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RIIO-GD1  
Annual Report  
2017-18

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## Executive summary

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2017-18 was the fifth year of the eight-year RIIO-GD1 price control. The main focus of the RIIO price control framework is on outputs, incentives, innovation and total expenditure (totex).

This report primarily focuses on the performance of Gas Distribution Network companies (GDNs) for 2017-18 and includes reviews of their performance over the RIIO-GD1 period to date, forecasts for the remaining years of the price control. The report outlines key successes and challenges faced in RIIO-GD1 and helps inform our views in developing the next price control RIIO-GD2<sup>1</sup>.

### Output performance and drivers

GDNs continue to build on progress made in the early years of the price control to deliver against their outputs. All GDNs met their annual output targets in 2017-18, with the exception of two of the four Cadent networks, which again did not meet all of its customer satisfaction targets. Cadent North London also faces challenge in meeting its targets for unplanned interruptions. SGN Southern and Cadent North London are currently off-track from their eight-year FPNES connections targets but both forecast to meet the target at the end of RIIO-GD1.

With the exception of one network in the area of unplanned interruptions<sup>2</sup>, all GDNs are forecasting to meet all their eight year output targets by the end of the RIIO-GD1 period. The GDNs are encouraged to meet their output targets through RIIO-GD1 incentives. These include licence or other regulatory requirements on outputs and public reporting on delivery.

### Financial performance and drivers

The financial performance of GDNs is presented using the return on regulatory equity (RoRE) measure. This is derived from GDNs' forecast performance for RIIO-GD1. We calculate that operational RoRE performance (ie excluding financing and tax) range from 9.5% to 11.6% for RIIO-GD1 price control. This forecast is dependent on current forecasts and future delivery of outputs.

Collectively, the GDNs have a total expenditure (totex) allowance of £18.2 billion (2017-18 prices) over the RIIO-GD1 period to deliver their outputs. GDNs are now forecasting to spend £16.1 billion, which is £2.1 billion (11.4%) less than their allowances. GDNs are incentivised to outperform their totex allowance as part of the Totex Incentive Mechanism (TIM) where they will retain approximately 63% of underspend with the remainder, after allowing for corporation tax, going back to consumers.

Totex is a key driver of operational RoRE. Consumers fund a significant portion of GDNs' totex underspends, so it is important for us to understand why the companies are forecasting to spend 11.4% less than their allowances. Totex underspends are predominately related to the iron mains replacement programme expenditure (repex) and operational expenditure (opex). These account for 64% and 32% of totex eight-year forecast underspend respectively.

Consistent with last year, GDNs continue to report that improvements in their operational efficiency within the RIIO-GD1 period, are predominately driving their totex underspend.

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<sup>1</sup><https://www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-consultation>

<sup>2</sup> Cadent was unable to provide a forecast for unplanned interruptions for North London in its 2017-18 data submission. See paragraph 2.12.

Examples include introducing new technologies to improve productivity, new working practices to minimise gas leakages, the reduction of emergency repair costs driven by iron mains replacement and adopting a flexible workforce approach to fully engage staff during idle times.

Some of the underspend is also down to factors outside the GDNs' control. For example, the GDNs continue to benefit from recent mild winters except for the brief cold period in early 2018. The mild winters have resulted in GDNs spending less on emergency and repair. In addition, GDNs have benefitted from a slower than anticipated growth in input prices relative to the retail prices index (Real Price Effects, RPEs).

Finally, some of the underspend is likely due to variations in assumptions made at the time of setting RIIO-GD1 compared to actuals, for example, actual costs and work profiles for GDNs to replace iron mains.

## **Customer bills**

The financial and output performance of GDNs affects the allowed revenue that they can collect through customer bills. The performance in 2017-18 will impact on allowed revenue, and therefore customer bills, in 2019-20. We estimate that the average GB domestic customer will pay £114 (£ real in 2017-18 prices) for the year in 2019-20 for gas distribution network costs.

# 1. Introduction and context

1.1. GDNs are responsible for operating, maintaining and extending the gas distribution network, and for providing a 24-hour gas emergency service within Great Britain (GB).

1.2. This report reviews the performance of GDNs against their set delivery outputs and costs incurred against expenditure allowances for 2017-18. It also reports on the cumulative performance in the first five years of RIIO-GD1 and forecasts for the remainder of the eight-year price control period.

1.3. There are eight GDNs operating in GB, managed by four companies. To ensure value for money for consumers, we regulate the GDNs through periodic price controls that determine the amount of revenue that can be earned by the GDNs, and that stipulate levels of performance. To set our price controls we use the RIIO (Revenue = Incentives + Innovation + Outputs) framework. The latest price control runs from April 2013 to March 2021. We set the baseline revenues that GDNs can earn at the start of the price control. There are mechanisms to adjust revenues year-on-year depending on GDNs' performance against pre-set targets. There are outputs associated with baseline revenues that GDNs must deliver either on an annual or on an eight-year basis.

1.4. Using data and supporting information submitted by the GDNs, this report firstly reviews how the GDNs are delivering against the financial and output requirements of the price control. Chapter 2 gives an overview of output performance, including an explanation of why any targets were missed and a summary of some wider RIIO-GD1 output considerations. Chapter 3 provides an outline of financial performance, presenting information on company returns (measured through RoRE), total expenditure and allowed revenues. Chapter 4 provides an illustrative comparison of GDN cost efficiency using some of the models we used in the setting of the RIIO-GD1 price control. Given that all GDNs are forecasting to underspend total expenditure allowances in RIIO-GD1, Chapter 5 provides our high-level view of the drivers of this underspend.

1.5. Unless otherwise stated, all financial values in this report are in 2017-18 prices.

Company	Gas Distribution Network (GDN)	GDN abbreviation
Cadent	East of England	EoE
	North London	Lon
	North West	NW
	West Midlands	WM
Northern Gas Networks Limited	Northern	NGN
SGN	Scotland	Sc
	Southern	So
Wales & West Utilities Limited	Wales and West	WWU



## 2. Outputs, incentives and innovation

### Chapter Summary

This chapter examines GDNs’ performance against their RIIO-GD1 output commitments. Where GDNs have failed to achieve an output, or are forecasting to do so, we explain the reasons provided by the GDNs and what is being done in response. This chapter also considers wider RIIO-GD1 output considerations, alongside successes, challenges and innovation.

### Outputs and incentives

2.1. GDNs must deliver a range of outputs during RIIO-GD1. Some outputs must be met each year of the price control, while others must be met over the eight-year RIIO-GD1 period. An overview of GDN output performance in 2017-18 is shown in Table 2.1.

**Table 2.1: GDN 2017-18 output performance<sup>3</sup>**

2017-18 OUTPUT PERFORMANCE							
Company	Network	Environment	Connections / wider works	Customer Satisfaction	Social Obligations	Safety	Reliability/ Availability
CADENT	EoE	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting
	Lon	Meeting	Meeting	Missed customer satisfaction target on main gas connections	Off track from FPNES connections 8 year target	Meeting	Challenges in meeting unplanned interruptions duration target
	NW	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting
	WM	Meeting	Meeting	Missed customer satisfaction targets on duration of planned works and main gas connections	Meeting	Meeting	Meeting
NGN	NGN	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting
SGN	Sc	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting
	So	Meeting	Meeting	Meeting	Off track from FPNES connections 8 year target	Meeting	Meeting
WWU	WWU	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting

2.2. In 2017-18 GDNs achieved most of the output targets set for RIIO-GD1 and have consistently achieved the output targets for safety, environment, connections/wider works since 2015-16. For further information on output success achieved by GDNs please refer to the “Wider output considerations successes” section in this report.

<sup>3</sup>Red - the GDN has failed to achieve an annual output, or we forecast that it will not meet an eight-year output; Amber - the GDN is at risk of not meeting an eight-year output; Green - the GDN has met the annual output, or are on-target to meet the eight-year output commitment.

2.3. Although GDNs are achieving most of their output targets, as highlighted above, there are areas where improvements are required. Below is a summary of the key output performance issues for 2017-18. Additional data is also provided in the supplementary data file.

### **Customer satisfaction surveys**

2.4. The customer satisfaction surveys ask GDNs' customers to score their service out of 10. Customers are surveyed following planned interruptions, emergency responses and repair work and connections. GDNs can be rewarded or penalised annually by up to 0.5% of their base revenue, depending on how well they perform against their target.

2.5. In most cases the GDNs are achieving high levels of customer satisfaction, but there are some pockets of poorer performance. All GDNs met their annual targets for 2017-18 except Cadent. Cadent North London missed its target for the connections survey, and Cadent West Midlands missed its target for the connections and planned interruptions surveys. In 2017-18, Cadent was penalised £1.16 million under the Broad Measure of Customer Satisfaction incentive for failing to meet the customer satisfaction targets in these areas (although Cadent achieved a net overall reward for this incentive based on its performance in other component parts, such as in other customer satisfaction surveys).

2.6. Cadent has now been penalised a total of £9.91m in the RIIO-GD1 period for missing customer satisfaction targets (although received a net reward for this incentive, for the reasons outlined above). In 2017-18 it created a new Customer Performance Team to provide a single point of accountability for its customer strategy and it is currently rolling out various initiatives across its areas to improve customer experience. We are keen to see performance in this area improve in the remaining years of RIIO-GD1.

### **Fuel Poor Network Extension Scheme (FPNES)**

2.7. The FPNES helps vulnerable and fuel poor households that are off the gas grid to switch to natural gas by offering funding towards the cost of connecting to the gas network. So far in RIIO-GD1, GDNs have connected 64,100 households under this scheme, which is just over 70% of the eight-year industry target.

2.8. SGN Southern and Cadent North London are currently off-track from their eight-year FPNES connections targets but both forecast to meet the target at the end of RIIO-GD1. SGN Southern has forecasted that its 8-year target will be met through increased consumer engagement, together with the introduction of new initiatives arising from its £20m additional funding commitment to tackle fuel poverty. This was part of its £145m voluntary contribution made to benefit customers in November 2017<sup>4</sup>. Cadent has introduced a new model to help predict where potential fuel poor customers are located and continue to look for opportunities to further increase connections to households.

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<sup>4</sup> Refer to Strategic Report for SGN annual report 2018:  
<https://www.sgn.co.uk/uploadedFiles/Marketing/Pages/Publications/Docs-Annual-Reports/SGN-Annual-Report-2018.pdf>

GDNs have noted that meeting their FPNES targets will be more difficult given our decision to change the scheme criteria.<sup>5</sup>

### **Loss of supply (duration and number of interruptions)**

2.9. The loss of supply output aims to encourage GDNs to reduce the impact of service interruptions on customers. GDNs are measured on their performance against their targets for the number and duration of both planned and unplanned interruptions.

2.10. This is an eight-year output requiring GDNs to achieve minimum levels of network reliability performance for consumers, specifically in managing the number and duration of planned and unplanned interruptions of gas supply. Following a mid-period review of RIIO-GD1 targets, a consultation was undertaken and revised targets issued for this output in July 2017.<sup>6</sup>

2.11. Across the industry, planned interruptions fell by 20,500 in 2017-18 compared to the previous year. There was a marginal rise (circa 200) in the number of unplanned interruptions and an increase in the average duration of unplanned interruptions in 2017-18 compared to the previous year. This was primarily driven by a rise within Cadent's North London network.

2.12. Cadent was unable to provide a forecast for unplanned interruptions for North London in its 2017-18 data submission. It raised concerns on the achievability and reliability of future forecasting due to the large number of multi-occupancy buildings (MOBs) and uncertainty of workload. We are seriously concerned by the deterioration in Cadent's North London network performance in this area and are in active discussions with them about how the issue can be remedied. We have asked Cadent to provide us with a satisfactory action plan but will consider further steps if we do not think its proposals adequately protect consumers.

### **Wider RIIO-GD1 output considerations**

2.13. Additional wider RIIO-GD1 output areas worth highlighting are set out below:

#### **Iron mains risk reduction**

2.14. GDNs continue to undertake the long-term programme of replacing risky iron mains<sup>7</sup> on their networks as mandated by the Health and Safety Executive (HSE)<sup>8</sup>. Under RIIO-GD1, the 'iron mains risk reduction' primary output target sets the level of iron mains risk that GDNs must remove from their networks.

2.15. In 2017-18, five out of the eight networks have now exceeded their total GD1 primary output target of risk removed. The remaining three networks have yet to

<sup>5</sup> [Decision on change to the criteria for the Fuel Poor Network Extension Scheme September 2017](#)

<sup>6</sup> [Decision on updated reliability \(loss of supply\) targets for RIIO-GD1 March 2018](#). We did not change the targets for WWU as it told us that it did not want new targets and we considered its targets to be suitably challenging.

<sup>7</sup> The gas distribution network consists of 65,000 km of iron mains, representing 25% of the total mains population. The remainder is constructed mainly from polyethylene and steel. Iron mains are known to fail in service and can potentially cause major incidents (fires and explosions), which can injure or kill people and damage property.

<sup>8</sup> More info on the HSE's programme can be found on its website:

<http://www.hse.gov.uk/gas/supply/mainsreplacement/enforcement-policy-2013-2021.htm>

achieve their total output target but have still removed more risk than expected at this point in the price control.

### Guaranteed standards of performance (GSOPs)

2.16. GSOPs set service levels to which GDNs are required to adhere. They cover supply restoration; reinstatement following works; provision of alternative heating and cooking facilities for priority domestic customers (e.g. when there is an outage); complaint response times; notification periods for planned gas supply interruptions; and connection services. If a GDN fails to meet the service level specified in the GSOP, it must make a payment to the customer affected<sup>9</sup>.

2.17. We monitor compliance against GSOPs for connections as an output within RIIO-GD1. We also monitor compliance to other GSOPs as part of the overall picture of performance in reliability and customer service.

2.18. GSOPs on connections relate to the timely delivery of new connections services where GDNs must meet the standards at least 90% of the time. All GDNs achieved this in 2017-18. GDNs also met their GSOP targets for responding to emergency phone calls and gas escapes. For the other GSOPs<sup>10</sup>, a total of £2.9 million in compensation payments were made in 2017-18, of which 70% related to payments to domestic customers' premises with gas supplies not restored within the prescribed period.

2.19. Last year it came to our attention that GDNs have been misinterpreting the reporting procedure for GSOP-related compensation payments. GDNs have been including such payments in totex, which is not in line with our reporting requirements. The exclusion from totex is important to avoid GSOP payments being partially funded by consumers through the operation of the totex incentive mechanism. To date over the first 5 years of RIIO GD1, £16.7m of GSOP payments have been reported within totex. The GDNs have agreed to correct this reporting issue and any sums recovered to date through the totex incentive mechanism are expected to be returned to customers in 2020/21. We will seek to clarify the guidance to ensure this does not happen again.

### Wider output considerations - successes

2.20. In 2017-18, the GDNs continued to achieve the majority of their output targets. Key successes achieved by the GDNs within RIIO-GD1 period include:

- **Customer satisfaction** - In most cases customer satisfaction survey scores have improved, with some GDNs consistently achieving scores over 9/10. The number of complaints have reduced by 20% since 2013-14.
- **Social obligations** – Most GDNs are on track to achieve the target of 91,000 fuel poor households to be connected to the gas network over RIIO-GD1. To date, GDNs have connected 64,100 fuel poor households, which is 5,200 more than planned at this stage of the price control. GDNs continue to develop and

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<sup>9</sup> See Appendix 10 of [RIIO-GD1 Regulatory Instructions and Guidance](#) and the [Energy Networks Association Notice of Rights](#).

<sup>10</sup> GSOP 1 supply restoration; GSOP 2 reinstatement of customer premises; GSOP 3 heating and cooking facilities for priority domestic customers; GSOP 12 notification and payments under GSOPs; GSOP 13 notification in advance of planned interruptions; GSOP 14 responding to complaints.

implement innovative approaches to identify consumers in vulnerable situations to connect them to the scheme.

- **Reliability** – The service availability of the distribution network in 2017-18 was 99.99%. The sector continues to make sufficient capacity provisions to ensure customers' gas supply is not interrupted during periods of highest demand in harsh winter conditions, such as Beast from the East experienced in early 2018. Good collaboration exists between GDNs in assisting other networks during major incidents to minimise loss of gas supply to customers. For example, all GDNs contributed engineers to speed up the process of supply restoration following a gas supply outage incident affecting around 3,500 customers in March 2018.
- **Low carbon** – GDNs are developing flagship innovation projects that will provide quantified safety-based evidence to help inform future government policy for the decarbonisation of heat.
- **Customer safety and engagement** – Within the RIIO-GD1 period, GDNs have rolled out several gas safety schemes primarily targeted at children and vulnerable consumers. This includes engaging consumers on the dangers of carbon monoxide poisoning and how to spot it. The sector has introduced safety devices such as a locking cooker valve which can be easily fitted to existing gas cooker pipework in elderly or vulnerable people's households. When the valve is locked it eliminates the risk of the cooker being unintentionally turned on or left on.

## Innovation

2.21. The Network Innovation Allowance (NIA) and gas Network Innovation Competition (NIC) have now been in place since 2013. These aim to encourage GDNs to innovate in the design, build and operation of their networks to facilitate the transition to a low carbon economy.

2.22. Please refer to Table 2.340 of the supporting datafile accompanying this report, which provides a summary of the number of NIA projects undertaken by the GDNs, their costs and percentage of NIA allowance used to date.

2.23. In 2017-18, two GDN projects were selected by us to receive a total of £15.2 million of NIC funding:

- SGN funded **Robotic Roadworks and Excavation System (RRES)** project was awarded £6.3 million. RRES will use advanced robotics and artificial intelligence to lower operational cost, improve efficiency, safety and environmental impact of utility excavations and activity.
- Jointly funded **H21** project was awarded £8.9 million to provide safety based evidence to assess whether the gas distribution networks of GB are suitable to transport 100% hydrogen. The evidence produced could be used to support the case for a GB hydrogen conversion.

2.24. Table 2.350 of the supporting datafile accompanying this report provides a breakdown 2017-18 NIA projects and expenditure for 2017-18. Further information on NIA projects and National Innovation Competition (NIC) is on our website.<sup>11</sup>

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<sup>11</sup> [Gas Network Innovation Competition](#)

## 3. Financial performance

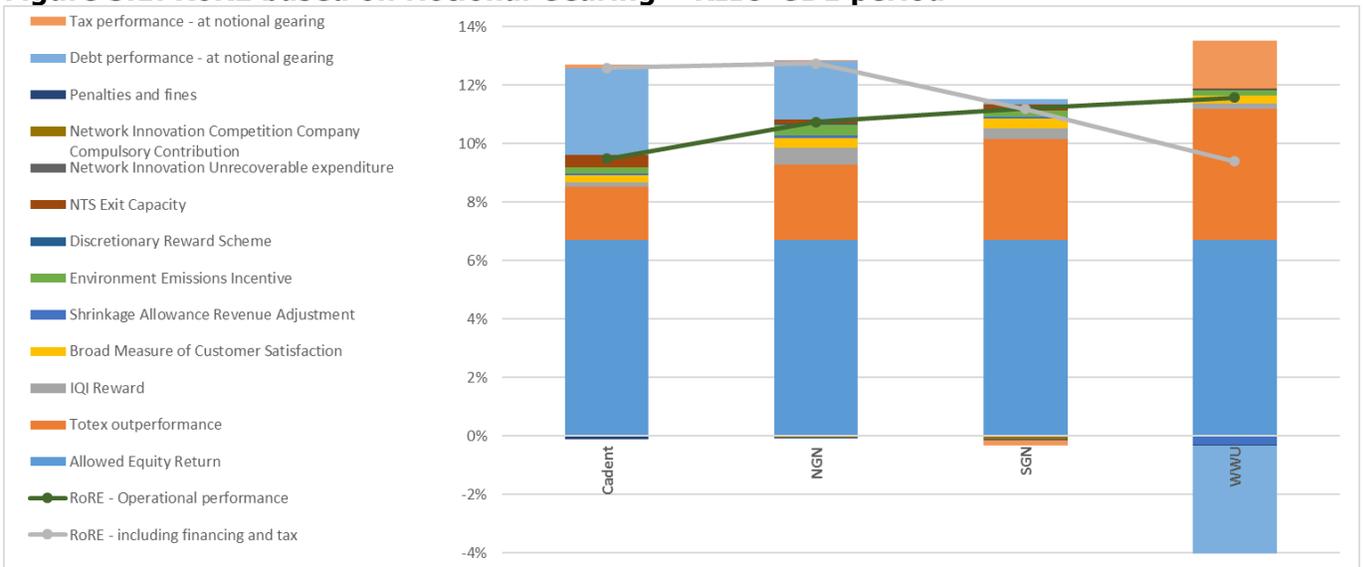
3.1. Accompanying this report we have included a regulatory financial performance annex. This sets out our detailed assessment of network companies<sup>12</sup> regulatory financial performance, based on information that they have reported using the new regulatory finance performance reporting (RFPR) process. This provides more targeted, detailed financial information on performance under RIIO, namely the impact on returns of each company's level of gearing, cost of debt and actual tax payments.

3.2. In this Annex we set out our view of the following:

- Return on Regulatory Equity (RoRE) for the RIIO-1 period
- Allowed Revenue and the Annual Iteration Process (AIP)
- Gearing and financing
- Regulatory Asset Value (RAV)

3.3. A summary of GDNs' RoRE performance is shown in Figure 3.1 and further details are provided in the Appendix 2 (Finance Report).

**Figure 3.1: RoRE based on Notional Gearing – RIIO-GD1 period**



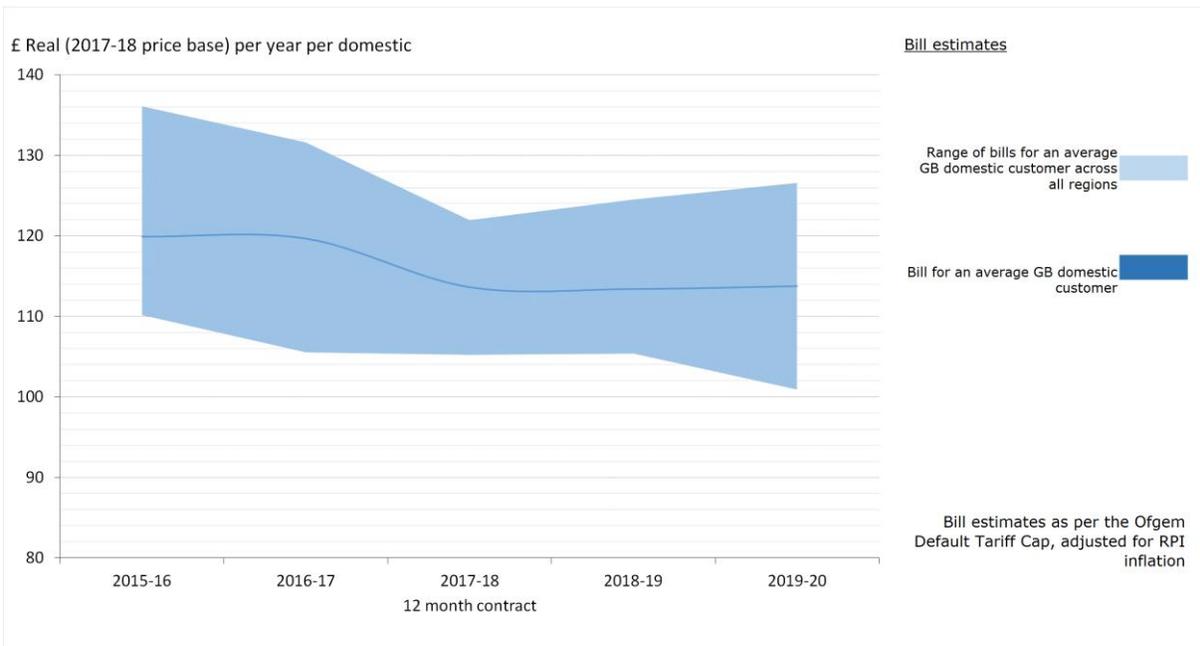
<sup>12</sup> This includes financial performance for all sectors – RIIO-GD1, RIIO-T1 and RIIO-ED1.

## Customer bill impact

3.4. Our Default Tariff Cap<sup>13</sup> provides an estimate of the overall cost of domestic energy bills. This includes estimates of the proportion of the overall cost of energy which is gas distribution costs. Our methodology uses an average gas demand applied uniformly across all regions and over time.<sup>14</sup> Actual customer bills are sensitive to geographic region, consumption volume and the timing and duration of contracts.

3.5. Our latest bill estimates using this methodology are reported in Figure 3.2 and in Table 3.1. We estimate that the average GB customer in 2019-20 will pay £114 per annum (in 2017-18 price terms) for gas distribution costs. Charges differ considerably depending on the region in which a domestic consumer resides: ranging from £101 in East of England to £127 in London (in 2017-18 price terms), see Table 3.1 for details.

**Figure 3.2: Estimates of typical GB consumer costs to meet allowed revenue**



<sup>13</sup> We used the latest data as per the Default Tariff Cap: <https://www.ofgem.gov.uk/publications-and-updates/default-tariff-cap-level-1-april-2019-30-september-2019>. This report assumes charges remain unchanged throughout 2019-20. However, when the Default Tariff Cap is updated in late summer 2019 it will reflect the latest data available. For this report, the DTC nominal bills have been deflated using RPI data.

<sup>14</sup> Using median domestic consumption behaviour (volume and timing of use) for a 12-month fixed price contract.

**Table 3.1: Regional estimates of typical GB consumer cost to meet allowed revenue (£ Real (2017-18 price base) customer bill per typical domestic consumer)**

Year:	Apr-15	Apr-16	Apr-17	Apr-18	Apr-19
<b>GB average:</b>	<b>120</b>	<b>120</b>	<b>114</b>	<b>113</b>	<b>114</b>
<b>Licensee</b>					
Cadent - East of England	112	106	105	105	101
Cadent - London	136	132	122	122	127
Cadent - North West	119	118	110	110	110
Cadent - West Midlands	116	113	110	110	109
Northern Gas Networks	120	116	110	106	110
SGN - Scotland	110	121	112	113	112
SGN - Southern	127	128	121	125	122
Wales and West Utilities	122	123	118	115	119

## Total expenditure (totex)

3.6. The totex approach to setting price controls aims to incentivise companies to deliver outputs at the lowest total cost, without preferring cost savings derived from operating expenditure (opex) or capital expenditure (capex) solutions<sup>15</sup>. This approach encourages GDNs to choose the most efficient way of meeting their outputs.

3.7. At the start of RIIO-GD1, we provided GDNs a totex<sup>16</sup> allowance of £17.6 billion. Since then, allowances have been adjusted to reflect uncertainty mechanisms<sup>17</sup> and voluntary company returns. In this 2017-18 report, SGN's £145 million voluntary contribution has been reflected in totex figures. For this report, performance will be measured against the adjusted allowances, £18.2 billion when rounded, for the eight years of RIIO-GD1.

3.8. GDNs are incentivised to outperform their totex allowance as part of the totex incentive mechanism (TIM). Through TIM, any underspend compared to the allowed totex is shared between the GDN and consumers. GDNs will retain approximately 63% of this underspend and the remainder will go back to consumers after allowing for corporation tax.

3.9. Table 3.2 shows that in 2017-18, the totex allowance was £2.3 billion and actual expenditure was £1.9 billion<sup>18</sup> resulting in an underspend of £0.4 billion or 16%.

<sup>15</sup> This is achieved by setting the same totex incentive rate (the percentage that the licensee bears of an under or overspend against allowances) for both capex and opex solutions.

<sup>16</sup> Totex excludes business rates, license fees, pensions contributions and shrinkage (uncontrollable costs).

<sup>17</sup> At the time of setting RIIO-GD1 allowances, there was uncertainty around some costs and because of this, the price control allows the GDNs to apply for adjustments to their allowances by means of a reopener mechanism, in order to accommodate particular uncertain costs.

<sup>18</sup> Reported actual expenditure has not been corrected to remove GSOP-related compensation payments. We intend to resolve this discrepancy for reporting year 2018-19 and any sums recovered to date through the totex incentive mechanism are expected to be returned to customers in 2020/21 (see paragraph 2.19).

**Table 3.2: Totex allowances and actual expenditure in 2017-18 (£m, 2017-18 prices)**

Category	CADENT				Industry
	EoE	Lon	NW	WM	
Total allowed expenditure	351	310	259	201	
Actual expenditure	319	267	214	164	
Overspend (underspend)	(31)	(43)	(45)	(37)	
Total incentive rate	63.0%	63.0%	63.0%	63.0%	
Allowed expenditure after sharing	339	294	242	187	
Category	NGN	SGN		WWU	Industry
		Sc	So		
Total allowed expenditure	257	221	446	266	2,311
Actual expenditure	227	163	383	195	1,933
Overspend (underspend)	(30)	(58)	(63)	(71)	(378)
Total incentive rate	64.0%	63.7%	63.7%	63.2%	
Allowed expenditure after sharing	246	200	423	240	2,171

3.10. Table 3.3 shows five-year totex performance and eight-year forecast totex performance. Forecasts for the remainder of the price control have been conducted by the GDNs based on their expectations. All eight GDNs have underspent totex allowances to date and are forecast to underspend for the whole RIIO-GD1 price control period by £2.1 billion (11.4%).

**Table 3.3: Totex allowances and actual four-year cumulative expenditure and RIIO-GD1 forecast**

GDN		5 Year Cumulative				RIIO-GD1 Forecast			
		Adj'd Allowance <sup>1</sup>	Actual	Variance		Adj'd Allowance <sup>1</sup>	Actual (forecast)	Variance	
		£m	£m	£m	%	£m	£m	£m	%
Cadent	EoE	1,719	1,603	(116)	(6.7%)	2,708	2,678	(31)	(1.1%)
	Lon	1,547	1,285	(262)	(16.9%)	2,435	2,186	(249)	(10.2%)
	NW	1,295	1,185	(110)	(8.5%)	2,043	1,897	(146)	(7.1%)
	WM	1,001	866	(135)	(13.4%)	1,590	1,376	(214)	(13.5%)
NGN	NGN	1,347	1,175	(172)	(12.8%)	2,111	1,881	(230)	(10.9%)
SGN	Sc	1,101	852	(249)	(22.6%)	1,721	1,411	(310)	(18.0%)
	So	2,209	1,812	(397)	(18.0%)	3,462	2,969	(493)	(14.2%)
WWU	WWU	1,363	1,097	(265)	(19.5%)	2,155	1,746	(410)	(19.0%)
<b>Industry</b>		<b>11,581</b>	<b>9,875</b>	<b>(1,706)</b>	<b>(14.7%)</b>	<b>18,226</b>	<b>16,144</b>	<b>(2,082)</b>	<b>(11.4%)</b>

<sup>1</sup> Adjusted allowance - includes adjustment for Tier 2A and additional allowances for Physical Site Security, Streetworks (incl. forecasted), London Medium Pressure adjustment, fuel poor and Xoserve. These costs do not include PCFM policy adjustments.

3.11. The eight-year picture demonstrates that companies expect to continue to underspend through RIIO-GD1. However, their forecast underspends are lower than they have been to date. This is mostly because companies forecast to increase their spend in areas such as repex towards the end of the price control.

3.12. Figures 3.01F and 3.02F in the data file show costs split between the categories of capital expenditure (capex), iron mains replacement expenditure (repex) and operational expenditure (opex).

## 4. Cost modelling

### Chapter Summary

This chapter provides comparative analysis of GDNs cost performance in 2017-18 by using the cost benchmarking models that we used in the setting of the RIIO-GD1 price control.

### Overview

4.1. In RIIO-GD1, we set totex cost allowances based on an efficiency review of GDNs' historical cost performance and an assessment of their forecasts. We relied extensively on comparing costs between GDNs at a disaggregated activity level and totex level.<sup>19</sup> Where such comparative benchmarking could not be undertaken due to unique costs or particular high value or technical projects, we engaged specialist consultants for expert review of expenditure and forecasts.

4.2. We are currently developing our approach to cost assessment for RIIO-GD2 and are planning further working groups in this area ahead of a more detailed consultation on our proposed approach in summer 2019. In advance of this, we have re-run the econometric models used when setting RIIO-GD1. We have done this purely for illustrative purposes to show where companies stand against RIIO-GD1 models.

4.3. Presenting the results of these models in no way prejudices the further development that we will undertake, and the models eventually developed for RIIO-GD2 may differ significantly from those set out here. We may decide that alternative cost drivers, functional forms and disaggregation of costs are more appropriate for the purposes of RIIO-GD2. Nonetheless, we hope that the results presented here provide a helpful context for the work about to be undertaken.<sup>20</sup>

### Methods

4.4. We used the ten years of GDPCR and RIIO-GD1 data to date to re-run the following cost models from RIIO-GD1: seven bottom-up models to analyse GDNs' performance at a disaggregated activity level, as well as one top-down (totex) model to explicitly account for the potential trade-offs between cost activities.

4.5. The models establish a relationship between GDNs' costs and our chosen driver of these costs. We assumed a Cobb-Douglas functional form and thus used the logarithm of both the dependent and the independent variable (i.e. costs for the activity and cost

<sup>19</sup> In RIIO-GD1, costs were analysed also at a mid-level (opex, capex, repex). However, we did not use the corresponding results as they were similar to the findings at the totex level.

<sup>20</sup> For further information on our RIIO-GD2 cost assessment approach, please refer to the RIIO-2 sector specific methodology consultation document (RIIO-GD2 Sector Annex) published in December 2018. Link below: <https://www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-consultation>

driver) in all model specifications.<sup>21</sup> Moreover, we included time fixed effects ('time dummies') to account for potential differences in costs over time. The general model specification is as follows:

$$\log(\text{cost activity}_{it}) = \beta \log(\text{cost driver}_{it}) + \delta_1 \text{time dummy}_1 + \dots + \delta_{10} \text{time dummy}_{10} + e_{it},$$

Where subscript *i* indicates the GDN and *t* the year, while *e<sub>it</sub>* is the error term.

4.6. Before estimating the models via Ordinary Least Squares (OLS), we also made some adjustments to take account of costs outside of GDNs' control. These adjustments are the same as we used in RIIO-GD1 (e.g. streetworks and regional factors such as labour costs). These adjustments mean that the costs used in the models are different from those reported by the GDNs in their RRP. Nonetheless, such adjustments are necessary to ensure comparability between GDNs.

4.7. Table 4.1 lists each cost model with the corresponding cost driver. Intuitively, we would expect a positive relationship between each cost activity and the corresponding cost driver (i.e. positive sign for the coefficient  $\beta$ ). This is confirmed by our estimation, as shown in the last column in Table 4.1. Indeed, all the estimated regression coefficients are positive and statistically significant at the 1% confidence level.

**Table 4.1: Model specifications and estimated coefficients**

Level of analysis	Cost activity	Cost driver	Estimated coefficient ( $\beta$ )	R <sup>2</sup>
<b>Bottom-up</b>	Maintenance	Maintenance MEAV <sup>1</sup>	0.792	0.994
	Repairs	Total external condition reports	0.887	0.993
	Emergency	Emergency CSV <sup>2</sup>	0.976	0.995
	Work management	MEAV <sup>1</sup>	0.557	0.995
	Connections	Workload	0.711	0.995
	Mains reinforcement	Workload	0.730	0.837
	Repex	Workload	0.815	0.999
<b>Top-down</b>	Totex	Totex CSV <sup>2</sup>	0.767	0.999

**Notes.** <sup>1</sup> MEAV stands for Modern Equivalent Asset Value. It indicates the current replacement value of an asset. <sup>2</sup> CSV stands for Composite Scale Variable. We used CSVs in some of our regressions to encompass a wider range of factors influencing costs than are captured in a single cost driver. For example, in the case of emergency, the CSV is a combination of customers' number and total external condition reports. As for totex, the corresponding CSV is defined as a weighted

<sup>21</sup> The Cobb-Douglas function is one of the most common functions in empirical cost research. It accounts for potential economies of scale and enables variables to better reflect the normality assumptions underlying the OLS estimation method.

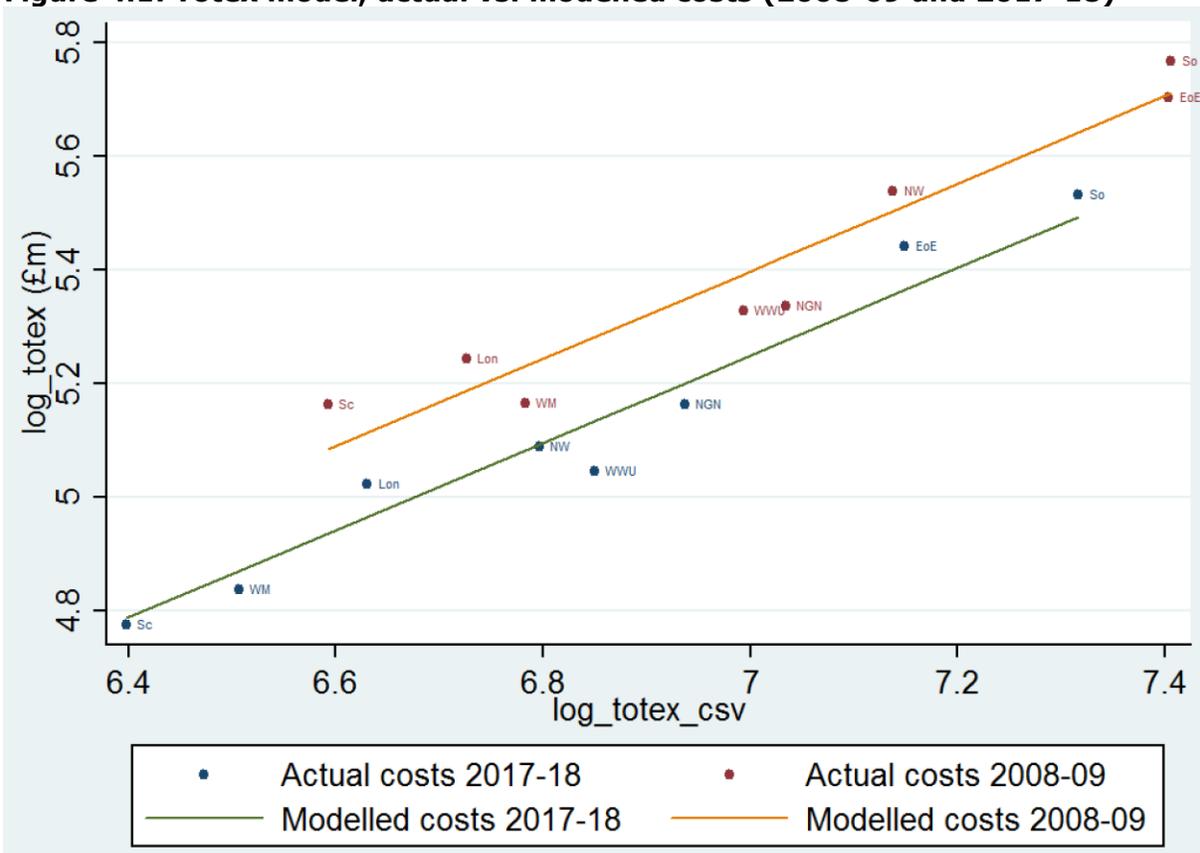
average of MEAV, emergency CSV, total external condition reports, as well as workloads related to connections, mains reinforcement and repex.

## Model results

4.8. Figure 4.1 illustrates part of the regression results. The orange and green straight lines show the estimated relationship between totex and totex cost drivers (CSV) at the start (2008-09) and at the end (2017-18) of our observation period, respectively. The red and blue dots report the actual costs at the start and at the end of the observation period, respectively.

4.9. Broadly speaking, if the actual totex of a GDN is below the line of modelled totex in a given year, then the GDN exhibits lower totex than the average (eg WWU or NGN in 2017-18), thus suggesting relative cost efficiency. Overall, the figure shows a general decrease in the level of totex over time (the shift of the line downwards), which could imply improving cost efficiency over RIIO-GD1 and the previous price control (GDPCR). The figure also shows that the totex cost drivers (CSV) have decreased (the shift of the line to the left). Further analysis suggests that this is mainly due to actual workloads being below those assumed in modelling.

**Figure 4.1: Totex model, actual vs. modelled costs (2008-09 and 2017-18)**



4.10. After running all models listed in Table 4.1, we compared the actual costs (ie submitted costs, with the due adjustments) with the modelled costs (ie costs predicted by the model). Actual costs higher than those predicted by the model ('modelled') imply that the GDN is performing below the average. On the contrary, actual costs below the modelled costs indicate that the GDN is performing above average.

**Table 4.2: GDNs’ actual vs. modelled costs (2017-18) using 10 years of data**

Activity GDN/Costs (£m, 2009-10 prices)	Maintenance		Emergency		Repairs		Work Management	
	Actual	Modelled	Actual	Modelled	Actual	Modelled	Actual	Modelled
EoE	24.44	17.41	14.54	13.84	17.57	15.58	22.73	17.36
Lon	9.60	8.20	10.15	8.59	16.45	13.29	13.06	11.60
NW	14.34	10.29	10.61	10.08	14.72	15.23	15.12	13.69
WM	9.50	8.87	7.32	7.19	9.09	9.94	14.04	11.73
NGN	8.86	10.13	11.76	8.94	11.54	10.76	9.94	13.68
SC	6.98	9.60	4.66	5.76	5.15	4.64	8.20	11.65
SO	12.38	15.64	11.66	13.49	12.96	12.71	15.96	17.44
WWU	12.38	15.26	6.93	8.48	5.77	8.64	16.10	14.65

Activity GDN/Costs (£m, 2009-10 prices)	Mains Reinforcement		Connections		Repex		Totex	
	Actual	Modelled	Actual	Modelled	Actual	Modelled	Actual	Modelled
EoE	5.10	4.84	12.13	8.46	77.03	77.85	230.65	213.50
Lon	8.66	1.11	5.40	4.84	59.93	61.97	151.66	143.37
NW	1.76	2.91	4.42	4.45	57.92	64.07	162.18	162.85
WM	1.78	1.80	3.22	4.29	50.30	50.69	126.18	130.37
NGN	1.49	3.17	7.82	8.12	72.43	82.92	174.75	181.36
SC	3.50	4.52	6.56	8.57	50.30	41.07	118.62	119.91
SO	5.16	5.83	14.94	14.31	130.15	106.40	252.72	242.87
WWU	3.58	5.69	14.08	12.95	52.97	59.50	155.26	169.61

4.11. The results in Table 4.2 suggest that the same GDN does not necessarily perform above average in all cost categories. In other words, it seems that most GDNs exhibit lower costs in certain activities, but higher costs in others. For example, in 2017/18 NGN performed above average in all activities except in emergency and repairs. Similar results are obtained for WWU, with below average performance only shown in work management and connections activities, and SGN Scotland, with below average performance only shown in repairs and repex. Cadent North West and West Midlands only exhibit higher costs than the average in maintenance, emergency and work management activities. SGN Southern also shows costs higher than the average in more than two activities (repairs, connections, repex and totex). Finally, for most cost activities, Cadent East of England and North London exhibit higher costs than the average.

4.12. Table 4.2 shows the results relative to the reporting year 2017-18 for each GDN and each cost activity. It does not explicitly link cost performance to output delivery. It is important to note that the results provide a limited view of cost performance by only comparing one year’s expenditure against modelled costs. Therefore, the results do not provide a picture of overall cost efficiency performance through RIIO-GD1. The assumptions and limitations are discussed further below.

4.13. When looking at the results over time it can be seen that the relative positions of the companies is not constant over time. This could be due to changes in relative efficiency, issues with the way data is reported (eg impact of accruals discussed further below), or factors in a year that may have had a disproportionate impact on a particular

company. In the development of models for RIIO-GD2 we will need to examine such factors in more detail to ensure that we are making appropriate comparisons. To demonstrate how the difference between modelled and actual costs has evolved over time Table 4.3 presents the results from the totex model using 5 years of RIIO-GD1 data.

**Table 4.3: GDNs' actual vs. modelled totex over time using 5 years of data**

	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	107%	104%	103%	107%	107%
Lon	110%	105%	109%	108%	106%
NW	105%	110%	107%	103%	100%
WM	99%	103%	99%	96%	97%
NGN	90%	89%	94%	94%	96%
SC	94%	94%	94%	96%	100%
SO	94%	96%	97%	101%	103%
WWU	104%	100%	99%	96%	92%

4.14. Table 4.3 summarises the results of the estimation of the totex model over 5 years of RIIO-GD1 data. Specifically, the table shows, for each GDN and each year, the ratio of actual totex to modelled totex in percentage terms. Values above 100% indicate that actual totex is higher than the average in the corresponding year, while values below 100% indicate that actual totex is lower than the average.

## Limitations of this analysis

4.15. Some proportion of relative cost variations between companies shown above may not be due to genuine efficiency, but instead be the result of other structural differences across GDNs (eg opex/capex allocations or reporting inconsistencies<sup>22</sup>). We use data normalisations to ensure the consistency of data when using such models in cost assessment. Such data normalisations have the potential to change the results of this preliminary analysis.

4.16. Although these results are useful in providing an overview of GDNs' relative performance in terms of costs, it is important to note that all modelling requires assumptions. Despite the very high R squared values for all the estimated regression models, some of them did not pass statistical tests for robust model specification.<sup>23</sup>

<sup>22</sup> For example, our analysis does not include any adjustments for accruals. In this respect, it was brought to our attention that WWU reported a large one-off accrual release in 2017-18. We acknowledge that this makes WWU's 2017-18 data submission an imperfect reflection of their ongoing operating costs and thus affects the relative performance results for the year 2017-18. However, adjusting for this specific accrual would require making a similar adjustment for any previous material accrual releases occurred in the past, which is out of the scope of this analytical illustration. Another example is the reporting of capitalised replacement costs. Differently from the other companies, SGN included these costs in repex rather than in mains reinforcement. We acknowledge that this discrepancy might affect repex regression results and needs to be addressed in the future.

<sup>23</sup> For example, the models for maintenance, emergency, repairs and repex did not pass the test for the presence of omitted variables (Ramsey test). This means that, as it is, the corresponding models might not be well specified.

## 5. Totex performance drivers

### Chapter Summary

This chapter outlines our updated view on the drivers of GDN total expenditure (totex) underspend for 2017-18, and considers whether these are down to efficiency, variances against assumptions made within the RIIO-GD1 settlement, or other external factors.

### Overview

5.1. GDNs are incentivised to outperform the RIIO-GD1 totex allowances as they retain a share of underspend with a share also being passed on to consumers. In the first five years of the RIIO-GD1 price control, GDNs have underspent totex allowances by 14.7% (14.2% in 2016-17), and are forecasting an eight-year underspend of 11.4% (12.1% in 2016-17)

5.2. It is important for us to understand why the companies are forecasting to spend 11.4% less than their allowances to help inform the setting of the next price control. In this chapter we show some of the key totex underspend drivers outlined by the GDNs.

5.3. We asked the GDNs to explain the drivers for totex underspend in their annual strategic commentaries. We consider the drivers to be attributable to the following three expenditure categories:

- **Efficiency:** an improvement in how things are being done, resulting from, for example, innovation and more efficient working practices.
- **External factors:** factors outside of the control of GDNs and unforeseeable at the time of setting the price control. These include areas such as weather and economic conditions.
- **Provision in the price control settlement:** assumptions made within the RIIO-GD1 settlement that have varied against the actual position.

5.4. We summarise industry trends below, but the effects for individual GDNs may differ. The drivers identified don't apply universally and do not apply for all GDNs at the same magnitude.

## Industry-wide summary

5.5. The industry picture for the key drivers of totex underspend is largely the same in 2017-18 as we reported in the 2016-17 Annual Report.<sup>24</sup> GDNs continue to report cost efficiencies through the introduction of new ways of managing their business operations, assets and via innovation. GDNs also report that some of the underspend is driven by factors outside of their control. For example, GDNs have been able to spend less on emergency and repair because winters have not been as harsh when compared with previous years and the GDNs have also benefitted from a slower than anticipated growth in input prices relative to the retail prices index (Real Price Effects, RPEs). Finally, GDNs have reported some of the underspend is due to variations in assumptions made at the time of setting RIIO-GD1 compared to actuals. For example, repex allowances were set according to a particular profile of work but actual spend reflects a different work-mix. The underspends associated with this point vary by company, and some companies have told us they expect to make up the difference over the remainder of the price control. For further detail on this point, please refer to the 2016-17 Annual Report.

5.6. In 2017-18, GDNs have reported a small number of underspend drivers that we did not include in the 2016-17 Annual Report. These include:

- Efficiencies in work management, scheduling and control, including access to accurate real-time information to aid resource planning and decision making.
- Efficiencies yielded from stakeholder engagement activities leading to savings in areas such as traffic management.
- Benefits gained from assumptions made at the time of setting RIIO-GD1 regarding customers on interruptible contracts. Savings on reinforcement were realised by managing such customers through network optimisation instead.

5.7. The GDNs also reported overspend in some activities. These include IT and business support investments but that should yield future efficiencies, and network reinforcement to ensure ongoing security of supply.

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<sup>24</sup> <https://www.ofgem.gov.uk/publications-and-updates/riio-gas-distribution-annual-report-2016-17>