increase work opportunities

[6] Explorative Qualitative Workshops and interviews (Exploratory Phase) (Ref: 002)

[7] SGN Business Plan Acceptability Testing Phase 1 (Ref 078)

[8] Specialist panel Scotland - Supporting our communities Meeting 1 and 2 (Ref 018, 019)

[9] Specialist Panel Southern - Supporting those at risk Meeting 1 and 2 (Ref 020, 021)

[10] Stage 1: Explorative Qualitative Workshops and interviews (Ref 002)

[11] Shaping the Business Plan Qualitative workshops - Customer Service & Supporting Vulnerable (Ref 085)

[12] Moving Forward Together workshops London & Edinburgh Nov 2018 (Ref 013,014)

[13] Conjoint & WtP Summary report (Valuation Phase) (Ref 005)

for disadvantaged groups in society.[14] Our people reflect the community they serve and have extensive knowledge of their local area and the challenges or opportunities that exist to help us better respond to the needs of our customers. Further information is provided in our Workforce Management appendix (009).

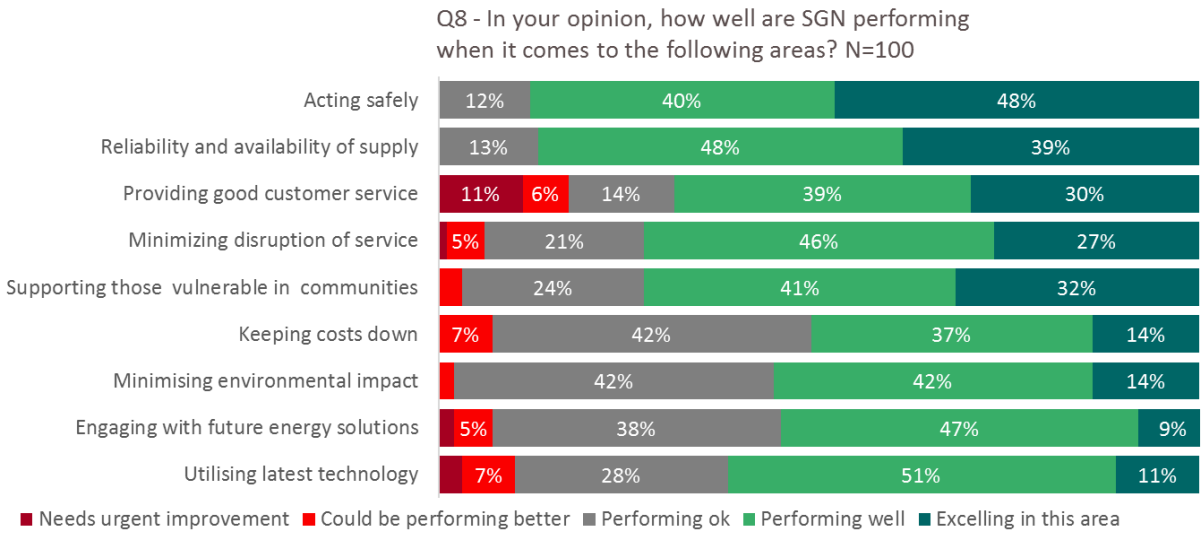
4.2 Shared future

Customers consistently rate future energy solutions as a high priority for further investment,[15] [16] and stakeholders expect us to further develop and understand our role in a future decarbonised energy system.[17] [18] For emergency activities this means continuing to provide a safe and reliable network for both current and future gas customers.

4.3 Safe and efficient

Safety is critical to our business, and we intend to maintain our existing outstanding performance in our emergency activities. Our customers and stakeholders have consistently told us that safety and reliability of gas supplies is very important, and that we are performing well in these areas.[19] [20]

This has been demonstrated by our stakeholder satisfaction surveys, where 97% of stakeholders responding to the survey rated 'acting safely' and 'reliability and availability of supply' as fairly or very important. Over 87% of stakeholders felt we were performing well or excelling in relation to acting safely and reliability and availability of supply. None felt we could be performing better or needed to urgently improve.



[14] Valuation Phase (Conjoint & WtP) Summary report (ref 094)

[15] Explorative qualitative workshops and interviews (Exploratory Phase) (ref 002)

[16] Conjoint & WtP summary report (Valuation Phase) (ref 005)

[17] Future of Heat specialist panel Aug 2018 (ref 023)

[18] Collaborative future of gas networks workshop (ref 070)

[19] Stage 2: Max Diff Prioritisation Phase Report (ref 003,004)

[20] SGN Stakeholder Satisfaction Wave 1 and Wave 3 (ref 071, 073)

In our programme of customer research, customers were specifically asked to rank attributes relating to different topics. Our customers strongly rated ensuring gas supplies are reliable as the most important priority. There was broad and high agreement that SGN need to maintain consistent supply. This priority was ranked highest by customers when we looked at this on a regional basis across Scotland, London and in the South East[21].

Our emergency service plays a vital role in continuing to provide a safe and reliable network for current and future gas customers. Customers are happy with the current services they receive and very few have experienced issues, as indicated by the high acceptability scores received from both 'informed' and 'uninformed' customers in our quantitative acceptability testing (unformed domestic customers in Southern and Scotland gave acceptability scores for our business plan of 85% and 88% respectively).[22] They believe we should be ensuring maintenance of the gas infrastructure continues.[23] For hard to reach groups, reliability of supply was seen as essential, and the need for consistent supply that enabled heating, meant that this can outweigh 'keeping costs down' for this group.

Through our programme of customer research, we asked customers what initiatives and improvements they would be willing to pay for. Our willingness to pay research customers has revealed that whilst domestic customers exhibit a certain degree of appetite to restore gas supplies more quickly after an interruption in gas supplies, this ranks as their lowest priority against other potential service improvements tested. However, SME business customers saw this as a higher priority, displaying a greater willingness to pay for this improvement when compared to other initiatives such as supporting vulnerable customers and reducing the duration of roadworks.[24]

Customers asked to review the acceptability of our proposals consistently rated reducing the average time of gas supply outages as highly important, and this was seen as the most important factor for vulnerable customers.

Our customers want us to keep our costs down. The efficiency of our emergency costs throughout the GD1 period has been shown in Table 3: and is further evidenced below in Figure 13: and Figure 14:.

[21] Max diff Prioritisation Phase (Ref: 003, 004)

[22] Business Plan Acceptability Testing Phase 2 (Ref 079)

[23] SGN Business Plan Acceptability Testing Phase 1 (Ref 078)

[24] Stage 3: Conjoint & WtP Summary report (Ref 005)

5 GD2 cross sector issues

5.1 Decarbonisation and whole system

Emergency work is focussed on ensuring that the network is safe. By delivering an efficient and rapid emergency service, supported by our repair work, we can reduce the emissions caused by leakage associated with our network.

Our emergency service predominantly impacts our business carbon footprint through vehicle use. All of our FCOs are lone workers and each requires a vehicle to promptly attend gas emergencies and carry safety critical equipment for identifying the source of a gas leak and to make it safe. To minimise the impact our emergency service operation has on the environment we source vehicles that are suitably sized and equipped for our operations. For example, our repair, connections and replacement team vehicles must be equipped with onboard power, the capability to tow and have three seats in the front cab. An FCO vehicle has none of these requirements meaning they can be smaller and more fuel efficient.

To aid our emergency service function, all our vehicles are fitted with GPS tracking units to help our Operations Control Centre quickly identify the most suitable engineer to attend a gas emergency. In addition, our FCOs use the GPS navigation device inside their cab to receive live traffic data and help them choose the most appropriate route to each job. During GD1, we invested in additional GPS technology to gather driver behaviour data including speeding, harsh breaking and vehicle idling. The data is used to provide each driver with a score and forms part of an engineer's performance discussion each month. Through this feedback, we see improvements in driver behaviour which in turn should reduce our environmental impact through necessary vehicle use.

Our Environmental Action Plan (EAP) sets out ambitious targets for the direct decarbonisation of our fleet via electrification. We have recognised that our FCO vehicles are the most appropriate subset of our fleet for initial electrification. There are currently several barriers to implementation, such as the density of charging infrastructure throughout our footprint, and the requirements of operating a 24/7 emergency service, however, we are working on overcoming these barriers and further information can be found in our EAP.

All SGN sites allow for waste segregation meaning any waste generated through our activities can be sorted by our engineers into the appropriate waste streams and loaded onto our stores' delivery trucks for return to central stores. The main type of waste generated by the emergency service function are items such as used ECVs, flexible connectors and meters. This can be emergency control valves, flexible inlet connections, regulators or gas meters or customer pipework. These assets are repaired wherever possible to minimise customer disruption but when necessary will be replaced and it is important that we dispose of the waste in a responsible manner.

5.2 Innovation

Improving our efficiency and reducing the overall impact of street works is a key objective of our innovation strategy. Work duration, size, disruption (traffic management) and interruption are key criteria which we are looking to reduce through innovation. Some examples of innovative tools and techniques that we have utilised within our emergency workstream are described below. These are set out in more detail in the Innovation appendix (008).

Advanced minibag

Where a service does not require replacement, this is generally due to the leak being associated with the ECV. Replacing an ECV on a live service can be a difficult operation without creating the scenario where the operative inadvertently creates more escaping gas. Historically, this operation often had to be aborted as a suitable seal could not be obtained, leading ultimately to the replacement of the full service. The development of the advanced minibag is a more effective tool that allows for the exchange of an ECV in a gas free atmosphere. A customer's supply still requires temporary interruption, however, the duration is significantly shorter than either the exchange using the old technique, or the time taken to replace the service. Critically, the minibag prevents the escape of gas and avoids the need to replace the service in full thereby minimising the disruption to the customer, as all work is completed by the FCO in the first visit. By enabling the FCO to complete the repair on the first visit without the needs for a repair team to attend site, we are able to prevent escape of gas sooner, reduce the environmental impact of leakage on the atmosphere and minimise our business miles.

Self-amalgamating tape

This simple innovation project allows a repair on small joint leaks on our riser network. It provides a quicker and simpler method than traditional repair equipment that tends to be rather bulky. Time is reduced compared to conventual repair techniques and reduces the requirement for disconnecting risers which leads to customer interruption and loss of supply.

As with the advanced minibag, this type of repair can be completed by the FCO in one visit without the need for a repair team to attend site. This means we can prevent the escape of gas sooner, reduce the environmental impact of leakage on the atmosphere and minimise our business miles.

Customer self-isolation and restoration

By developing a process whereby customers are empowered to carry out the isolation and restoration of their own supply, in the appropriate circumstances, this removes the need to wait for an engineer to visit each property. This will reduce the cost of an incident where a significant number of properties are affected and minimise its impact on consumers, as it is estimated that adopting this approach could reduce the duration of an incident by approximately 70%. This allows our FCOs to focus on vulnerable customers during an incident who may be unable to restore their own gas supply or require additional assistance to provide peace of mind at a time when they are most at risk.

Tornado max

The existing Tornado air powered vacuum device has been adapted to remove residual gas trapped in building voids to aid re-occupation. Work is being undertaken to develop an additional piece of equipment which improves and extends the design and functionality, resulting in a longer life span and delivering associated cost efficiencies.

Advanced gas detection

We are working with a supplier to develop gas detection equipment which will build upon instruments already being used by GDNs throughout GB. This will result in a new method of managing site investigation data. Currently Leakage Investigation Surveys (LISs) are completed electronically by manually inputting data from unconnected gas detection apparatus. The GS700 unit will have the ability to record the data electronically, using a web-based application. This has the potential to allow full site work history to be available anywhere across the business, providing a rigid audit trail, while removing the need for a resource to manually manage the data transfer.

5.3 Resilience

Resilience in our emergency service is safeguarded though maintaining adequate resourcing levels to meet the peak workload demands. Our resourcing profile cannot be flexed mid-year (for example, reducing FCO numbers in the summer months) as this would create the risk that the resources may not be available again during the winter months. It is also of critical importance that we maintain competency levels, working experience and familiarity with internal SGN procedures. As such, we must retain our resources throughout the year. Further information can be found in our Workforce Management appendix (009).

6 GD2 Activity breakdown

This section sets out the future operating environment for the GD2 period, considering several assumptions, detailing our expected workloads, and costs drivers.

6.1 a) Approach to GD2

Below we discuss our proposed approach to managing the productivity impacts caused by the loss of legacy meter work. Throughout development of our plan we have discussed this with stakeholders and refined our proposal accordingly.

Improving productivity to cover the loss of meter work

The deadline for completion of the smart metering roll-out is currently set as 2020, although we note the recent BEIS consultation to extend this deadline to require 85% saturation by 2024. We had originally based our GD2 forecasts on a completion date of 2023, as industry intelligence indicated the smart meter roll-out would be extended, however, given the consultation, we have now amended this to 2024.

As the roll-out continues, we will see a reduction in an important component of the alternative complementary work that FCOs are currently able to undertake, working on existing 'legacy' (non-smart) metering contracts. The observed market trend is that the suppliers prefer to do this work in-house and as a result it is not expected that we will be able to achieve equivalent levels of work in the smart meter environment. As discussed, we must maintain the emergency service standards of delivery and as a result our FCOs' waiting time will be increased as the complementary work diminishes.

The financial impact of the loss of this work results in the re-allocation of proportionate waiting time and overheads back into emergency costs. We estimate that in GD2 this represents an average of £3.3m a year, although in reality as the loss of meter work is profiled against the smart metering roll-out, the main impact would be seen in the last two years of GD2, which would represent £8m (£4m a year) of the total suggested £16.7m potential impact.

Our proposal is that we seek to re-utilise 40% of this increase in costs caused by the loss of meter work (£4.5m), through the delivery of productivity enhancements and further complementary activities. This is reflective of the expectation set in GD1 that we would absorb 15%, but also recognises our success in this area and therefore we consider that a higher target is appropriate. This is also reflective of our stakeholder engagement in this area, as we have increased our proposal from an original suggestion of 20% within our July draft business plan submission.

Emergency workloads

In GD2 we expect both networks to show a further reduction in public reported escapes, a trend which begins in GD1 and continues into GD2. While this reduces costs overall, it also increases our risk exposure to the impact of an extreme weather event or major incident on our 97% standard of service, as such an event would form an increased share of our overall emergency workload volumes. The tables below show our expected workloads until the end of GD2.

Table 4: Scotland workload forecasts (number of incidents '000s)

	RIIO-GD1						RIIO-GD2						
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Uncontrolled (#)	46.7	44.3	45.6	44.9	43.8	41.0	39.0	37.8	36.7	35.6	34.4	33.3	32.2
Controlled (#)	28.1	26.3	27.8	27.9	25.9	23.6	23.3	22.6	22.0	21.3	20.6	19.9	19.3
Smart Intervention	0.0	0.0	0.0	0.0	0.0	0.0	5.3	6.7	13.3	13.3	10.9	0.0	0.0
Total	74.8	70.6	73.4	72.8	69.7	64.6	67.6	67.1	72.0	70.2	65.9	53.2	51.5

Table 5: Southern workload forecasts (number of incidents '000s)

	RIIO-GD1								RIIO-GD2				
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Uncontrolled (#)	102.5	98.3	97.9	96.7	95.4	91.2	86.9	84.2	81.5	78.8	76.0	73.3	70.6
Controlled (#)	55.8	52.5	52.6	52.1	49.3	47.7	46.3	44.8	43.4	41.9	40.5	39.0	37.6
Smart Intervention	0.0	0.0	0.0	0.0	0.0	0.0	10.7	13.3	26.7	26.7	21.8	0.0	0.0
Total	158.3	150.8	150.5	148.8	144.7	138.9	143.9	142.3	151.6	147.4	138.3	112.3	108.2

Actual smart metering interventions from 2013 to 2019 are realised within the uncontrolled and controlled gas escape workloads.

As discussed above, we anticipate an increase in smart interventions as we move from GD1 into GD2, as the frequency and complexity of installations increases. This increase can be seen 2021/22, where we anticipate that the intervention rate will peak. Our amended forecasts assume an 85% saturation of smart meters by 2024, due to the delayed roll-out of the second iteration of smart meters (SMETS2 meters). However, if this end date changes then this would correspondingly impact our anticipated level of interventions.

6.1 b) Policy

The major policy decision that will impact the emergency service workload and expenditure profile is related to the smart metering roll-out programme, and the associated BEIS consultation with regards the amended target end date. This is explored further in section 6.8 of this appendix (managing uncertainty).

6.1 c) Scenarios and sensitivities

The core driver for expenditure in the emergency service work stream is the emergency workload. The workload has been forecast based upon the accelerated replacement programme as described in our Replacement appendix (019). Based upon the replacement programme, we can forecast the length of each diameter main for each material in our networks for each year of GD2. Using historic data for the number of network related escapes per material type per diameter band we have then forecast the number of escapes we expect per year of GD2.

As our workload is driven by the replacement programme, the scenarios we have considered are derivations based on the baseline and accelerated repex programmes. As we have had strong stakeholder feedback for the delivery of an accelerated repex programme it is the accelerated repex derived network related escape numbers we have proposed in this appendix.

Additionally, we have forecasted non-network related escapes based upon historic trends that we have seen, including an increased amount of no-trace found gas escapes and a constant amount of carbon monoxide related escapes.

6.2 GD2 outputs and price control deliverables

GD2 outputs specifically impacted by the emergency service function are:

Output name	Output type	Company driven target
Emergency response time	Licence obligation	No
Guaranteed Standards of Performance (GSOPs)	Licence obligation	No
Consumer vulnerability minimum standards	Licence obligation	No
Consumer vulnerability and carbon monoxide safety use-it-or-lose-it allowance	Price control deliverable	Yes
Average restoration time for total unplanned interruptions	Output Delivery Incentive (Financial)	Yes
Customer satisfaction survey	Output Delivery Incentive (Financial)	No
Complaints metric	Output Delivery Incentive (Financial)	No

We believe that these outputs are appropriate to allow us to meet our customer and licence obligations regarding our emergency service function. Our customer satisfaction scores throughout GD1 have shown that similar outputs have helped deliver a sector-leading customer experience.

During GD1, we have strived to exceed output targets where possible. This culture of continuous improvement is embedded within our organisation. The following two examples demonstrate our approach to outputs:

- Our emergency response time licence obligation has a target of 97% yet operationally, we always aim to reach 100% of gas emergencies within the prescribed timescale. This is reflected in our performance shown in Figure 10:.
- Our Ofgem target for customer satisfaction in Emergency Response is 9/10 yet internally we follow the principle of delivering 10/10 service to all customers. This culture is reflected in our performance shown in Figure 11:.

This behaviour is already realised within our performance and our costs and we foresee no reason to pass additional costs onto customers to deliver the above outputs.

6.3 Bespoke Outputs

We do not propose any bespoke outputs related to our emergency service function.

6.4 Investment in existing assets – CBA/NARMs

The opex defined under emergency does not propose any investment in existing assets, therefore there are no cost benefit analyses or Network Asset Risks Metrics (NARMs) appropriate to this appendix.

6.5 Engineering Justification Papers

Our emergency operating expenditure is not supported by any engineering justification papers.

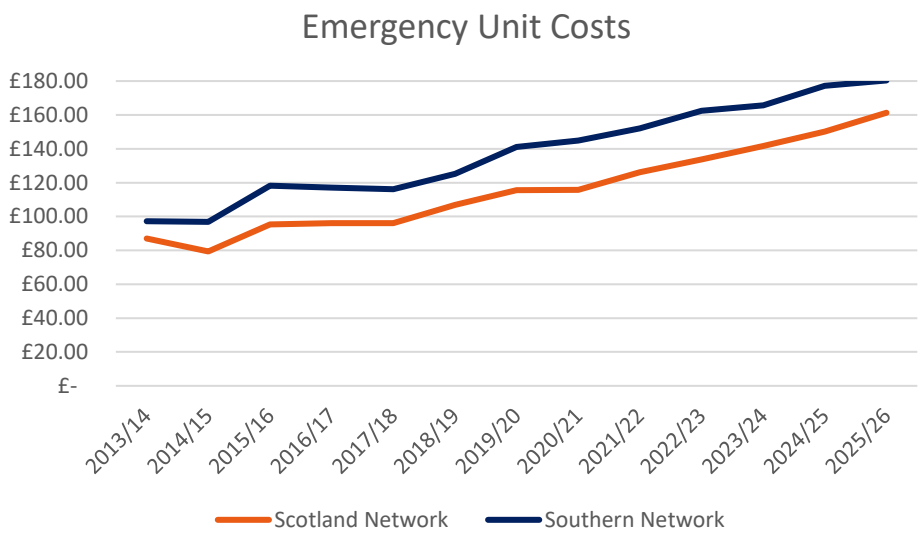
6.6 Investment in new assets

Our emergency opex does not propose investment in any new assets, this is covered under our capex and repex strategies.

6.7 Cost efficiency

Our actual emergency service unit costs for GD1 and forecasts for GD2 are show in Figure 12: below.

Figure 12: Emergency service unit costs



These unit costs are based on the volume of controlled and uncontrolled PREs and total costs for the emergency service shown in Table 1:. The reason for the unit cost increase is due to the phased increase of waiting time returning to the emergency costs as traditional meter work diminishes. As discussed, SGN intends to absorb 40% of this new waiting time by sourcing suitable, alternative work for FCOs. The remainder will be realised in the emergency service costs.

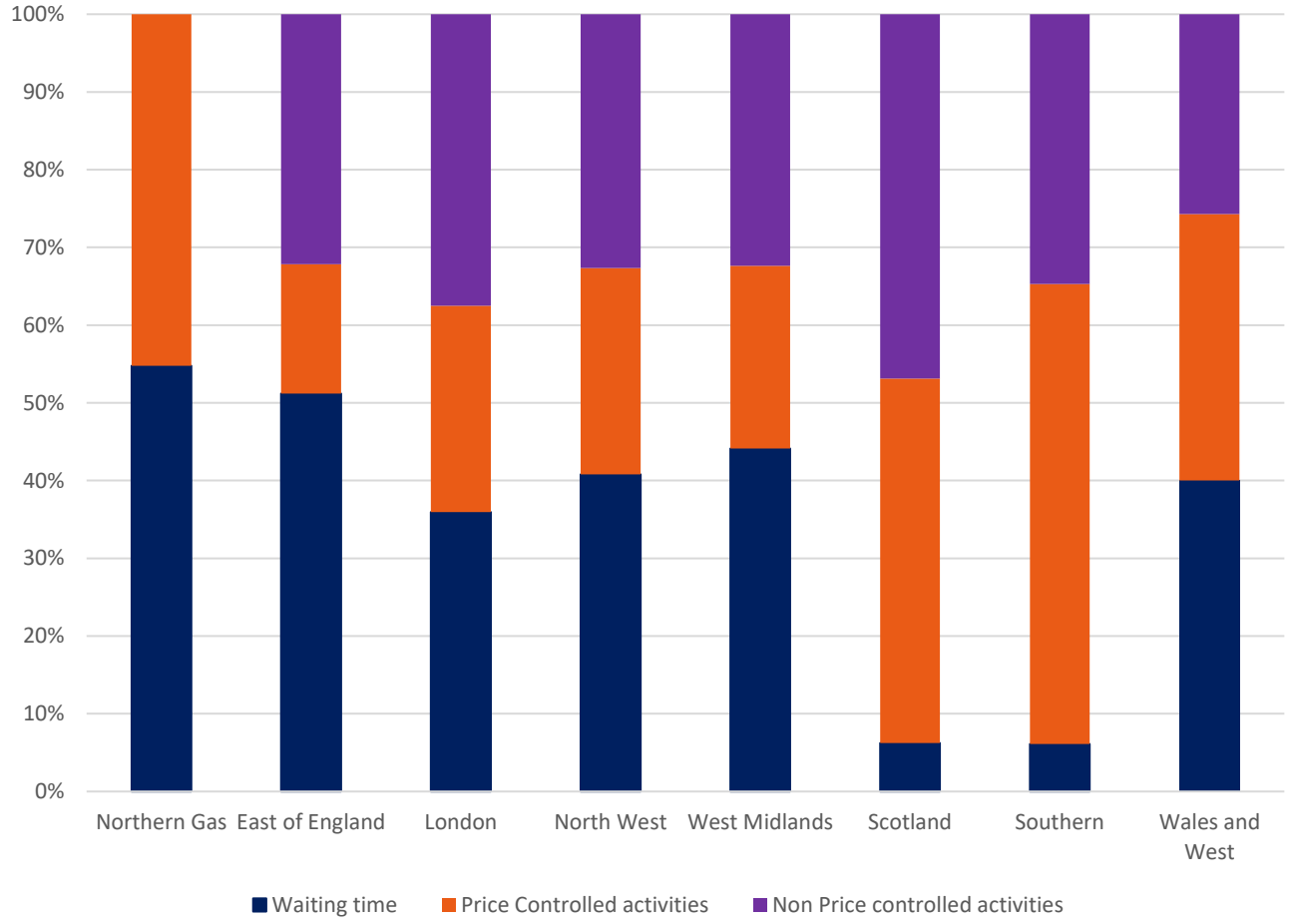
Internally, the cost efficiency of the emergency service within our local depots is monitored through monthly reporting of unit costs by our finance business partners.

Efficiency gains during GD2 are expected to be delivered through implementation of innovation projects, examples of which can be found in the Innovation appendix. In addition, the continued diversion of waiting time to commercial non-formula work and other complementary totex work will help deliver a cost-effective emergency service.

The trend of reducing emergency work is realised in base costs through the cost of waiting time. SGN attempts to mitigate the impact of waiting time on customer bills by sourcing other alternative work that is compatible with the operation of an emergency service. Any time spent on duties outside the function of the emergency service is costed appropriately as seen in Table 2:.

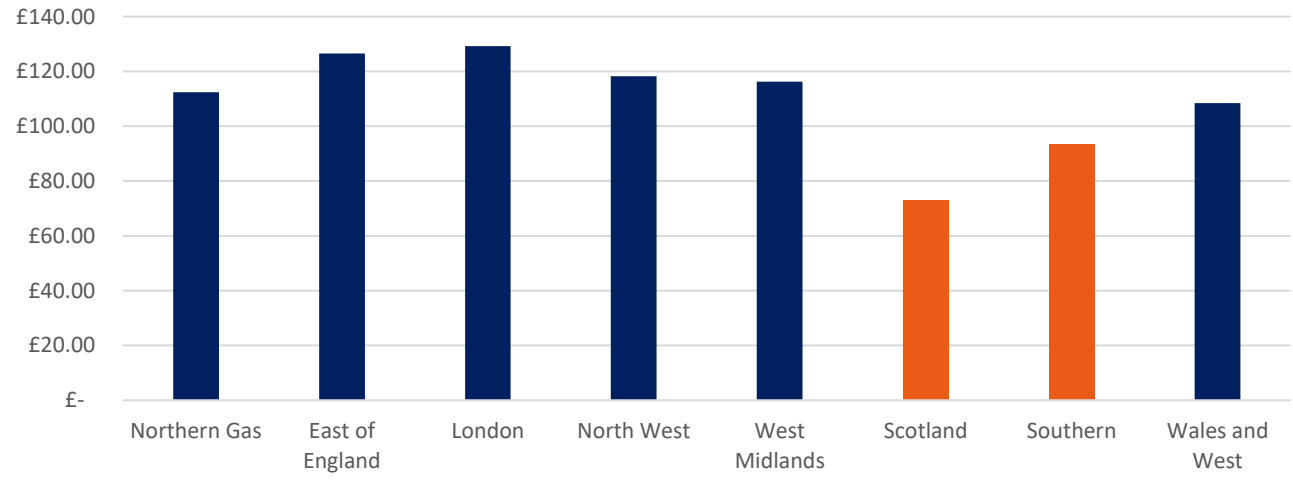
When compared to other GDNs, SGN is shown to adopt a resource utilisation strategy that minimises the cost of waiting time incurred within the emergency service function as seen in Figure 13: below:

Figure 13: Utilisation of emergency service resources when not engaged in emergency service delivery (source: RRP 17/18)



This impact of this strategy is seen in the average unit cost for an emergency service visit in Figure 14:. Despite us operating in areas with significant sparsity and urbanity challenges, we minimise the impact of the emergency service on customer bills by efficient utilisation of resources.

Figure 14: Average Emergency unit costs (net emergency costs + waiting time 2017/18)



Regional factors

There are regional variations in cost that exist and are driven by external factors outside of our control. These factors have been recognised by regulators throughout previous price controls. There are three specific areas driving costs that are specific to certain regions of our footprint, London-specific costs (urbanity), sparsity, and the Isle of Wight. These factors are explored in more detail in our Cost Efficiency appendix (005), however in summary:

- London-specific costs:

The prevalence of multi-occupancy buildings may create additional costs related to gas risers and lateral mains.

Wages are relatively high in London compared to other parts of the country, which can affect our utilities costs through the compensation paid to our employees, contractor rates and in some cases fleet costs and payments for commuting time.

The value of economic output in central London is also exceptionally high, which results in commercial customers placing higher demands on utilities.

- Sparsity:

Sparsity can be defined as the combination of low customer density (workload) and maximum area of cover (driven by time bound standards).

We provide a safe and secure network to all our gas users. To achieve this, we must ensure we have sufficient resources to respond to and repair gas escapes where ever they occur within our network.

As a country, Scotland contains areas of very low population density and an average significantly below the remainder of the UK mainland.

Development of the gas network over the past 50 years has resulted in a number of isolated, geographically distant customers. Our performance is significantly impacted in areas where:

- Travel from sparse area to next nearest populated area is not possible within time restriction
- Available workload is significantly lower than average

By the very nature of the sparse area the effective productivity of our two key services, emergency response and repair, is significantly reduced. We are unable to achieve the productivity levels of a normal network which will have a mix of urban and rural. The areas which we consider sparse display characteristics which differentiate them from the remainder of our network and most of the other GB gas networks.

We have commissioned external research to evaluate the extent of this effect across our network and to consider a reasonable cost impact on our ongoing operations. Further information can be found in our Cost Efficiency appendix (005).

The conclusions reached are that there are six defined areas of sparsity within our network. The sub depot locations from which these areas are supported are as follows:

- Inverness
- Elgin
- Galashiels
- Dumfries
- Rothesay (Isle of Bute)
- Dunoon
- Isle of Wight

Our Southern distribution area includes the Isle of Wight (IoW). Operating a gas distribution network on the IoW comes with several challenges that are not seen in other parts of mainland network operation. These

factors are not due to sparsity as seen in our Scotland network but are a consequence of the island being geographically disconnected from the mainland. These factors include reduced competition between suppliers in tender events, minimum resource requirements to be sustained on the island to ensure a 24-hour service and an additional cost associated with transportation via ferry or hovercraft.

6.8 Managing uncertainty (use-it-or-lose-it, volume drivers and reopeners)

We have forecast the impact of the smart meter roll-out on the basis that 85% saturation of meter installations is achieved by 2024. However, given the learnings from GD1 and the risk of change in this programme we consider it appropriate to have an uncertainty mechanism in relation to the smart meter programme. This can be separated into two elements: FCO utilisation rates and smart meter interventions.

FCO utilisation rates

As above, our forecasts are based on the BEIS consultation, assuming that the roll-out achieves 85% meter installation saturation by 2024. As a result, under our base case, we have assumed that the current FCO waiting time re-utilisation achieved through legacy (non-smart) metering contracts will diminish accordingly. The return of waiting time back to our emergency service will therefore create an additional cost. In a demonstration of our commitment to keeping customer costs down, we are currently assuming that we will be able to absorb 40% of this additional cost through our productivity challenge, and as such we do not think that it is appropriate to have a reopener around FCO utilisation rates.

Smart meter interventions

Following the recent consultation issued by BEIS[25], we have updated our forecasts to now be based upon 85% saturation of smart meter installations by 2024. The remaining 15% installations are forecast to take place in subsequent years, and therefore the smart meter programme is now anticipated to impact all years of the GD2 price control. This is an amendment from our October submission, where we anticipated that the programme would be completed by 2023.

Smart interventions, as discussed in section 3.1, are reported to us through the Cadent National Gas Emergency Telephone Service (NGES), through customer engagement, or directly from meter installers. They are potential emergency visits due to an issue either pre- or post-installation of a smart meter. For example, we may be required to undertake remedial action to facilitate installation or may be required to attend a gas escape, or a no gas report, as a consequence of installation.

Smart interventions are attended by our emergency service and therefore contribute towards our emergency workload.

At the end of 2018, there were approximately 13.8 million smart or advanced meters installed; 92% domestic, 8% non-domestic. The final quarter of 2018 represented an 8% increase in installations compared to the previous quarter. As at April 2019, within the SGN footprint approximately 1.63m, 0.58m in Scotland and 1.05m in Southern, meters have been installed since 2010.

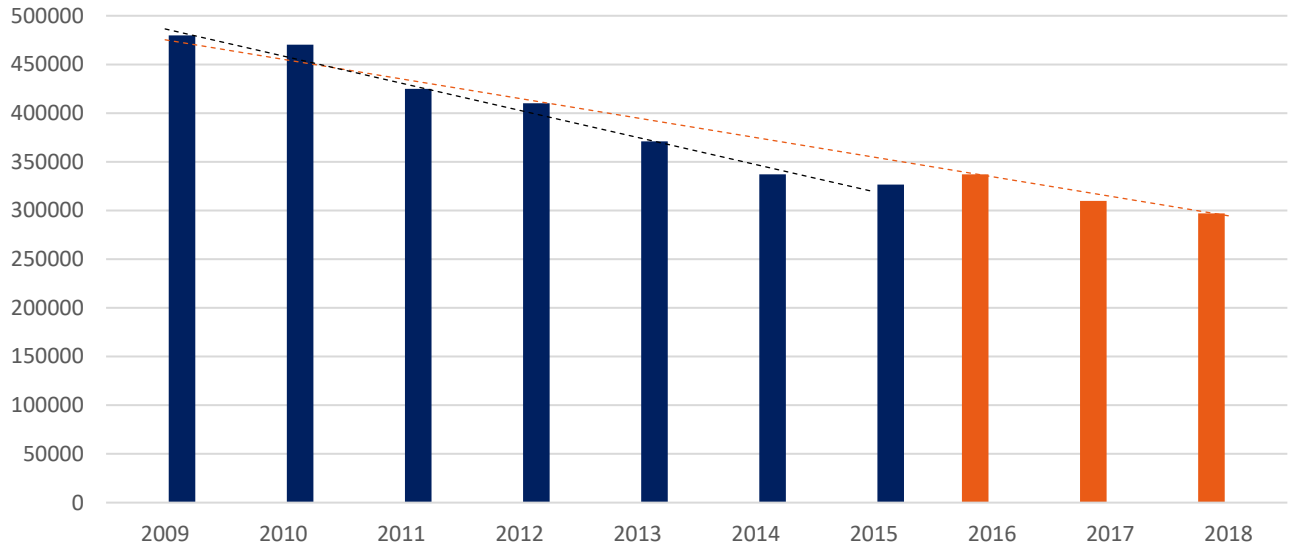
As discussed in section 3.1, our triage desk prioritises smart interventions to ensure any non-emergency visits can be rescheduled at a more appropriate time for the customer. This also benefits our resource planning as it reduces the number of visits our emergency service must attend.

[25] BEIS consultation proposed 90% saturation, with a backstop of 85%

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831734/smart-meter-policy-framework-post-2020-consultation.pdf

Figure 15: below demonstrates the total emergency workloads across Scotland and Southern, including smart interventions, for the period 2009 to 2018:

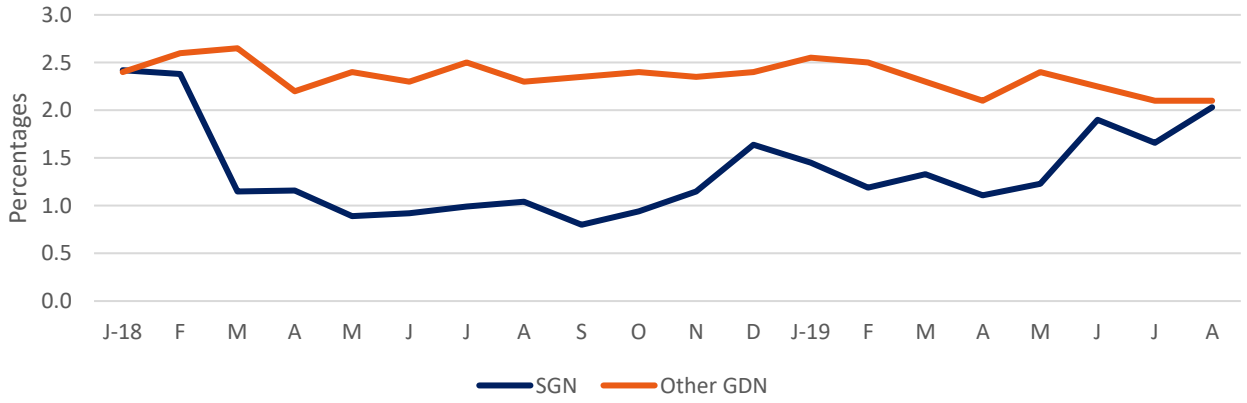
Figure 15: Total SGN emergency workloads including smart interventions



From 2009 to 2016, emergency workloads were decreasing by an average of 28,077 jobs per annum in total across both networks. In the period 2016 to 2018, this decline reduced to an average of 18,0786 a year. Furthermore, the trend lines above demonstrate that the rate of workload decline including smart interventions (shown by the orange line above) is shallower than the equivalent decline without smart interventions (shown by the blue line above). This data demonstrates that smart interventions have eroded the reductions in emergency workloads by approximately 33%, and that the subsequent year on year reductions in workload are also diminished.

Our triage desk, discussed in section 3.1, was implemented in 2017 and became fully operational in 2018. Prior to this point, interventions would have been captured in our main emergency workloads, not separately identified and not subject to prioritisation. The positive impact of the triage desk and associated operational data capture is reflected in the above graph, where the 2017 workloads show a more significant reduction from 2016 (when there was no triage in place) and a continued, albeit more muted, reduction in 2018. This is further supported by Figure 16: below, which demonstrates that due to the mitigating actions of our triage team, we have a significantly lower intervention rate in comparison to the reported rates seen in another GDN.

Figure 16: GDN intervention rates

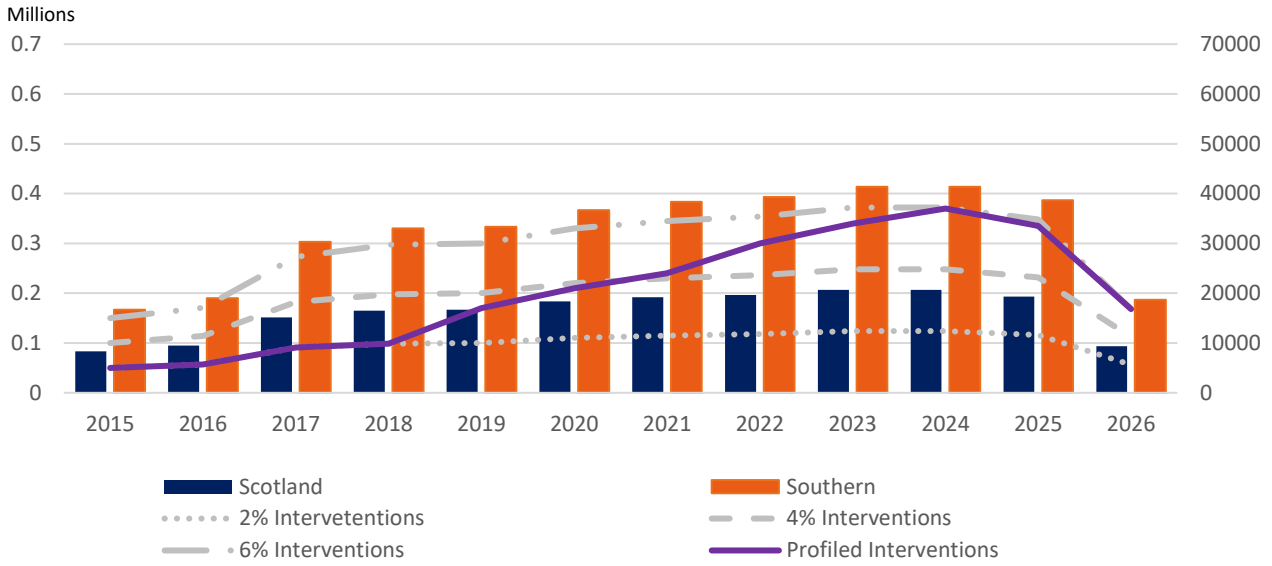


As the roll-out is supplier-led, GDNs have no influence over the installation approach, and as such must

respond reactively to the workload as it occurs. Consequently, we have undertaken scenario modelling to create anticipated intervention rates in order that we can understand the potential resourcing impacts.

As discussed in section 3.1, we have modelled a profile based on 85% saturation by a 2024 roll-out deadline, and have developed a sculpted profile as shown in Figure 17: below, based on an increasing profile of 2%, 4% and 6% interventions:

Figure 17: Interventions based on a 2024 completion deadline



The left axis represents millions of meters per network, while the right axis shows the total number of interventions against the three different rates.

The sculpted profile is based on a working assumption that as the roll-out progresses, the volume and complexity of installations is likely to increase, and therefore the relative number of interventions is also likely to rise. This assumption is supported by the 2018 management reporting compiled by our triage team, as seen in Figure 18: which demonstrates that despite the processes we have put in place to mitigate interventions, we are seeing a rising trend:

Figure 18: SGN interventions 2015 to 2019

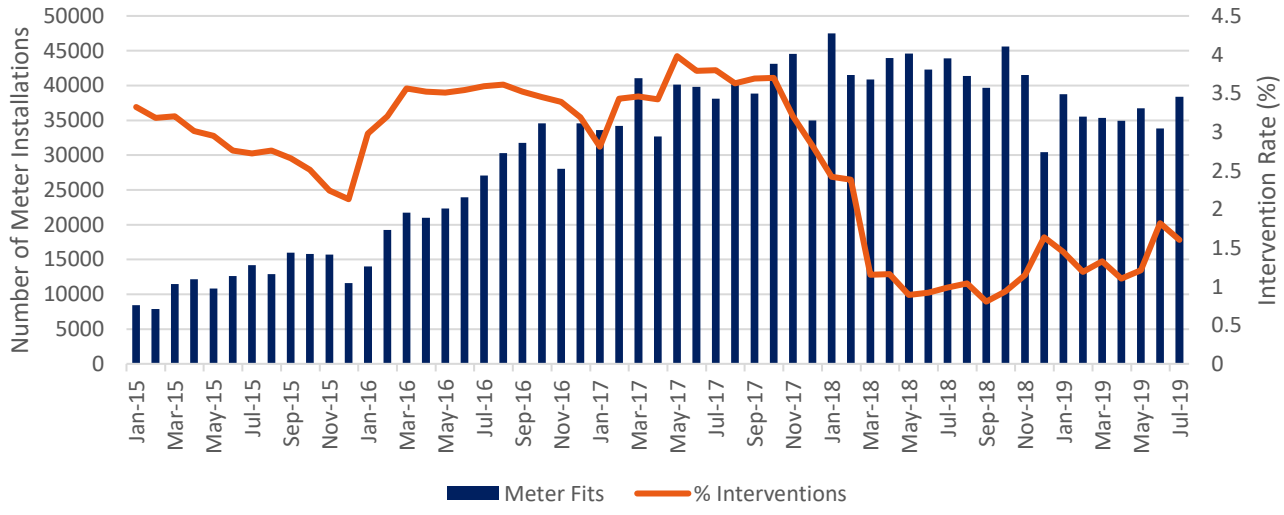


Figure 18: above demonstrates the decline in interventions in 2017 following implementation of our triage processes. As a result of our successful triage process, interventions remained reasonably flat from March 2018 to September 2018, when they began to rise. This increase in interventions, despite our triage processes, coincides with the installation of meters with upgraded functionality (SMETS2) beginning to be installed.

While we do anticipate that our intervention profile will increase, we have also based our forecast on two key assumptions around the smart meter roll-out which should prevent any increase beyond 6%.

For example, we are forecasting based on the assumed resolution of communication hub challenges in multi-occupancy buildings, or those with a dense outer structure. Similarly, we are also assuming that SMETS1 meters will be successfully adopted and contribute towards supplier roll-out targets. Should either of these assumptions be incorrect, there is the risk that our interventions may increase further.

The above data demonstrates that, as the volume of installations increases, and the complexity of installations increases, interventions also increase, and therefore we consider our profiled forecast to be a reasonable assumption on which to base our emergency workloads.

Our profile is also contingent on the continued success of our triage team in identifying and re-arranging non-emergency visits with customers. Should the manner in which smart interventions are reported through the NGES change, we may need to implement consequent changes in procedures, which would have an impact of the intervention rate in the intervening period.

Were the intervention rate to increase, or the process around reporting interventions to change, this would increase our emergency workloads and place a strain on our resourcing, as well as creating a risk for our continued delivery of our 97% standard, which is a licence obligation.

As discussed above, the roll-out of smart meters is supplier-led and therefore not within our control. While we have made reasonable assumptions to accommodate the extra workload, in reality it is difficult for us to predict and influence any further the impact which smart interventions will have. As such, we consider it appropriate for intervention rates to be subject to an uncertainty mechanism in the form of a re-opener based on realised intervention rates.

As we have already included a reasonable prediction of the intervention rates in our forecast based on historic data, we have been able to manage our workloads and resources to ensure that our predicted rates could be accommodated. As such, a re-opener on the basis of these rates avoids the need to include an excessive risk premium within our forecasts. As seen above in Figure 16:, as a result of our triage team, our intervention rates are substantially lower than the other GDNs as we have already taken all mitigating actions possible to minimise the impact that smart interventions have on our emergency workloads. As such, while we can continue our existing prioritisation, if rates are to increase in excess of our forecast then there is little within our control that we can do to minimise the workloads any further.

By including a forecast within our workloads which is subject to a reopener once the rates are known, our customers are provided with a fair balance between cost stability (as we have already anticipated a certain level of interventions) and cost efficiency (as we are not including an unnecessary risk margin to accommodate a higher intervention rate).

6.9 Competition

Contracting strategy

During GD1, we have utilised a mix of direct labour and external contractors to deliver the emergency service function. We have experienced challenging market conditions during this time because the skillset of our FCOs is highly transferable to smart metering or other domestic gas activities such as installing central heating.

Southern network has utilised a framework agreement to provide contractor FCOs to undertake core emergency work and supplementary meter work for our non-formula contracts during GD1. These resources support our depots in the south east of England where the recruitment and retention of employees is a particular challenge given the level of employment opportunities that exist. In 2019 it was decided to in-source these contractors to provide us with a greater level of resilience against labour market conditions. By doing so, we are able to remove the contractor work management overhead associated with the framework agreement and integrate the resources into our direct labour teams.

Having utilised external contractors in both networks during GD1, we have been able to use competitively tendered rates to benchmark our internal direct labour unit costs to ensure the emergency service function is delivered efficiently.

6.10 Real price effects

Our GD2 emergency service forecasts do not include any anticipated real price effects.

Ofgem has determined that the GD2 price control will use CPIH as the measure of inflation through which allowances should be adjusted year on year. While we consider CPIH to be a reasonable indicator of overall prices, our purchasing approach to goods and services differs from that of the domestic sector. As such, we have experienced real price effects in excess of those which would be applied through CPIH. We discuss this further, and propose alternative indices, in our Cost Efficiency appendix (005).

Costs in this appendix are shown in 2018/19 prices and are subject to the following cost pressures:

Upwards cost pressures

- Metering support. As discussed, at present our emergency expenditure benefits from undertaking commercial arrangements. This work will diminish as a result of the smart metering roll-out, where suppliers are undertaking meter installations in-house, and as such the associated waiting time costs will return to our emergency expenditure.
- Smart meter interventions. As discussed, a further consequence of the smart meter roll-out is the increase in interventions, whereby we are required to undertake a site visit either to facilitate a smart meter exchange, or to rectify any issues post-installation. An element of these interventions can be managed through our triage team, however a proportion will remain within the emergency workload. This work is expected to increase in intensity as we approach the assumed target date for completion of the roll-out.
- Regional factors. The impact of sparsity and urbanity are further detailed in the Cost Efficiency appendix (005). The analysis shows that both our networks are detrimentally affected by regional factors which influences the cost of operational delivery of outputs.
- Since our October draft business plan submission, there has been one change of note to the repair and emergency opex financial submission. As we operate a 24/7 service every day of the year, we need our teams available to respond quickly, safely, and efficiently to any gas emergency. Historically we have operated a resourcing model placing operatives on standby during evenings and weekends to provide this resilience.

  Following industry wide consultation with the key stakeholders on our resourcing model through the lens of personal and public safety we have identified the risk of fatigue. To mitigate the risk of fatigue we have, in collaboration with third-party global experts and trade union representatives, proposed a new resourcing

model using staggered working hours. This new model is designed to mitigate fatigue risk while practicably balancing costs. The proposed new resourcing model will be implemented from mid-November 2019 and will be continuously reviewed to ensure it is fit for purpose. This new resourcing model has had the yearly cost impact identified in Figure 6: below.

Table 6: Resourcing model costs

Network	Emergency	Repair
Scotland	Commercial Confidentiality	
Southern	Commercial Confidentiality	

Downward cost pressures

- Replacement programme. As the number of metallic mains in the ground decreases, as does the quantity of gas escapes on our network. This is shown in Figure 3: and Figure 4: in section 3.1, whereby the emergency workload is forecast to continue to decline.
- Weather. Based on seasonal norms, we would expect that winters may return closer to historical average temperatures. However, during GD1, we have also seen an increase in extraordinary winter weather events, both of which would increase workloads and drive up costs. Continuation of the exceptionally hot summer periods which we have recently experienced may also increase our workloads and similarly impact our costs. However, at present we have not made an accommodation within our forecast for these weather trends and have instead based our expected costs on the warmer winters observed through GD1 and the expected seasonal normal summers. Similarly, we have not factored in any additional costs in relation to an exceptional event, and therefore this represents a cost which we are currently proposing to absorb. This creates a risk for us should the actual weather deviate from our projections. However, this also has the benefit of reducing the expected costs of our repair activities. Therefore, we are currently working to better understand the potential cost pressures of prolonged or extreme weather events.

6.11 Financial summary

Funding rationale

For the purposes of the business plan submission on 9 December 2019 we have made our current forecast, shown in table 7, on the following assumptions:

- That cost pressures between 2018/19 and the start of the price control 2021/22 reflect the impact of the recent SGN pay deal.
- Existing 97% standard response times remain unchanged.
- The workload forecasts used throughout this paper are reflective of the replacement expenditure. If an alternative replacement strategy is chosen, then this may impact the emergency workloads and therefore emergency operating expenditure.
- The timing of gas escapes is not controllable, and we have no reason to expect a deviation from historical trends, so we have assumed that the proportion of emergency workload occurring at premium time is consistent with the last three years of RIIO-GD1.
- Commercial Confidentiality
- The smart meter roll-out is targeting an 85% installation saturation by 2024, creating a consequent reduction in our legacy meter work contracts. The associated time will be added back to FCOs' waiting time in the absence of other productivity improving measures.

Table 7: GD2 investment proposal

SGN (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Net Staff Costs	14.2	14.1	16.5	16.7	15.9	17.1	21.3	21.0	22.0	22.4	22.5	23.3	23.3
Commercial Confidentiality													
Materials	0.2	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Non Salary Staff Costs	0.3	0.0	0.5	0.5	0.5	-	0.6	0.5	0.7	0.7	0.7	0.7	0.7
Transport and Plant	2.8	2.9	3.9	3.6	3.5	3.7	3.8	3.9	3.5	3.5	3.5	3.7	3.6
Commercial Confidentiality													

Scotland (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Net Staff Costs	4.6	4.6	5.3	5.4	5.0	5.6	5.6	5.4	5.9	6.0	6.2	6.4	6.7
Commercial Confidentiality													
Materials	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Non Salary Staff Costs	0.1	0.0	0.2	0.2	0.3	-	0.3	0.3	0.3	0.3	0.3	0.3	0.4
Transport and Plant	1.1	0.8	1.2	1.2	1.1	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.2
Commercial Confidentiality													

Southern (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Net Staff Costs	9.5	9.5	11.1	11.3	10.9	11.5	15.7	15.7	16.1	16.3	16.4	16.9	16.6
Commercial Confidentiality													
Materials	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Non Salary Staff Costs	0.2	0.0	0.3	0.3	0.2	-	0.3	0.3	0.3	0.3	0.3	0.4	0.3
Transport and Plant	1.7	2.0	2.7	2.5	2.4	2.5	2.6	2.6	2.3	2.3	2.4	2.4	2.3
Commercial Confidentiality													

Business plan data templates

Below we have included direction to the relevant section of the Business Plan data templates (BPDTs) on a summary and activity-specific basis. We have included references to overall emergency service costs as well as associated topics: FCO utilisation, smart metering, emergency workloads and standards. Where possible, we have also included reference to the rows in which total values can be found. Where this is not possible, the activity is included in overall costs.

Cost influences and trends are discussed in section 6.10.

Category	Summary	Activity-specific
Total emergency service	2.01 Row 122	2.01 Row 122
FCO utilisation	2.03	2.03 Row 30 (Smart Metering) Row 39 (Emergency Activity) Row 50 (other Price Control Activities) Row 52 (non-formula (non-Price Control Activities))
Smart metering	2.22	2.22 Row 14
Emergency workloads	5.07	5.07 Row 12 (controlled PREs) Row 17 (uncontrolled PREs)
97% Standard	5.07	5.07 Row 14 (controlled PREs) Row 19 (uncontrolled PREs)

6.12 Assurance

Our Business Plan, including appendices, has been subject to a rigorous assurance process which is detailed in Chapter 3 of the plan and the Board Assurance Statement.

Our Director of Southern Operations and Managing Director Scotland were appointed as the Sponsors for the emergency service appendix and the associated Business Plan Data Templates (BPDTs), which have been through the following levels of review and assurance:

First Line

This was undertaken at project level by the team producing the document, as a regular self-check or peer review.

Second Line

This was undertaken independently within the organisation to review and feedback on product development, including a peer review by general managers. Internal audit reviewed the third line assurance work conducted by Ove Arup and Partners against scope.

Both senior manager and Director sign-off was obtained and our RIIO-GD2 Executive Committee: (1) considered the appropriateness of assurance activity for the appendix and (2) provided assurance to SGN's Board that the business plan meets Ofgem's assurance requirements.

Third Line

This was undertaken by external advisors and groups providing critical challenge during the development of products within the business plan. In addition to the feedback and challenge provided by the Customer Engagement Group (CEG) and Customer Challenge Group (CCG) this appendix was developed after consultation with and advice from:

Advisor / Group	Contribution
Ove Arup and Partners	Consultancy support to enable development of an evidence based high quality business plan draft by acting as an expert challenge group through independent peer reviews against Ofgem business plan guidance.

Fourth Line

This was undertaken by independent and impartial external providers, who provided a detailed and comprehensive report to both the Executive Committee and Board of Directors:

Advisor / Group	Contribution
Ove Arup and Partners ('Clean' Team)	Review of appendix against Ofgem's assurance requirements.
PwC	Business Plan Data Template review: Opex Cost Matrix: Controllable Activity Costs; Emergency; PRE, Reports & Repairs; Safety and Reliability.

7 Glossary

All acronyms and associated descriptions can be found within the Glossary appendix.