RIIO-GD2 Business Plan Appendix

Cost Efficiency

December 2019

SGN
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Contents

1 Overview

1.1 Scope of this appendix

It is important Ofgem's cost assessment approach at GD2 is robust and provides results that accurately reflect company performance. The approach used at GD1 is a solid foundation, and any significant movements away from this established approach should be strongly justified. However, there are several areas in which the GD1 approach can be built on or improved, and these are discussed in detail in this appendix.

It is also essential Ofgem continues to recognise the importance of totex models as part of its benchmarking toolkit. Totex modelling provides a view of companies' overall value-for-money, helps to capture trade-offs across different cost categories and overcomes allocation problems caused by companies operating different business models.

Furthermore, to achieve benchmarking results which accurately reflect company performance, Ofgem must continue to consider:

- Region-specific factors that impact companies' costs but are outside their control (including, for SGN, the recognised incremental costs of operating in London, the south more widely, the sparser regions of Scotland, and on the Isle of Wight);
- Cost pressures affecting companies, where these go beyond Ofgem's default inflation index (in particular for labour and materials); and
- Suitable productivity assumptions, based on trends in the wider economy that represent a realistic view of what can be achieved in future, rather than recent historical cost movements in the sector.

We believe optimal outcomes can be achieved through transparency and openness through Ofgem's Cost Assessment Working Group (CAWG). This group can help shed light on several complex topics, can offer views on what elements of the current cost assessment process may not be working well and can help propose and test new ideas.

One critical issue which we believe Ofgem needs to address, and which has been raised in responses to Ofgem's consultation, is to formalise the process around the sharing of Ofgem's early model proposals with industry. Experience of past price controls shows that mistakes can be made if a rigorous Quality Assurance process is not followed ***well before the draft determination***. At the latest, Ofgem should share its working models and data with the industry in Spring next year, but a proper due process would involve an even earlier engagement.

This appendix first looks at SGN's historical efficiency based on Ofgem's GD1 benchmarking models, as well as using models incorporating our proposed improvements to these models for GD2. It then covers other topics related to future efficiency, including regional factors, productivity assumptions and real price effects. We cover the issues set out above, as well as our proposed approach on each of these.

Nominal figures are used unless otherwise stated.

1.2 Impact

Assessment of GDN efficiency provides a view on the value for money delivered by each GDN and is also integral to the setting of allowances. In order to ensure that this assessment is robust, and that allowances are set at the right level, it is essential to consider how the approach to measuring efficiency can be improved, and whether certain elements need to be updated.

The benchmarking analysis is done on historical data up to this point i.e. the first 5 years of GD1. Our view is that this analysis shows that we are a leading company and starting from an efficient cost base, which is the basis for our cost projections going forward. The historical efficiency performance can give Ofgem and stakeholders confidence that the costs we are putting forward for GD2 are also efficient.

1.3 Approach to GD2 – Summary of GD2 proposals

At present we have concerns about the robustness of some of the GD1 disaggregated benchmarking models. While many of the weaknesses in these models can be addressed, we note that it is essential to retain the totex model as a key part of Ofgem's cost assessment toolkit, as this provides an overarching cross-check to the disaggregated models.

The proposed modifications to specific disaggregated models are detailed in this appendix, and include:

Repex	• Include CISBOT workload in repex cost driver; • Consider using an average or aggregate of the five-year results; • Continue to adjust results for innovative processes; • Consider removing large diameter pipes from the results (doing an independent engineering assessment on these projects); • Update the unit cost assumptions that feed into the synthetic unit costs; and • Conduct a sense-check between cost efficiency results and quality of outputs.
Capex connections and mains reinforcement	• Consider updating the unit cost assumptions; • Ensure appropriate adjustments are made to one-off large costs that skew the regression results (such as mains reinforcement costs in London); and • Ensure costs are correctly reported (for example the North West reported negative costs in its mains reinforcement).
Opex	• Use publicly reported escapes (PREs) as 100% of the emergency cost driver; and • Ensure reporting in the repairs model is as consistent as possible in order to use external condition repairs as a cost driver.

Furthermore, Ofgem must carefully consider how to adjust for company costs that are driven by external, region-specific factors at GD2. If a different approach is used compared to GD1, this should be well-justified and fully account for cost differences between companies that are not driven by differences in managerial efficiency. For SGN, this includes the costs of operating in London, the south more widely, sparse regions of Scotland, and on the Isle of Wight.

Ofgem must also ensure that productivity assumptions used are based on trends in the wider economy that represent a realistic view of what can be achieved in future, rather than recent historical cost movements in the sector.

Finally, we have found clear evidence that we continue to experience real price effects in relation to our direct labour, contractor labour and materials costs, and we believe these cost pressures will continue into GD2. In this appendix we propose indices that could be used to index RPEs, after assessing a long list of indices against a set of criteria.

We suggest that Ofgem could use an average basket of the indices which pass a set of suitable assessment criteria. This would be similar to Ofgem's approach at GD1, and it reduces the risk around relying on a single index, particularly because of the cyclicality of certain sectors and it avoids any cherry-picking of specific indices. It also combines economy-wide and more sector-specific indices, which reflects the actual cost pressures faced by GDNs.

1.1 Forecast investment -GD1

The table below shows our totex outturn for the first six years of GD1 and forecast for the last two years of GD1, compared to the GD1 allowances. The table shows the forecast expenditure will be c.£800m below allowances over GD1. The drivers of this outperformance can be attributed to efficiency, external factors and variations in original assumptions.

Table 1: **GD1**

	Scotland					
	GD1 – first 6 yrs		Remaining 2 years		GD1 Period	
£m 2018/19 prices	Actual	Allowance	Forecast	Allowance	Forecast	Allowance
Opex	414	565	133	181	547	746
Repex	370	465	132	139	502	603
Capex	298	327	76	75	374	402
TOTEX	**1,082**	**1,356**	**341**	**395**	**1,423**	**1,751**

	Southern					
	GD1 – first 6 yrs		Remaining 2 years		GD1 Period	
£m 2018/19 prices	Actual	Allowance	Forecast	Allowance	Forecast	Allowance
Opex	773	987	259	315	1,032	1,302
Repex	1,095	1,302	412	402	1,507	1,704
Capex	412	447	140	115	552	562
TOTEX	**2,280**	**2,737**	**811**	**831**	**3,091**	**3,568**

	SGN					
	GD1 – first 6 yrs		Remaining 2 years		GD1 Period	
£m 2018/19 prices	Actual	Allowance	Forecast	Allowance	Forecast	Allowance
Opex	1,187	1,552	392	496	1,579	2,047
Repex	1,465	1,767	544	541	2,009	2,307
Capex	710	774	216	191	925	964
TOTEX	3,362	4,093	1,152	1,227	4,514	5,319

1.2 Forecast investment -GD2

Our totex outturn for the five years of £3,058m. A like for like comparison with GD1 is £2,786m, this also delivers additional outputs of £271m across GD2. This includes cost efficiencies of £76m.

Table 2: **GD2**

GD2 Period - Scotland Forecast						
£m 2018/19 prices	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Opex	74	76	71	70	72	363
Repex	66	66	66	65	66	329
Capex	58	67	70	61	49	306
TOTEX	**198**	**209**	**207**	**196**	**187**	**998**

GD2 Period - Southern Forecast						
£m 2018/19 prices	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Opex	131	133	134	133	134	665
Repex	204	198	196	195	195	988
Capex	74	87	89	83	74	407
TOTEX	**410**	**418**	**418**	**411**	**402**	**2,060**

GD2 Period - SGN Forecast						
£m 2018/19 prices	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Opex	205	209	204	203	206	1028
Repex	270	264	262	260	260	1317
Capex	132	154	159	144	123	713
TOTEX	**608**	**628**	**625**	**608**	**590**	**3,058**

2 Cost efficiency within the business plan

This appendix provides further detail behind chapters 12b and 12c of our business plan. It shows how we have assessed our historical efficiency relative to other GDNs, and what our proposals are for how efficiency should be assessed in future. It also covers factors that are relevant for the future assessment of our efficiency, including how regional factors affect our costs, how we have embedded productivity into our plan and how real price effects are likely to affect us in GD2.

3 GD1 performance and learning

3.1 GD1 track record

Below we set out our track record in GD1 in relation to output delivery, incentives, cost efficiency, and the returns achieved by our shareholders.

3.1.1 Output delivery

The table below summarises our performance on the delivery of primary outputs in GD1. We believe our output delivery has been industry leading.

Table 3: **Primary Outputs**

How we fared in our primary outputs:

● Risk of not reaching annual output or forecast achievement for the eight year period.

● Successful achievement of an annual output or forecast achievement of the eight year output.

ANNUAL OUTPUT MEASURE 2018/19		ACTUAL	
Primary Output	**Deliverable**	**Scotland**	**Southern**
Connections	Guaranteed standards performance	●	●
Environmental	Leakage	●	●
Reliability (network capacity)	Achieving 1 in 20 obligation	●	●
Safety (emergency response)	97% controlled escapes	●	●
	97% uncontrolled escapes	●	●
Safety (management of repairs)	GS(M)R 12 hour escape repair requirement	●	●
	Management of repairs (repair risk)	●	●
Safety (major accident hazard prevention)	GS(M)R safety case acceptance by HSE	●	●
	COMAH safety report reviewed by HSE	●	●
Customer service	Planned interruptions survey	●	●
	Emergency response and repair survey	●	●
	Connections survey	●	●
	Complaints metric	●	●

RIIO-GD1 EIGHT YEAR OUTPUT COMMITMENT		FORECAST	
Primary Output	**Deliverable**	**Scotland**	**Southern**
Connections	Introduce distributed gas entry standards	●	●
Social obligation	Fuel poor connections*	●	●●
	Carbon monoxide awareness	●	●
Environmental	Leakage	●	●
	Provide biomethane connections information	●	●
Reliability (loss of supply)	Duration of planned interruptions	●	●
	Duration of unplanned interruptions	●	●
	Number of planned interruptions	●	●
	Number of unplanned interruptions	●	●
Reliability (network reliability)	Maintaining operational performance	●	●
Safety (mains replacement)	Iron mains risk reduction (based on MRPS)	●	●
	Sub-deducts networks off risk	●	●

* We are very close to achieving this output but recognise there is some risk to meeting the challenging target we set.

3.1.2 Incentive performance post IQI

Our incentive performance to-date has resulted in average incentive income earned a year of £16.9m. A breakdown of the overall incentive income earned in each year is shown in the table below. Note this is income earned and ignores the two-year lag for income purposes.

Table 4: **Incentives**

SGN incentive (£m)	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Shrinkage	0.8	0.8	0.6	0.8	0.9	1.2
EEI	2.4	3.7	3.4	4.7	4.5	5.0
NTS exit incentive	2.6	1.1	1.9	5.5	6.0	9.7
Customer satisfaction	4.2	5.3	5.2	5.3	5.3	5.5
Customer complaints	0.0	0.0	0.0	0.0	0.0	0.0
Stakeholder engagement	2.1	2.4	1.8	3.2	2.3	3.0
DRS award	0.0	0.7	0.0	0.0	0.0	0.0
Total	**12.1**	**14.0**	**12.9**	**19.5**	**18.7**	**24.4**

Our 2018/19 performance for incentives has generated income of £3.7m for Scotland and £20.7m in Southern. This includes the recent stakeholder award, when we were awarded the highest amount for a GDN. Both our networks continue to perform strongly.

3.1.3 Totex performance

The table below shows our totex outturn for the first six years of GD1 and forecast for the last two years of GD1, compared to the GD1 allowances.

Table 5: **Totex outturn**

	Scotland					
	GD1 – first 6 yrs		Remaining 2 years		GD1 Period	
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Opex	414	565	133	181	547	746
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TOTEX	3,362	4,093	1,152	1,227	4,514	5,319

The table above shows the forecast expenditure will be c.£800m below allowances over GD1. The drivers of this outperformance can be attributed to efficiency, external factors and variations in original assumptions, as set out overleaf (values are before customer sharing). This demonstrates we have delivered significant efficiency gains over this period with 70% being clearly attributable.

- **Category 1 - Efficiency (£563m, 70% of variance)**

  Efficiency gains through the application and roll-out of innovation, introduction of management changes, improved processes, frontier performance/efficient business model and improved contracting strategies. A number of these efficiencies are step-changes that cannot be repeated in GD2, particularly in repex e.g. a Contracting Strategy change to use smaller contractors and a move to 90% plus insertion rather than open cut.

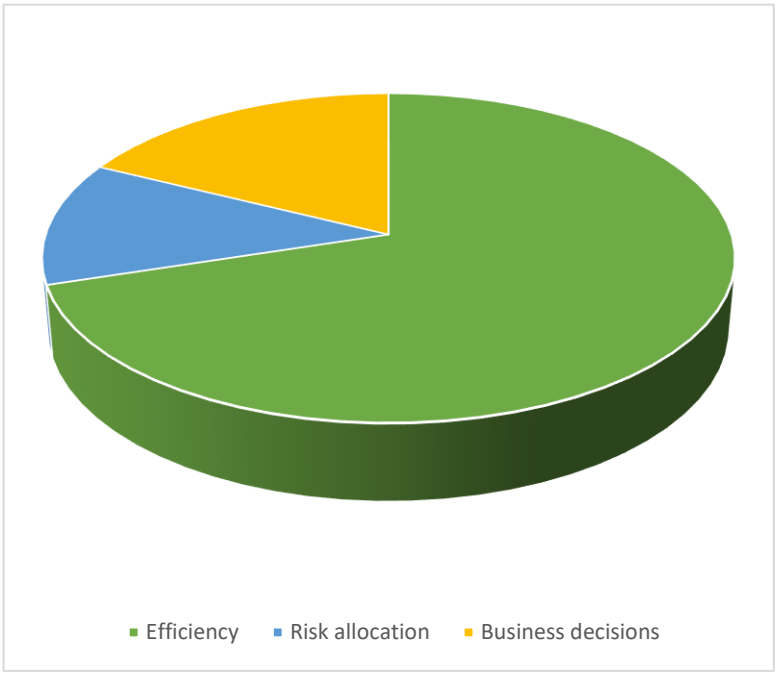
- **Category 2 - External factors/Risk allocation (£100m, 12 % of variance)**

  Where a forecast was made at the start of GD1 and companies took the risk actual expenditure could have exceeded allowances or vice-versa based on a variable that was not directly controlled by the network, e.g. weather, economic conditions, <2" services found. This category has been considered for uncertainty mechanisms.

- **Category 3 - Variations in settlement position/Good business decisions (£145m, 18% of variance)**

  These are areas where assumptions set at the start of the price control have varied, but we were incentivised to manage the risk exposure and good business decisions have been made that were beneficial. These include the volume of meter work and the roll-out of smart meters, non-mandatory repex where the application of CBAs has resulted in a cheaper opex solution, and the enduring solution for the Scottish Independent Undertakings that negated the need for a re-opener. This category has been considered for uncertainty mechanisms.

Figure 1: Outperformance analysis



3.2 Return to investors

Return on Regulatory Equity (RORE) is calculated for each network at the end of the year and is an estimate of the average annual return which shareholders could expect over the eight-year price control period.

The figures are based on the totex forecasts set out in this appendix. Over the eight years, we are forecasting a return on regulated equity of 11.1% across our two networks compared with a base cost of equity of 6.7% (real post tax).

Table 6: **RORE Table**

NETWORK Performance (£m 18/19 prices)	Scotland 8 Yr Ave	Southern 8 Yr Ave	SGN 8 Yr Ave
Totex Variance to allowance	43	61	103
Incentive Income	3	13	16
IQI Reward	2	4	7
Less Sharing/Tax	17	25	42
	31	**53**	**84**
Performance return on equity (£m)			
Performance relative to allowance	31	53	84
Equity (based on notional gearing)	590	1,312	1,902
Performance returns %	5.2%	4.0%	4.4%
Base cost of equity	6.7%	6.7%	6.7%
Total RORE pre financing)	**11.9%**	**10.7%**	**11.1%**

Information Quality Incentive (IQI)

We continue to focus on customer value by delivering our outputs while providing a cost-efficient network. This approach has provided each network with continuing benefits from incentive income outlined by the GD1 framework.

The difference between actual costs and allowances are forecasted to fall over the course of GD1. There have been some factors outside our control in the first six years, mainly weather and the delay in smart metering which are expected to unwind, which coupled with contracting and employee cost pressures are expected to result in this outperformance decreasing from current levels. We are moving to more complex and higher diameter projects which are also increasing costs.

During GD1 a RORE of 11.1% equates to c.£210m/year. This is built-up of £125m notional return as set in the cost of equity and £84m through various incentive mechanisms and the IQI.

3.3 Ensuring stakeholder target achievement

We have aligned our executive, senior leader and other bonus arrangements to achievement of targets important to our stakeholders (in addition to financial and regulatory targets), namely:

- Continuing to deliver a safe, reliable and cost-effective network, maintaining our standards of service and delivering an Emergency Service on a 24/7 basis;
- Achievement of safety and environmental targets;
- Achieving future de-carbonised energy solutions;
- Achieving customer service targets;
- Achieving stakeholder satisfaction improvement targets;
- Achieving support for vulnerable communities' targets; and
- Achieving people targets such as talent and succession, diversity and inclusion, and employee engagement.

3.4 Current efficiency

We assess our efficiency relative to the other GDNs in the sector, using the data on costs incurred in the first five years of GD1 to date. We show the efficiency results using both Ofgem's methodology from the GD1 review, as well as the efficiency results that follow from updating that methodology to factor-in our new proposals for the GD2 benchmarking approach[1]. Our proposals have been discussed through the CAWG and we believe there is broad industry support for them. The tables below summarise the efficiency results using our proposed models and Ofgem's GD1 models, for both the totex and disaggregated benchmarks.

Table 7: **Standardised efficiency score**
SGN proposed totex methodology

	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.07	1.06	1.07	1.13	1.08
Lon	1.09	1.04	1.10	1.05	1.06
NW	1.03	1.10	1.08	1.03	1.01
WM	0.98	1.03	1.02	0.99	0.99
NGN	0.88	0.90	0.93	0.92	0.95
SC	0.95	0.92	0.89	0.93	0.98
SO	0.95	0.93	0.93	0.98	0.97
WWU	1.05	1.03	0.99	0.97	0.97
UQ	0.95	0.92	0.93	0.96	0.97

Table 8: **Standardised efficiency score**
Ofgem GD1 totex methodology

	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.06	1.06	1.06	1.13	1.08
Lon	1.10	1.05	1.10	1.05	1.06
NW	1.02	1.10	1.08	1.02	1.00
WM	0.98	1.03	1.01	0.98	0.98
NGN	0.87	0.88	0.92	0.92	0.94
SC	0.96	0.93	0.91	0.94	0.96
SO	0.95	0.93	0.94	0.99	1.00
WWU	1.05	1.02	0.98	0.97	0.98
UQ	0.96	0.93	0.94	0.96	0.97

Table 9: **Standardised efficiency score**
SGN proposed bottom-up methodology

	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.10	1.07	1.06	1.12	1.10
Lon	1.02	0.94	1.04	1.05	1.11
NW	1.06	1.14	1.10	1.03	1.02
WM	1.04	1.09	1.05	1.00	1.02
NGN	0.91	0.91	0.94	0.90	0.88
SC	0.90	0.85	0.85	0.88	0.94
SO	0.99	0.98	1.00	1.04	0.99
WWU	0.99	1.01	0.96	0.97	0.94
UQ	0.97	0.94	0.96	0.95	0.94

Table 10: **Standardised efficiency score**
Ofgem GD1 bottom-up methodology

	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.09	1.07	1.06	1.12	1.09
Lon	1.04	0.96	1.05	1.06	1.12
NW	1.05	1.14	1.09	1.02	1.01
WM	1.04	1.09	1.03	0.99	1.01
NGN	0.88	0.88	0.92	0.89	0.86
SC	0.91	0.87	0.88	0.90	0.92
SO	0.99	0.99	1.01	1.06	1.03
WWU	0.99	1.01	0.95	0.96	0.95
UQ	0.97	0.94	0.94	0.94	0.94

[1] It is likely that different GDNs will use different underlying modelling techniques and/or make different adjustments to input data to perform benchmarking analysis in their GD2 business plans. Similarly, Ofgem's previous publications (e.g. the GD1 annual reports) have set out some of Ofgem's initial analysis. We consider that our results are robust, and we have set out full detail on our proposed methodology and any data adjustments in this appendix. We expect any differences in the results relative to Ofgem or other GDNs will be discussed in full as part of the GD2 review.

Based on our proposed methodology, the analysis demonstrates the following:

- On a totex basis, we have been outperforming the sector average efficiency performance throughout GD1. In 2017/18 we remain at or above the industry average, with efficiency scores of 98% for Scotland (4th) and 97% for Southern (3rd).
- In terms of the disaggregated model, as we explain in this appendix, there are a significant number of issues within the disaggregated models which are distorting the results. Therefore, we consider totex to be a more reliable and relevant test of value for money. In addition, it should be noted as aggregated bottom-up modelling only covers 73% of the cost base (i.e. the costs that are assessed using regression analysis) it is incomplete. The scope of costs covered by the totex model is complete because it includes categories like business support costs. Despite these concerns, the results remain broadly supportive of our efficient starting position:
- For Scotland, this disaggregated model shows in 2017/18 our Scotland network performed better than the industry average, with an efficiency score of 94% - and this leading performance has been maintained throughout GD1. This result is confirmed using Ofgem's GD1 methodology, which shows Scotland performing above the upper quartile.
- For Southern, the performance is more mixed over the period but still demonstrates performance better than average in 2017/18 of 99% - the 4th ranked GDN. The mixed results are confirmed by Ofgem's GD1 methodology.

We note there is variation in Scotland and Southern apparent efficiency performance in different areas of the cost base within the disaggregated models. In Scotland and Southern's case, we are a leading performer on the opex benchmarks but are behind the average benchmark on repex. The overall outcome, though, is Scotland and Southern are among the leading GDNs on a totex basis.

When interpreting these results, it is important to bear in mind the following steps need to be completed as part of the ongoing review and have the potential to affect the results.

- **Data cleansing:** There is an extensive exercise in any price review of scrutinising and cleaning the data sources used for the analysis. One material data issue has already been identified by Ofgem in relation to WWU (which we have corrected for in all of our analysis).[2] We anticipate there may be other data issues that will need addressing as the price review progresses. For this reason, we have not included any analysis of costs using 2018/19 data, which has only recently been finalised and shared between the GDNs. Our initial review of that data suggests it is not yet sufficiently robust to be used in the analysis.
- **Benchmarking history only:** We do not currently have access to any forecast data for GD2 for the other GDNs. However, at GD1 Ofgem benchmarked both the business plan forecasts and the historical data, using a 50:50 weighting on each to reach its final conclusions. Our analysis can only evaluate the current efficiency position.
- **Methodological improvements:** Ofgem (through the CAWG) is continuing to explore methodological improvements to the models. We have suggested and implemented a number of these in our analysis (see

[2] See Ofgem's RIIO-GD1 Annual Report for 2017/18, paragraph 4.15 and footnote 22. https://www.ofgem.gov.uk/system/files/docs/2019/03/riio-gd1_annual_report_2017-18_0.pdf

summary below), but it is likely that further method changes will be made and Ofgem has just released its consultation on these changes.

- **Regional cost adjustments and other normalisations:** One important area which needs to be verified is the normalisations used to account for region-specific cost variations. For example, it is important for the benchmarking analysis to be adjusted to account for the fact that we will incur higher labour costs in London and the South East than most other GDNs. This cost is region-specific and outside of the control of our management. At present our analysis uses the normalisation values that Ofgem applied in GD1 for regional labour costs and network sparsity. We have undertaken some in-depth analysis of regional costs which indicates that, as a minimum, a similar scale of adjustment will be justified for GD2. We have therefore used the GD1 normalisations as a placeholder. We note these normalisations are implemented through 'pre-benchmarking adjustments. Ofgem's summer cost assessment consultation also considered the use of within-model regional adjustments. Our response to Ofgem's consultation is available online.[3]

A number of other analyses also demonstrate our industry-leading efficiency position:

- Innovation: Through GD1, our innovation projects have delivered quantifiable benefits of £125m and our use of innovation is recognised for challenging convention and pioneering new approaches in all areas of the network.
- Salary benchmarks: External analysis of labour costs conducted by Towers Watson showed our wages are competitive and efficient, including after recent increasing pressures and higher wage settlements.
- Outputs and service quality**:** We continue to be a leading performer on outputs delivery alongside the strong cost efficiency performance. We are recognised as the best network for customer service with complaints down 76% so far during GD1 and we've increased support to vulnerable customers. In our view this combination is what makes us the best overall value for money package for all our customers.

We expect once the price control process has been completed and these outstanding issues have been resolved, we will continue to be shown as an industry-leading performer on cost efficiency, across the whole cost base.

3.5 GD2 benchmarking recommendations

One of the critical policy decisions Ofgem will need to make for benchmarking, is what balance to strike between totex and disaggregated benchmarking approaches. For GD1, Ofgem's efficiency assessment was based on applying 50% weight to the results of the totex model and 50% weight to the results of the disaggregated models. This 50:50 combination gave Ofgem's overall view of the efficiency of the GDNs. The same 50:50 weighting between totex and disaggregated modelling was also applied in the electricity distribution price control, ED1, which was finalised in November 2014.

We do not consider there to be evidence to suggest Ofgem should move away from its established policy of placing a substantial focus and weighting on totex modelling for GD2 and we expect totex analysis to continue to be central in any assessment of efficiency of the GDNs. This is because totex analysis:

- Provides the best test of overall efficiency and value for money, capturing properly any optimised trade-offs;

[3] See our response to questions 16 and 17 here: https://www.ofgem.gov.uk/publications-and-updates/riio-2-tools-cost-assessment-consultation

- Provides **a** robust model that (in contrast to disaggregated approach) is not distorted by boundary issues and differences in business models, giving the right incentives to GDNs;
- Avoids the risk of an unreasonable 'cherry picked' outcome associated with disaggregated modelling; and
- Is more transparent than a disaggregated model and does not suffer from a number of material weaknesses in various disaggregated models (e.g. mains reinforcement) that give implausible and unreliable results.

Given this, we consider it is appropriate a greater emphasis should be placed on the overall value-for-money test, using a totex benchmark, rather than the conclusions drawn from any specific disaggregated model (or set of disaggregated models). We note one aspect Ofgem will need to consider is how the totex analysis will sit alongside the division of costs into high- and low-confidence, for the purposes of evaluating the Business Plan incentive.

In addition, we have set out some proposed modifications to specific disaggregated models which are detailed in this appendix. The adjustments in the models presented are:

- Including CISBOT workload in repex cost driver; and
- Using publicly reported escapes (PRE) as 100% of the emergency cost driver.

Other proposals we recommend Ofgem take on-board include the following:

Repex	• Consider using an average or aggregate of the five-year results; • Continue to adjust results for innovative processes; • Consider removing large diameter pipes from the results (doing an independent engineering assessment on these projects); • Update the unit cost assumptions that feed into the synthetic unit costs; and • Conduct a sense-check between cost efficiency results and quality of outputs.
Capex connections and mains reinforcement	• Consider updating the unit cost assumptions; • Ensure appropriate adjustments are made to one-off large costs that skew the regression results (such as mains reinforcement costs in London); and • Ensure costs are correctly reported (for example the North West reported negative costs in its mains reinforcement).
Opex	• Ensure reporting in the repairs model is as consistent as possible in order to use external condition repairs as a cost driver.

At present we have significant concerns about the robustness of some models. The RAG rating in the table below summarises our views on the feasibility of resolving the weaknesses in the individual GD1 regressions. While many of these weaknesses can be addressed, with the possible exception of the capex regressions, moving to an entirely bottom-up approach would be highly risky as it would remove the overarching cross-check that the totex model provides.

Table 11: **RAG rating for robustness of regression models**

Model	% of totex	RAG rating
Top-down		
Totex	100%	
Bottom-up		
Work management	10%	
Emergency	5%	
Repairs	6%	
Maintenance	6%	
Connections	4%	
Mains reinforcement	1%	
Repex	40%	

The key issues are:

- Work management, emergency, repairs, maintenance (opex regressions): The current models appear to be relatively good at explaining efficiency but produce larger ranges in efficiency scores than we would expect, and which can be explained by differences in managerial efficiency alone. Using alternative cost drivers that better explain costs (such as public reported escapes rather than a Composite Scale Variable such as the Modern Equivalent Asset Value (MEAV) of customer numbers and external condition reports for the emergency regression) and ensuring regional adjustments are reviewed and updated, can help to resolve this.
- Connections, mains reinforcement (capex regressions): Both capex regressions display infeasibly large efficiency score ranges. The mains reinforcement regression results are also very volatile year-to-year. These results are not credible given both regressions use workload cost drivers and are effectively assessing unit costs. A combination of relatively small cost head, highly variable costs, and poor data suggests this cost area is not suitable for regression analysis. There may be other types of analysis suitable for these cost areas, such as bespoke engineering assessments/judgement.
- Repex regression: The repex regression results display significant volatility over time. Again, this undermines its credibility because the regression is essentially a unit cost analysis, and large swings in unit costs from year-to-year do not appear realistic. However, we believe this regression could be improved by updating the synthetic unit cost driver and aggregating/averaging data over time to reduce volatility.

These issues will need to be addressed through the GD2 process. Therefore, while we have shown these results in this appendix, we believe they are not sufficiently robust to include in our plan at present, so we continue to put our reliance on totex.

3.6 The efficiency of our forecasts and productivity assumptions

Our business plan takes as its starting point our existing efficient performance. On top of this, we factor in an additional £15.2m (average annual average in GD2) of stretch targets, to be generated through productivity and efficiency. This is equivalent to 1.4% a year on opex (£7.7m saving a year), 0.7% on capex (£2.6m saving a year; and 0.7% on repex (£4.9m saving a year) – giving a total productivity assumption across the cost base of 1.0% a year. This means, at the end of the next price control, we will save customers £76m relative to today.

We plan to achieve this through a combination of innovation savings rolled forward from GD1 and process efficiency, in particular to absorb some of the impact of increased unproductive time in Emergency following the loss of legacy meter work contracts. However, we are delivering industry leading quality which means we are not purely driven on taking costs out of the business.

This saving is challenging in the context of the introduction of volume drivers for much of the capex/repex programme, and the wider productivity slowdown in the UK. We have collated independent evidence in this area and will be submitting a paper from First Economics[4] with this business plan. Conclusions from this work have established it would be reasonable for GDNs to use lower productivity projections. For example, the Bank of England's latest forecast of economy-wide productivity in the UK up to 2022-Q1 is 0.3%. In this context, our plan is stretching – aiming to achieve triple the productivity rate forecast by the Bank of England[5] for the economy.

3.7 Real price effects

Ofgem has determined the price control will use CPIH as a measure of inflation through which allowances should be adjusted each year to accommodate changes in average costs. While CPIH is a reasonable indicator of overall prices in the economy, the goods and services we purchase as a network differ from a typical household. The price control allowances should account for the differences in underlying trends on major cost items we experience as a network that would differ from the movement in CPIH.

We have collated evidence on our input cost pressures, focusing for now on the most material categories. For GD2 we show that RPEs exist in direct labour, contractor labour and materials:

- Direct labour: Labour costs make up 23% of totex in 2018/19, representing a material input. Since the start of GD1 (i.e. from 2013/14 to 2018/19), salaries of directly-employed staff have outstripped CPI(H) inflation rates, with the weighted average salary (across five key roles representing 80% of our expenditure on wages) experiencing compound annual growth of 2.6% between 2013/14 to 2018/19 compared to a much lower growth rate of CPIH of 1.5% over the same period. Salary benchmarking by Towers Watson[6] in 2017 indicated that our basic salaries had fallen behind market rates, which fed in to pay negotiations in 2018, where we agreed an above-inflation pay increase.
- Contractor labour: Contractor labour costs made up approximately 43% of totex in 2018/19. We have also reviewed the increases in contractor labour rates across different rate categories (open cut, insertion,

[4] Frontier Productivity Growth First Economics February 2019

[5] https://www.bankofengland.co.uk/-/media/boe/files/inflation-report/2019/february/inflation-report-february-2019.pdf Table 3.C (page 22)

[6] https://www.willistowerswatson.com/en-US/Solutions/compensation-strategy-and-design

renew services, resources). Our review of 115 contract rates shows that 83 contracts rates (72% of the total), have experienced rate increases above CPIH over the total contract period. We have also analysed the average total cost over a typical works package over GD1 for Southern and found that cost increased for a typical package of work have outstripped CPIH in almost all regions.

- Materials. Materials costs make up approximately 31% of our totex in 2018/19. We have assessed our materials costs against CPIH for PE plastic pipes, which is our single largest area of materials spend. We have found that the cost for representative basket of PE plastic pipes has increased by c. 4.10% between 2013 to 2018, outstripping CPIH of 1.54% over the same period.

The labour cost pressures we have faced in recent years are reflective of the wider trends in the economy – for example ONS statistics from April 2019 show there is currently relatively low unemployment and real wage increases of 1.5%.[7] Salary benchmarking undertaken by Towers Watson has confirmed our overall remuneration package is generally in-line with the average, however we have continued to face some challenges associated with employee churn, and our expectation is therefore above-inflation wage increases will continue.

Ofgem has proposed it will index RPEs for GD2 and has asked stakeholders for views on how this should be implemented. In this plan, we have proposed indices for GD2 for labour and materials. Our proposals are based on assessing a long list of potential indices against a set of criteria which broadly reflect CEPA's proposals in Ofgem's cost assessment consultation, namely criteria of materiality, accuracy and usability/credibility. However, we expect to continue evaluating these indices and engaging with Ofgem directly on proposals for appropriate indices.

Our review suggest that a number of labour and materials indices may be suitable for GD2. We are therefore proposing Ofgem use an average of the indices that pass our assessment criteria. This reduces risk around cherry-picking indices and relying on a single index which may be affected by cyclicality of certain sectors. We have forecasted RPE indices based on a linear extrapolation of the historical average of the suitable indices. We also recommend Ofgem further investigates some materials indices which appear to be suitable, but for which we have not been able to access data. If these pass the criteria, these should be incorporated into the average materials index.

In addition, Ofgem should consider whether there may be region-specific and/or licensee-specific drivers of real price effects (e.g. caused by differences in environmental standards) which should be factored either into the index or into baseline allowances (potentially via an uncertainty mechanism).

[7] Source : https://www.bbc.co.uk/news/uk-47947205.

4 Historical efficiency

This section sets out our position on historical cost efficiency. We set out our current view of our latest efficiency position, based on outturn costs incurred through GD1. The section covers:

- Section 4.1: Over-arching approach and principles for benchmarking;
- Section 4.2: Totex benchmarking;
- Section 4.3: Disaggregated benchmarking (including aggregated bottom up results and regression analysis for the cost categories of work management; emergency; repair; maintenance; connections; mains reinforcement; and repex, as well as a high-level view of movements in business support costs since GD1);
- Section 4.4: Proposals for Ofgem's over-arching GD2 benchmarking policy;
- Section 4.5: Wage analysis;
- Section 4.6: Outputs performance;
- Section 4.7: A description of our industry leading business management processes; and
- Section 4.8: A summary of the impact of innovations delivered by us to-date.

4.1 Overarching approach and principles for benchmarking

In common with all price reviews, there will need to be a rigorous process of data investigation and scrutiny. Ofgem has already noted there are some issues with the 2017/18 data for WWU.[8] Specifically, WWU had some atypical accrual releases and methodology changes which artificially reduced its costs in 2017/18. In this appendix, all our presented models make an adjustment to correct the WWU data issue.[9] Another example highlighted by Ofgem, was capitalised repex which we have also adjusted for. It is likely further data adjustments will be identified and corrected as the modelling develops.

In this appendix we show results of benchmarking analysis using both our proposed method as well as repeating the method Ofgem employed for GD1. We note our results using Ofgem's method differ slightly from the results set out in Ofgem's 2017/18 annual report. This is because we have made some data adjustments to correct for errors and to make costs consistent over time. The adjustments we have made are:

- WWU adjustment for accrual releases and change of cost methodology;
- SGN adjustment for pension costs not originally submitted;
- Adjusted work management costs for Southern and Scotland in 2017/18;
- NGN loss of metering cost;

8 See Ofgem's GD1 Annual Report for 2017/18, paragraph 4.15 and footnote 22. https://www.ofgem.gov.uk/system/files/docs/2019/03/riio-gd1_annual_report_2017-18_0.pdf

9

- Adjusting work management emergency cost for smart metering; and
- Including capitalised replacement costs in repex.

In terms of the modelling approach, in common with Ofgem's past practice, we have applied the Ordinary Least Squares (OLS) method to run all the regressions, using five years of panel data (GD1 historical data).

The principles of cost efficiency benchmarking

As part of the price control review, Ofgem needs to assess each GDN's cost efficiency, and ultimately determine what an efficient cost is for each network. Ofgem typically analyses historical costs and forecast costs to calculate efficient costs. These efficient costs feed into the allowances set by Ofgem in the next price control. Comparative benchmarking analysis between GB GDNs is one of the key tools used by Ofgem to determine efficient cost allowances.

However, assessing relative cost efficiency is inherently difficult. Primarily this is because, despite being in the same sector, network companies are quite different in a number of ways. For example:

- Each network has potentially different drivers of costs – for example some networks might cover a relatively large area, while others might have customers located in a relatively denser area;
- Different types of work are more prevalent in some areas;
- The companies tend to have different business models[10]; and
- A variety of other factors including for example the prevalence of vulnerable customers, differences in street works costs and differing rates of smart metering roll-out.

To effectively assess differences in cost efficiency between networks, Ofgem needs to control for external drivers of cost differences. To do this Ofgem uses regression analysis which estimates the relationship between costs and cost drivers. The difference between the estimated regression line and a company's actual costs (known as the 'residual') could be due to:

1. Genuine differences in managerial efficiency (which is what the benchmarking analysis is trying to estimate); and/or
2. Statistical weaknesses in the analysis (for example, missing variable bias - where the regression is not capturing a driver of costs – or spurious correlation, i.e. where costs and cost drivers might have a statistical relationship, but no underlying economic cause and effect' relationship).

The general aim of good benchmarking is to ensure the differences in results are 1. primarily due to genuine differences, and 2. to minimise the effect of statistical weaknesses. There are also other desirable features of good benchmarking such as ease of interpretation of results. In its cost assessment consultation, Ofgem set out three main criteria to consider when selecting models:

- Economic/technical rationale – Do the model specifications and results have a clear economic/technical rationale?
- Transparency – Including the data used, the results and ease of interpretation for stakeholders
- Robustness – Does the model pass statistical tests? Is the model sensitive to the underlying assumptions?

We agree with Ofgem's proposed model selection criteria. We also believe the statistical tests mentioned in the consultation are a good selection for measuring robustness and determining whether the effects of

10 This won't have any effect on totex benchmarking, but it will likely impact any disaggregated benchmarking.

statistical weaknesses are minimised. Some of the key tests are:

- Analysing the R-squared or other information criteria, which check whether the model fits the data well;
- The t-test which tests whether the cost drivers have a significant impact on costs;
- The F-test – another measure of statistical significance for the cost drivers;
- The Ramsey RESET test explains whether the model is correctly specified (i.e. whether there are non-linear combinations that work better);
- White's heteroskedasticity test calculates whether the variance of residuals is distributed normally – another test to determine if the model is incorrectly specified;
- Shaprio-Wilsky test for normality checks the variables are distributed on a normal distribution, such that a regression would give the best linear unbiased estimator; and
- Endogeneity of the cost driver being considered. In particular; whether the cost drivers used are beyond company control, apply to all companies and have an intuitive economic or engineering based relationship with the costs being assessed.

However, statistical tests are not the sole determinant of whether a model can be considered robust. Pragmatically there are a number of critical tests which also should be evaluated – these are mentioned briefly in CEPA's annex to the cost assessment consultation (see Table 2) but are worth emphasising here.

- First, the data must be thoroughly investigated. Ofgem should be confident the costs and cost drivers are being measured in the same way across companies and assess whether there are any data anomalies or inconsistencies in the way data is captured. This is likely to give rise to outliers that may then be distorting the regression results or distortions in the time series data or trends. Plotting the data is an important first step in the analysis.
- Second, the results should be within a reasonable range. The spread between the highest and lowest performing networks can sometimes be implausibly wide, in a manner that cannot reasonably be attributed to managerial efficiency. Typically, we would look to apply a hurdle test here, where any model with a greater than 20% spread of efficiency between the best and worst performing networks should require scrutiny to determine whether the spread is genuine or a modelling error. We would propose 20% as a rule of thumb threshold, as we would not generally expect variations beyond this level to be driven by managerial efficiency alone.
- Third, the results should be reasonably stable over time. Very volatile results over time for a given company can suggest an underlying error or modelling issue. We would not expect managerial efficiency to significantly improve/deteriorate (or indeed yo-yo) between consecutive years over the course of a price control. As a result, large year-on-year swings in rankings or efficiency scores would suggest a need for greater scrutiny.

When confirming the final benchmarking analysis, we should aim to demonstrate that these considerations have been fully taken into account. We have tried to apply this standard to the results presented in this appendix.

4.2 Totex benchmarking

4.2.1 Totex benchmarking - Existing Ofgem model

For totex (or 'top down') benchmarking, total expenditure of the network is benchmarked against a CSV which combines a top-down scale variable (MEAV) and a combination of drivers used in the disaggregated models, primarily based on workload. Specifically, the totex cost driver is calculated as a weighted average, using the following weights as used at GD1 final proposals:

Composite Scale Variable (CSV)

Component parts

- 37% MEAV;
- 42% repex top down workload;
- 2% connections workload;
- 2% mains reinforcement workload;
- 6% total external condition reports;
- 5% maintenance MEAV; and
- 6% emergency CSV.

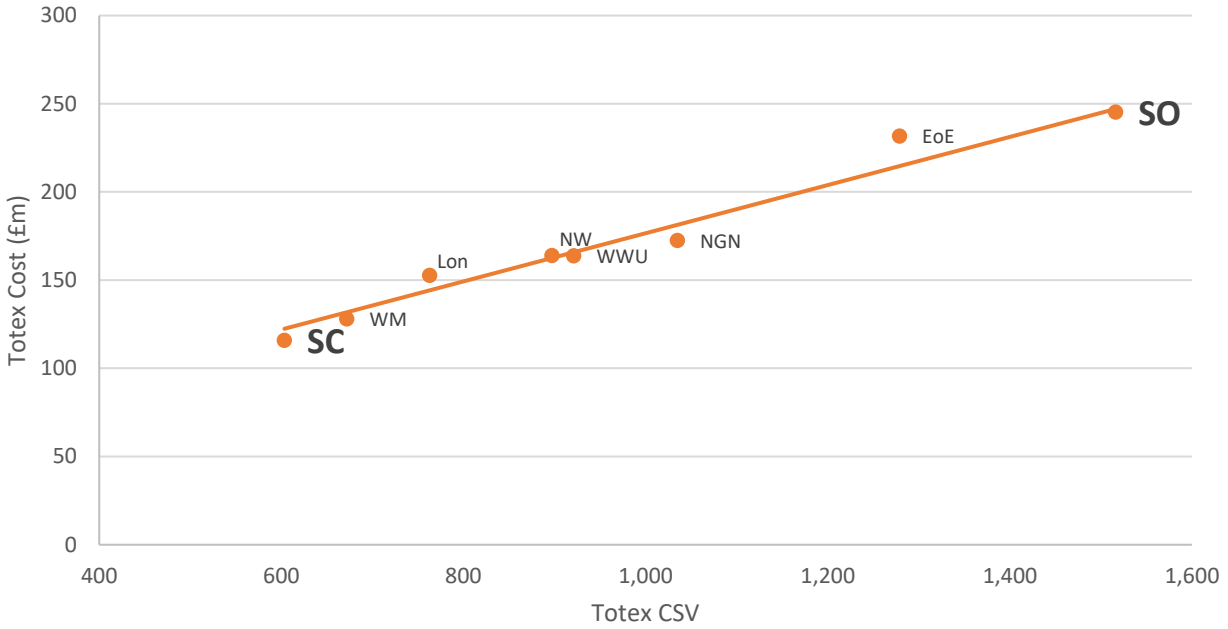
The totex costs are normalised for various factors including street works, gasholder remediation, and regional labour costs.

The table shows the standardised efficiency scores for totex, with lower values indicating a relatively more efficient network, and a score of 1 representing effectively the industry average. The graph shows the eight networks' data points for 2017/18 and the regression line.

Table 12: **Totex efficiency scores – Ofgem GD-1 method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.06	1.06	1.06	1.13	1.08
Lon	1.10	1.05	1.10	1.05	1.06
NW	1.02	1.10	1.08	1.02	1.00
WM	0.98	1.03	1.01	0.98	0.98
NGN	0.87	0.88	0.92	0.92	0.94
SC	0.96	0.93	0.91	0.94	0.96
SO	0.95	0.93	0.94	0.99	1.00
WWU	1.05	1.02	0.98	0.97	0.98
UQ	**0.96**	**0.93**	**0.94**	**0.96**	**0.97**

Figure 2: Totex efficiency scores – Ofgem GD-1 method



As mentioned, the weights we used to calculate the totex cost driver for the regression above were the same weights as used at GD1 final proposal. The weights were based on the share of each cost head within totex across all GDNs. We have tested the impact of updating the weights to use historical data for GD1 (noting also that Ofgem included forecast data in its GD1 approach, but reliable forecast data for the other GDNs is not currently available). The results are shown below. There are some minor differences compared to using the GD1 final proposals weights. If Ofgem replicates its GD1 approach at GD2, the weights will have to change in-line with this update and including additional historical and forecast data that becomes available. However, we do not expect this to have a material impact based on the relatively small impact we see below.

Table 13: **Totex efficiency scores – GD-1 method with updated weights**

	Standardised Efficiency Score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.05	1.05	1.05	1.11	1.06
Lon	1.09	1.05	1.10	1.06	1.06
NW	1.02	1.09	1.08	1.02	1.00
WM	0.98	1.02	1.01	0.98	0.98
NGN	0.88	0.89	0.93	0.92	0.96
SC	0.97	0.93	0.92	0.94	0.96
SO	0.96	0.94	0.94	0.99	1.00
WWU	1.05	1.02	0.98	0.97	0.97
UQ	0.96	0.94	0.94	0.96	0.97

4.2.2 Totex benchmarking - SGN proposed developments

The totex model is fairly stable and well-established, so at present we have not proposed any methodological changes – but some discussions may be worked through at the CAWG, and Ofgem/CEPA proposed some amendments in the cost assessment consultation[11]. However, some of our proposed adjustments to the bottom-up regressions would feed through to the totex model given the way the totex CSV is calculated. This is particularly true for changes to the repex model, which contributes to over 40% of the totex CSV. We have proposed two key changes to the bottom-up regressions which are explained further in the relevant sub-sections:

- **Repex:** Adjusting repex workload to account for CISBOT (see more in the repex section below); and
- **Emergency:** Changing the emergency CSV from customer numbers to publicly reported escapes.

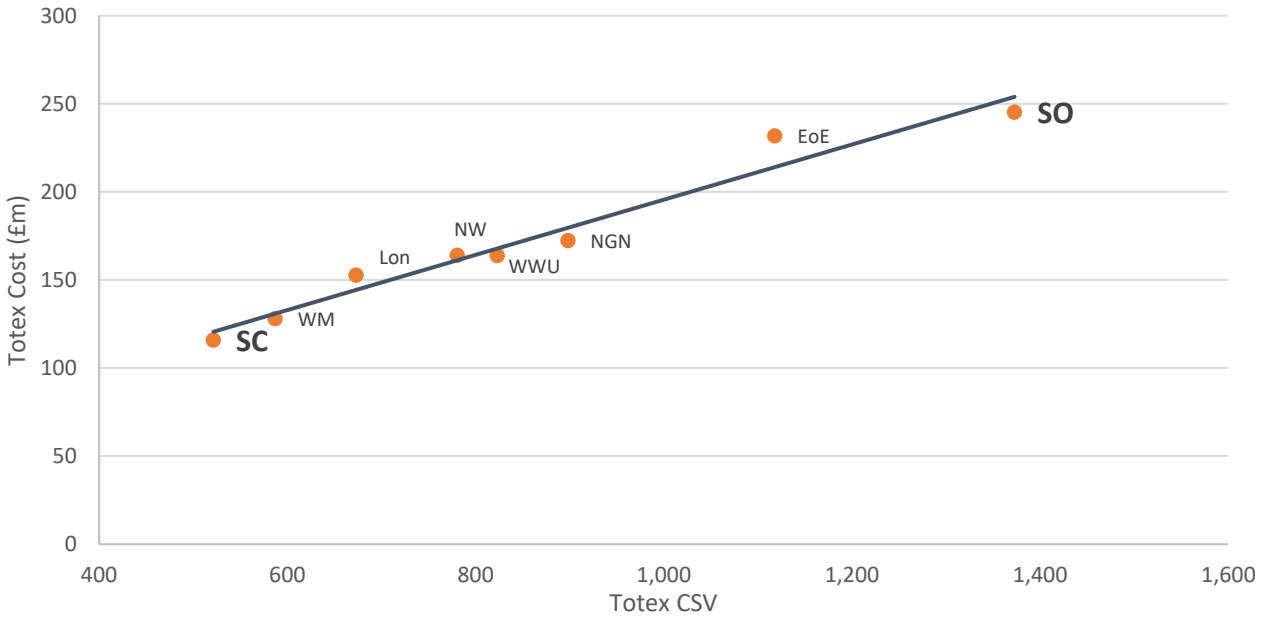
The table below shows the impact of implementing these changes on the totex model.

Table 14: **Totex efficiency scores – SGN proposed method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.07	1.06	1.07	1.13	1.08
Lon	1.09	1.04	1.10	1.05	1.06
NW	1.03	1.10	1.08	1.03	1.01
WM	0.98	1.03	1.02	0.99	0.99
NGN	0.88	0.90	0.93	0.92	0.95
SC	0.95	0.92	0.89	0.93	0.98
SO	0.95	0.93	0.93	0.98	0.97
WWU	1.05	1.03	0.99	0.97	0.97
UQ	0.95	0.92	0.93	0.96	0.97

[11] See SGN's response here: https://www.ofgem.gov.uk/publications-and-updates/riio-2-tools-cost-assessment-consultation

Figure 3: Totex efficiency scores – SGN proposed method



Southern and Scotland remain more efficient than the modelled regression line, ranked in the top three throughout most of GD1 - and in some years Scotland is the best performer overall. In the most recent year (2017/18) Scotland and Southern were 3rd and 4th respectively, and effectively equal to the upper quartile efficiency score (and only 2% behind the leading firm, NGN).

We believe this is firm evidence our overall cost base is efficient. When this is combined with our strong performance across a range of output measures (see Section 3.5), we believe we are delivering industry-leading overall value for money for our customers.

4.3 Disaggregated or 'bottom-up' benchmarking

In this section we discuss the various disaggregated models used by Ofgem. We set out in turn:

- Results from an 'aggregate bottom-up' model – which captures the overall efficiency scores resulting from accumulating the results from each underlying model; and
- Results from models for each individual cost-head i.e.
  - Work management – We spent £34m in 2017/18, and (across networks) which makes-up on average 10% of totex;
  - Emergency – £18m in 2017/18, and on average 5% of totex;
  - Repairs – £22m in 2017/18, and on average 6% of totex;
  - Maintenance – £20m in 2017/18, and on average 6% of totex;
  - Connections – £15m in 2017/18, and on average 4% of totex;
  - Mains reinforcement – £10m in 2017/18, and on average 1% of totex; and
  - Repex – £208m in 2017/18, and on average 40% of totex.

The total proportion of totex covered by these disaggregated models is 73%.

4.3.1 Aggregate 'bottom-up' – Existing Ofgem model

For bottom up benchmarking, there are several cost heads that are individually normalised and benchmarked with a specific workload or CSV. The cost categories that are benchmarked using the regression method are work management, emergency, repair, maintenance, connections, mains reinforcement, and repex. Once they are individually regressed and their modelled costs are calculated, the normalised costs and modelled costs are aggregated to calculate efficiency scores, and ultimately set an upper quartile.

The table below shows the standardised efficiency score for the aggregate bottom up benchmarking.

Table 15: **Aggregated bottom-up efficiency scores – Ofgem GD-1 method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.09	1.07	1.06	1.12	1.09
Lon	1.04	0.96	1.05	1.06	1.12
NW	1.05	1.14	1.09	1.02	1.01
WM	1.04	1.09	1.03	0.99	1.01
NGN	0.88	0.88	0.92	0.89	0.86
SC	0.91	0.87	0.88	0.90	0.92
SO	0.99	0.99	1.01	1.06	1.03
WWU	0.99	1.01	0.95	0.96	0.95
UQ	0.97	0.94	0.94	0.94	0.94

One issue worth noting from these results is the upper quartile efficiency score is generally lower in the disaggregated model than in the totex models. This is at least an indication the disaggregated model approach suffers from the problem of piecing together a 'Frankenstein' comparator company – i.e. by taking a benchmark from each underlying cost head it creates an unduly punitive aggregate benchmark, partly because it fails to reflect cost trade-offs between categories.

4.3.2 Aggregate 'bottom-up' - SGN proposed developments

The table below shows the results incorporating our proposed adjustments for repex and emergency highlighted above, as well as the WWU adjustment.

Table 16: **Aggregated bottom-up efficiency scores – SGN proposed method**

	Standardised Efficiency Score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.10	1.07	1.06	1.12	1.10
Lon	1.02	0.94	1.04	1.05	1.11
NW	1.06	1.14	1.10	1.03	1.02
WM	1.04	1.09	1.05	1.00	1.02
NGN	0.91	0.91	0.94	0.90	0.88
SC	0.90	0.85	0.85	0.88	0.94
SO	0.99	0.98	1.00	1.04	0.99

WWU	0.99	1.01	0.96	0.97	0.94
UQ	0.97	0.94	0.96	0.95	0.94

Assessing the results from the aggregate bottom-up regressions, Scotland is consistently one of the most efficient GDNs throughout GD1, being above the upper quartile in the first four years and setting the upper quartile in 2017/18. Southern remains around the industry average albeit with a year of relatively poorer performance in 2016/17.

4.3.3 Individual 'bottom-up' models – proportion of totex

The results above have been derived from the bottom up modelled costs, based on the individual cost regressions. When assessing each of the individual bottom up models, it is important to remember what the impact will be on the aggregated bottom up model. The table below summarises the proportion of totex that each of the bottom up models makes up.

Table 17: **Proportion of totex**

	Costs across all networks and years (£m)	Proportion of totex
Work management	799	10%
Emergency	388	5%
Repairs	473	6%
Maintenance	487	6%
Connections	281	4%
Mains reinforcement	93	1%
Repex	3,072	40%
Total bottom-up	**5,593**	**73%**
Business support costs	867	11%
Other cost heads (e.g. LTS & storage, other capex)	1,240	16%
Total expenditure	**7,700**	**100%**

This data is based on the costs incurred by all networks across the first five years of the price control. The table demonstrates, in a practical sense, the repex benchmarking model is by some distance the most material cost category, and therefore repex requires particular focus.

It should be noted, in-line with Ofgem's GD1 approach, business support costs are included in the totex model, but not included in the aggregate bottom-up model for the purposes of calculating an upper quartile value to be applied to the disaggregated results. In other words, the aggregated bottom-up efficiency scores and model cover only the 73% of the cost base which is assessed using regression analysis (and the scope of costs covered is therefore different to that covered by the totex model). We discuss efficiency analysis for business support costs at the end of this section as we understand this is an area where Ofgem is considering changes for GD2.

Other areas of cost such as LTS & storage, and other capex are considered individually using a non-regression assessment. These costs make up around 16% of totex. While these costs are, like business support costs, not considered in the aggregated bottom-up models, the sum of these cost areas are considered as part of the totex model.

The results from each of the individual bottom up regressions are indicative of relative efficiency in that cost category, and also determine the quality/robustness of the aggregated results overall. We therefore analyse each bottom up cost group individually below, assessing the merits and drawbacks of the benchmarking used at GD-1 using the principles set out above.

Work management – approximately 10% of totex

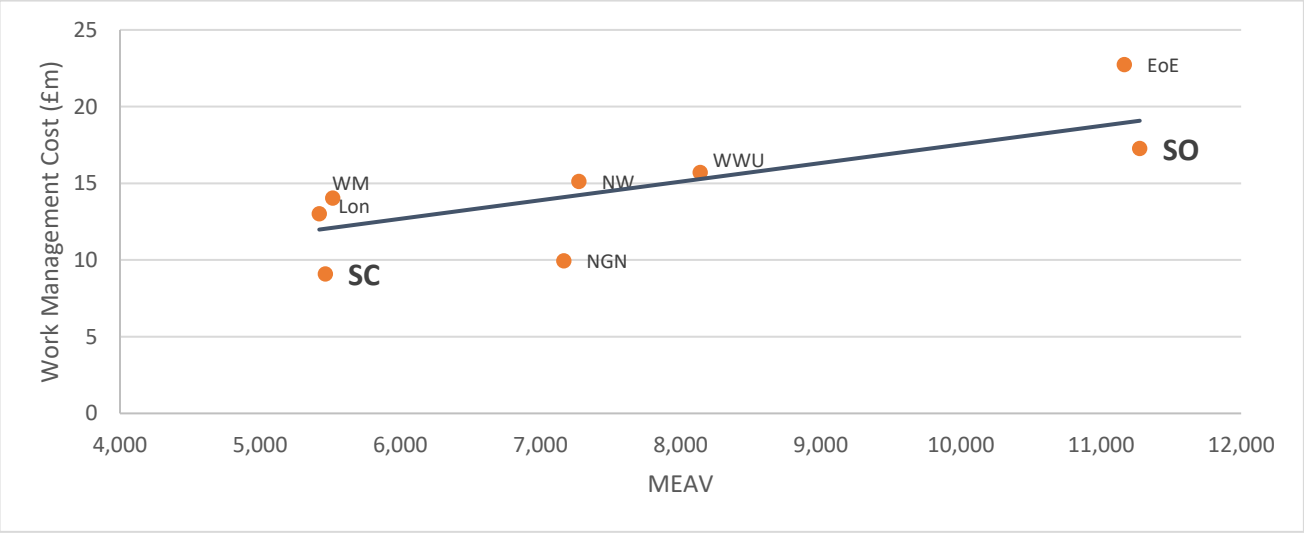
Work management - Existing Ofgem model description

Work management costs are comprised of four subsets of costs; asset management, operations management, customer management, and system control. Work management costs are normalised for smart metering costs, gas holder costs, and regional labour cost adjustments. The cost driver used against Work Management costs is MEAV.

Table 18: **Work management efficiency scores – Ofgem GD-1 method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.37	1.29	1.23	1.24	1.22
Lon	1.28	1.14	1.17	1.14	1.11
NW	1.18	1.21	1.08	1.06	1.07
WM	1.18	1.23	1.21	1.22	1.18
NGN	0.61	0.68	0.79	0.72	0.71
SC	0.84	0.73	0.63	0.83	0.77
SO	0.64	0.85	0.95	0.83	0.92
WWU	0.90	0.88	0.92	0.97	1.03

Figure 4: Work management efficiency scores – Ofgem GD-1 method



This shows that in 2017/18:

- Scotland efficiency score is 77%, ranked 2nd in the sector; and
- Southern efficiency score is 92%, ranked 3rd in the sector.

Over the GD1 period both Scotland and Southern have performed consistently better than Ofgem's GD1 industry benchmark. Overall, we think this demonstrates we are industry-leading on this cost category, perhaps jointly with NGN.

However, we note the model does produce a fairly wide range of efficiency scores; and it is clear Cadent's networks all perform poorly on this model. There may be structural differences or differing business models which could distort these results.

Work management - SGN proposed model developments

One proposal to improve the model might be to disaggregate work management further into the four component costs and instead of using MEAV, use some more appropriate cost drivers as listed below:

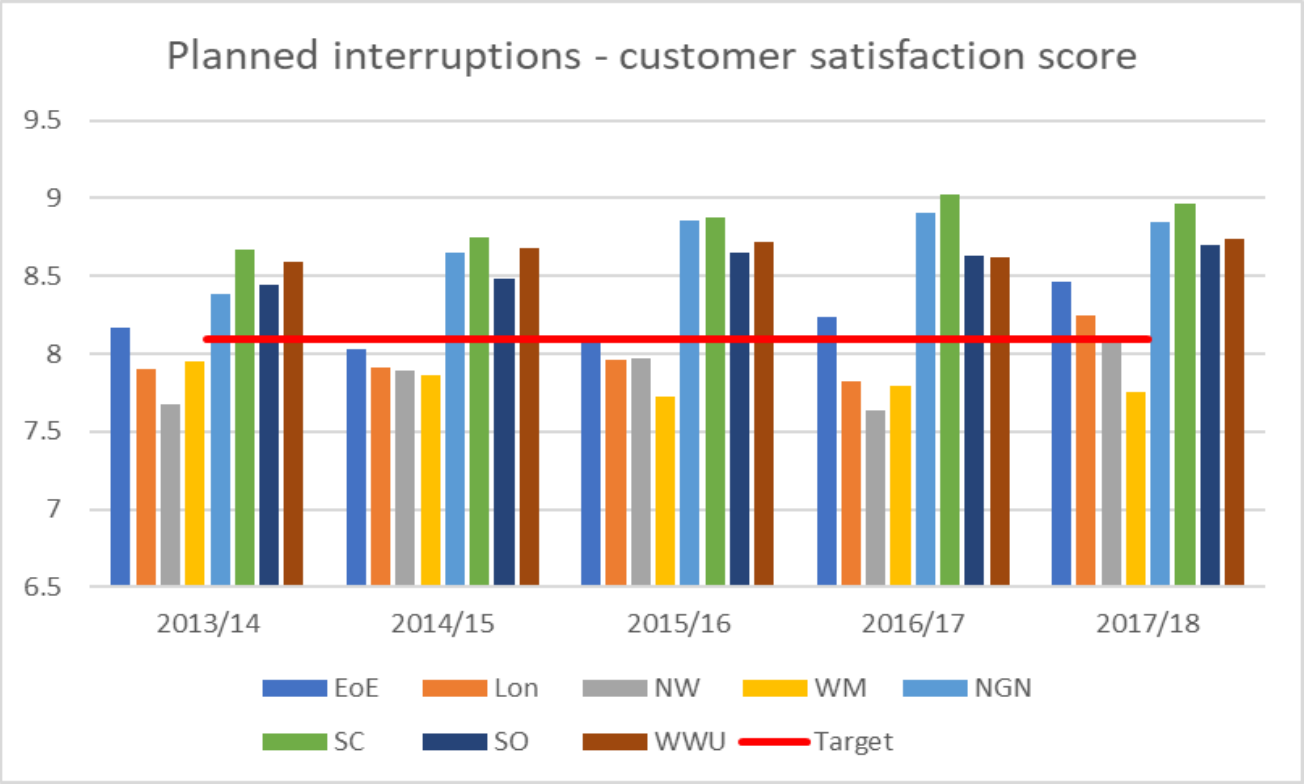
- Asset management - MEAV;
- Operations management – 50% emergency CSV, 50% External condition reports;
- Customer management – number of customers; and
- System control - MEAV.

We tested the results of these further disaggregated models and found the spread of efficiency scores is even wider than on the original work management model. It might be the case disaggregating these models is less effective at explaining differences in efficiency than the original work management model. This is a topic which may be discussed further through the CAWG.

External benchmarking by ARUP [12]has demonstrated our work management cost efficiency to be upper quartile, while delivering an industry-leading performance against functional Ofgem outputs. This is delivered through a tailored operating model which facilitates empowered decision making at depot level to most effectively serve the surrounding community. Active management of smaller contractors, falling under our Operations Management function, was highlighted as a success factor, as it drives greater pricing and delivery efficiency in addition to ensuring our policies and procedures prevail. Further detail and supporting evidence can be found in our Work Management and Business Support appendix.

[12] ARUP SGN RIIO2 Business Plan Support

Figure 5: Planned interruption – customer satisfaction



Emergency – approximately 5% of totex

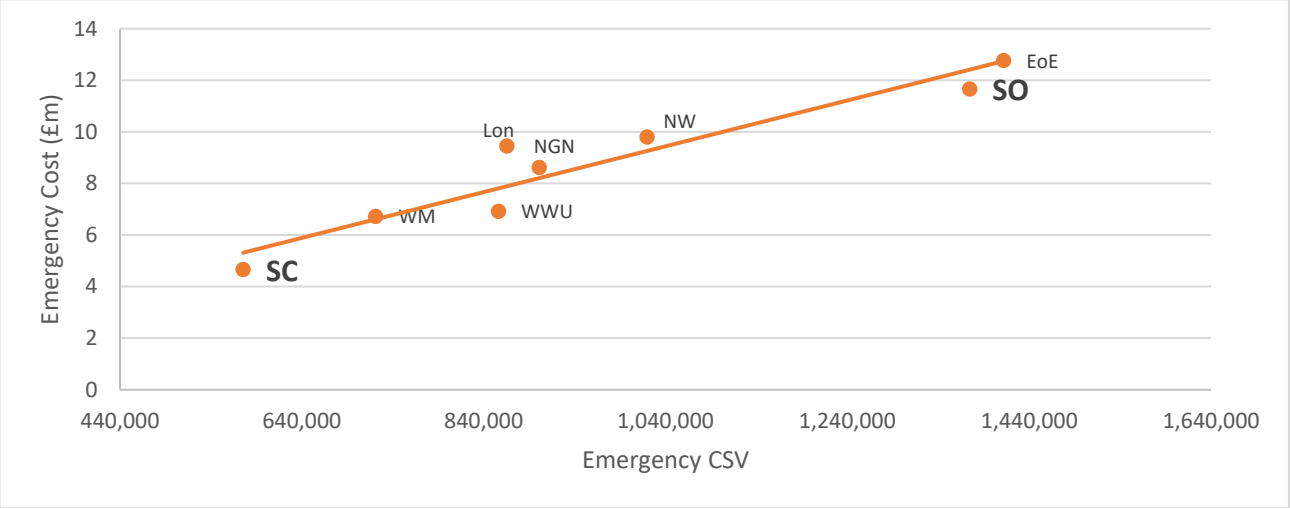
Emergency - Existing Ofgem model description

Emergency costs exclude costs of First Call Operatives (FCOs) utilisation and are normalised for smart metering costs, regional labour cost adjustments, and sparsity cost adjustments. The cost driver used for emergency costs is a CSV made up of 80% customer numbers to represent internal gas escapes, and 20% total external condition reports to represent external gas escapes.

Table 19: **Emergency efficiency scores – Ofgem GD-1 method**

	Standardised Efficiency Score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	0.97	1.00	0.91	1.04	1.00
Lon	1.42	1.45	1.40	1.29	1.19
NW	1.21	1.16	1.15	1.01	1.05
WM	1.03	1.06	1.00	1.01	1.01
NGN	0.85	0.88	0.89	0.93	1.05
SC	0.81	0.71	0.89	0.92	0.88
SO	0.80	0.79	0.96	0.96	0.94
WWU	0.91	0.94	0.79	0.84	0.88

Figure 6: Emergency efficiency scores – Ofgem GD-1 method



In 2017/18:

- Scotland efficiency score is 88%, ranked joint 1st in the sector with Wales & West Utilities.
- Southern efficiency score is 94%, ranked 3rd in the sector.

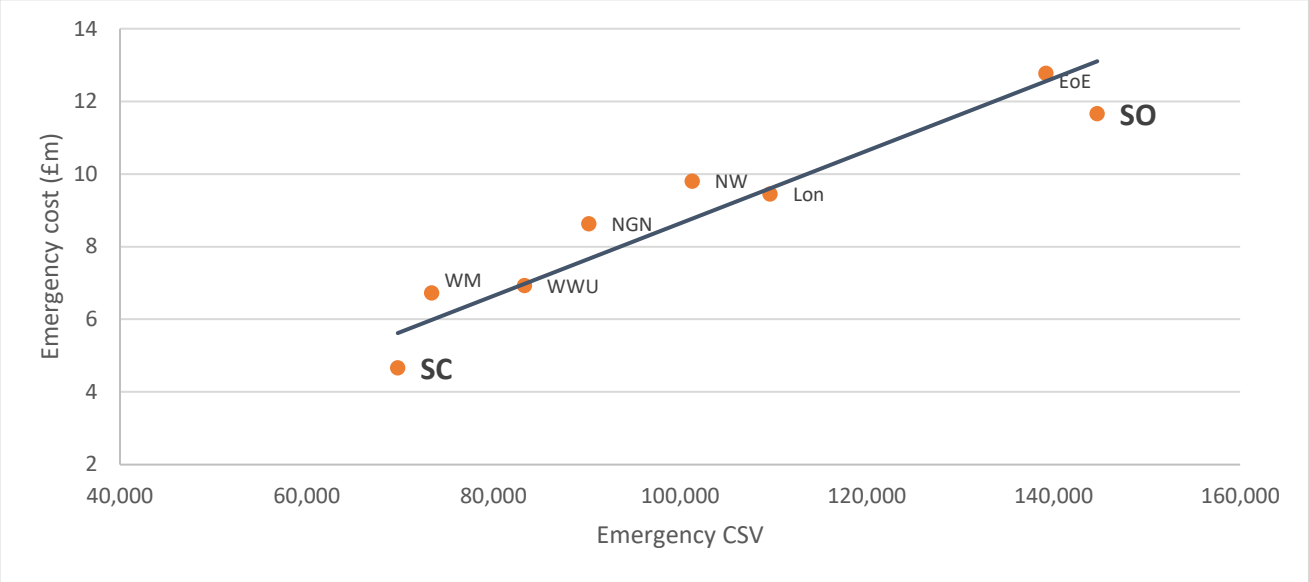
Emergency - SGN proposed model developments

While the existing model appears reasonably good at explaining efficiency, an alteration to emergency benchmarking which might improve the model is to substitute the emergency CSV with public reported escapes (PRE). This is because the PRE measure is possibly a closer representation of internal gas escapes, includes reports on external gas escapes and is a closer driver of actual costs in this area. Using this model generates a more plausible range of results. London in particular, now appears to be much less of an outlier.

Table 20: **Emergency efficiency scores – SGN proposed method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.02	1.04	0.97	1.04	1.01
Lon	1.14	1.14	1.14	0.98	0.98
NW	1.20	1.18	1.20	1.06	1.11
WM	1.04	1.11	1.09	1.08	1.11
NGN	1.11	1.16`	1.02	1.10	1.12
SC	0.75	0.64	0.80	0.84	0.81
SO	0.75	0.71	0.89	0.91	0.88
WWU	0.98	1.01	0.89	0.98	0.98

Figure 7: Emergency efficiency scores – SGN proposed method



Repair – approximately 6% of totex

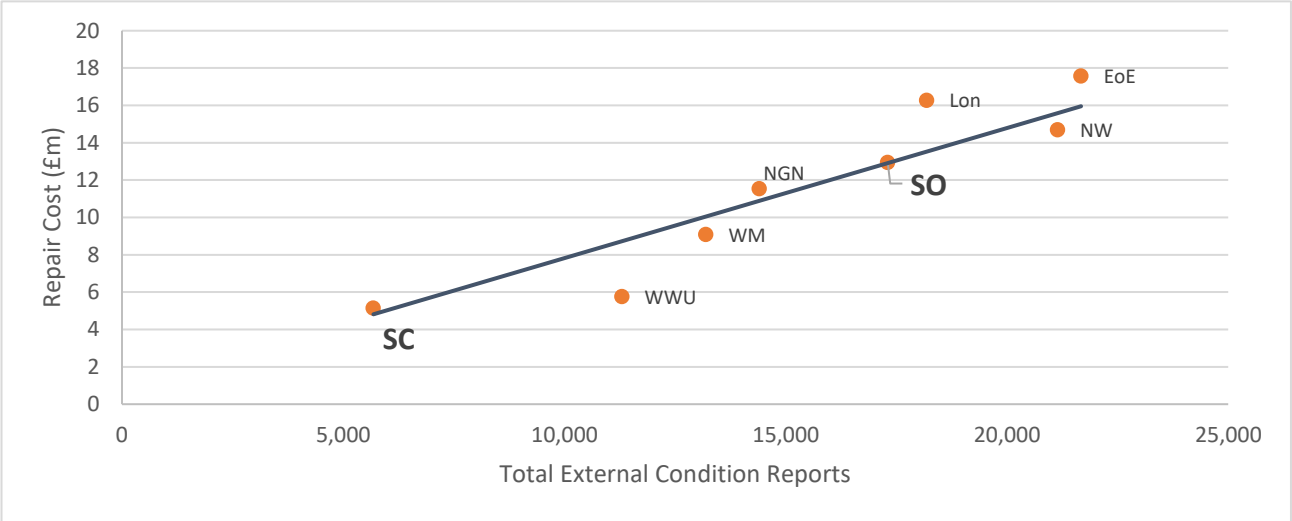
Existing Ofgem model description

Repair costs are normalised for street work costs, regional labour cost adjustments, sparsity cost adjustments, and urbanity cost adjustments. The cost driver used for Repair costs is total external condition reports.

Table 21: **Repairs efficiency scores – Ofgem GD-1 method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	0.94	0.93	0.97	1.26	1.11
Lon	1.07	0.94	1.03	1.06	1.21
NW	0.93	0.96	0.97	0.95	0.95
WM	0.91	0.87	0.85	0.85	0.90
NGN	0.97	0.96	1.11	1.02	1.06
SC	1.13	1.13	1.12	1.02	1.10
SO	1.16	1.33	1.08	1.00	1.01
WWU	0.89	0.89	0.87	0.83	0.66

Figure 8: Repairs efficiency scores – Ofgem GD-1 method



In 2017/18:

- Scotland efficiency score is 101%, ranked 4th in the sector; and
- Southern efficiency score is 110%, ranked 6th in the sector.

Repair - SGN proposed model developments

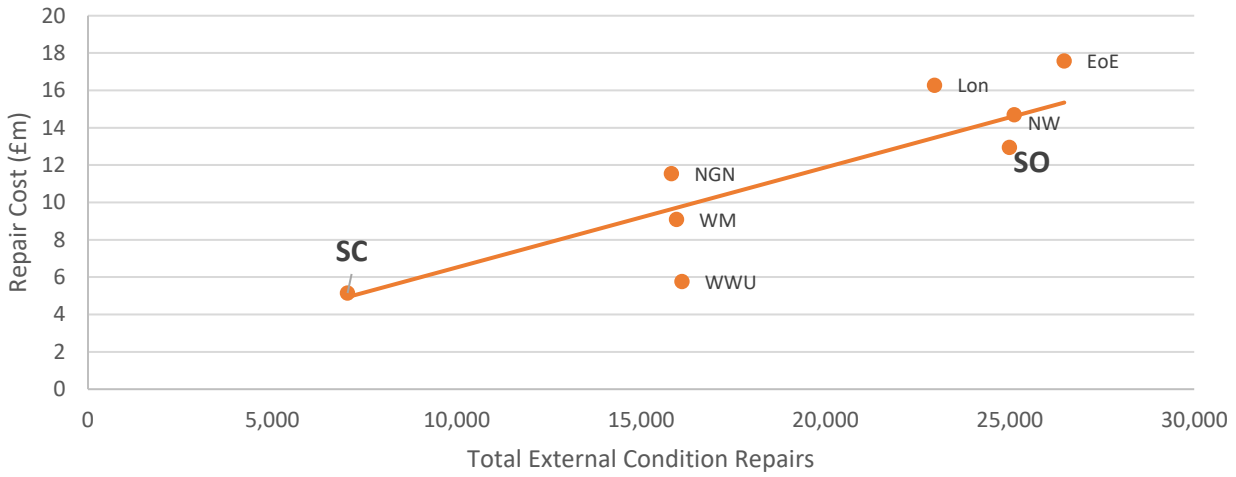
This model appears to be reasonably good at explaining efficiency, other than the Wales & West Utilities (WWU) outlier. This outlier suggests there are issues in cost reporting. In addition, several possible alterations to the repairs benchmarking were considered at the CAWG. The use of external conditional reports as a cost driver is good, but a report is not always the best indicator of the number of repairs done by a network (for example, one report might lead to a network doing a number of repairs in the same area). One proposed alteration is to use external condition repairs instead of external condition reports, which would be a more direct driver of repairs, and a more direct driver of costs. The results of this regression are shown below.

However, even with a more intuitive cost driver there are issues. Namely there are inconsistencies in how repairs data are collected in the industry, while the WWU outlier is clearly still present. Therefore, we support using the current model until more consistent reporting on external condition repairs is available.

Table 22: **Repairs efficiency scores – SGN proposed method (subject to data improvements)**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	0.99	1	0.99	1.33	1.15
Lon	1.1	0.84	0.97	1.06	1.2
NW	0.95	0.98	1.05	1.02	1
WM	0.9	0.87	0.86	0.88	0.92
NGN	1.14	1.21	1.24	1.14	1.18
SC	1.08	1.09	1.1	0.97	1.07
SO	0.98	1.12	0.96	0.88	0.89
WWU	0.86	0.89	0.83	0.73	0.58

Figure 9: Repairs efficiency scores – SGN proposed method (subject to data improvements)



Maintenance – approximately 6% of totex

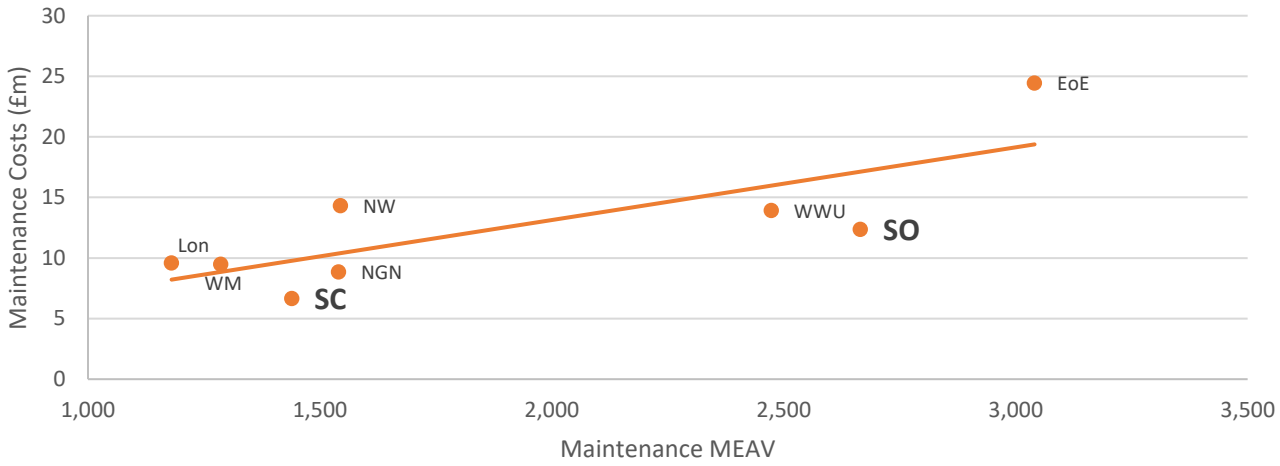
Existing Ofgem model description

Maintenance costs are normalised for regional labour cost adjustments and urbanity adjustments. The costs driver used for maintenance costs is maintenance MEAV, which is a subset of MEAV excluding mains MEAV and service MEAV.

Table 23: **Maintenance efficiency scores – Ofgem GD-1 method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.14	1.17	1.21	1.26	1.26
Lon	1.08	0.96	1.27	1.09	1.17
NW	1.17	1.17	1.43	1.34	1.37
WM	0.85	1.00	0.98	1.05	1.07
NGN	0.75	0.84	0.80	0.79	0.85
SC	0.97	0.84	0.72	0.76	0.68
SO	1.09	0.81	0.71	0.78	0.72
WWU	0.95	1.20	0.89	0.92	0.87

Figure 10: Maintenance efficiency scores – Ofgem GD-1 method



In 2017/18:

- Scotland efficiency score is 68%, ranked 1st in the sector.
- Southern efficiency score is 72%, ranked 2nd in the sector.

SGN proposed model developments

We have continued our industry-leading performance on this cost category throughout GD1. However, there are some issues with this model. For example, the MEAV data will likely need to be scrutinised for its applicability to maintenance work.

The actual maintenance costs have been historically difficult to define. There are different types of maintenance work: routine, planned work; and non-routine, unplanned work (only the routine costs are included in the regression analysis). However, different types of work may be classified differently by different networks. For example, during planned maintenance work there could be further issues on a nearby area. It is more efficient to do that unplanned work at the same time, but the costs may be allocated to planned work.

These issues have not yet been discussed in the CAWG, so it may be inappropriate to draw firm conclusions on an alternative model.

Connections – approximately 4% of totex

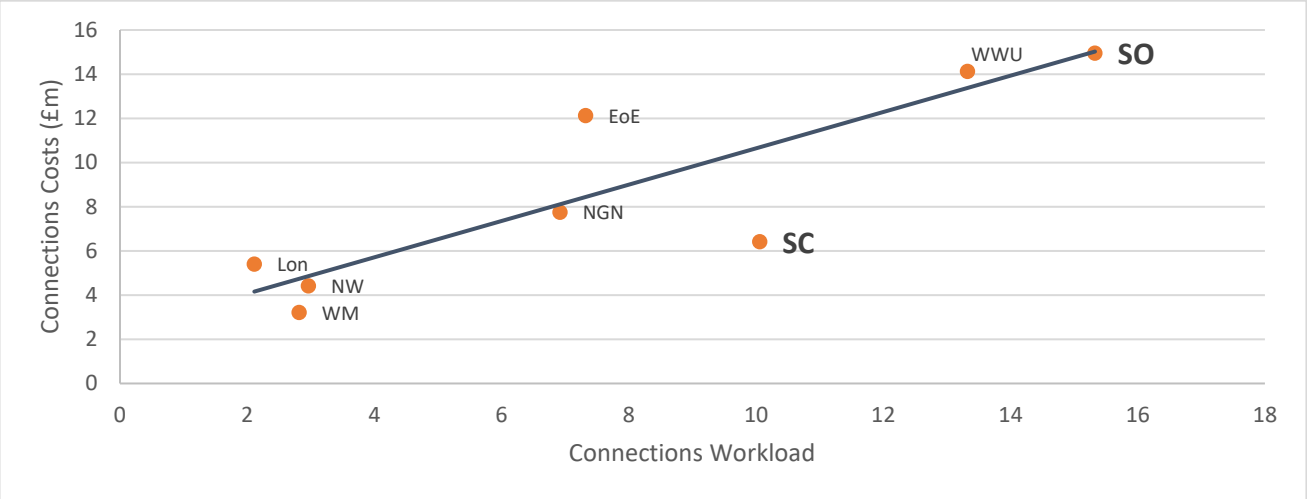
Existing Ofgem model description

Connections costs are normalised for street work costs, fuel poor costs, regional labour cost adjustments, and urbanity cost adjustments. The cost driver used for connections costs is a synthetic unit cost comprised of new housing, existing housing, and non-domestic mains above and below 180mm, and services.

Table 24: **Connections efficiency scores – Ofgem GD-1 method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.17	1.21	1.19	1.32	1.37
Lon	1.11	1.20	1.03	1.16	1.43
NW	0.87	0.96	0.96	0.75	0.93
WM	0.95	1.03	1.06	0.87	0.70
NGN	0.99	0.93	0.95	0.93	0.91
SC	0.62	0.59	0.62	0.65	0.58
SO	1.21	0.90	1.08	1.11	1.02
WWU	1.08	1.17	1.09	1.21	1.06

Figure 11: Connections efficiency scores – Ofgem GD-1 method



In 2017/18:

- Scotland efficiency score is 58%, ranked 1st in the sector; and
- Southern efficiency score is 102%, ranked joint 5th in the sector.

Scotland has been the number one GDN on this cost category throughout GD1 but looks like an outlier (as does East of England). Southern's performance has generally improved such it is close to the sector average. Since the model employs a workload cost driver, the wide range of efficiency scores appears implausible. It is unlikely the leading GDN has an efficiency score of 60% while the lagging GDN has a score of 143%, implying an 80 percentage-point difference in efficiency between the two, which is clearly not credible given this is essentially unit costs analysis.

Mains reinforcement – approximately 1% of totex

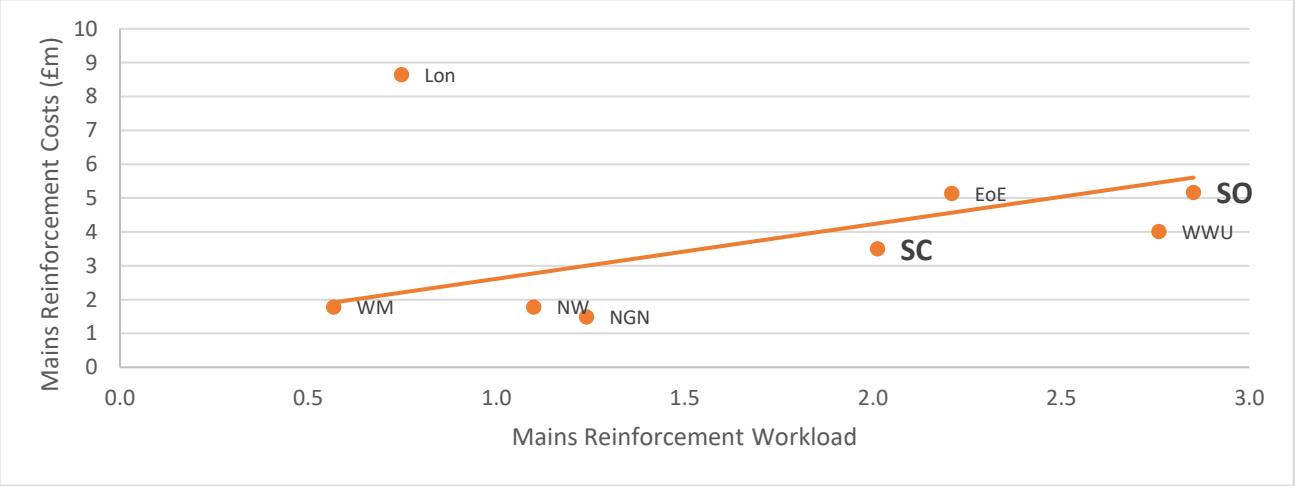
Existing Ofgem model description

Mains reinforcement costs are normalised for street work costs, district governor costs, regional labour cost adjustment, and urbanity cost adjustments. The cost driver for mains reinforcement is a synthetic unit cost comprised of general reinforcement, and specific reinforcement, both above and below 180mm.

Table 25: **Mains reinforcement efficiency scores – Ofgem GD-1 method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	0.89	0.87	1.24	0.33	0.92
Lon	0.95	1.29	1.31	3.41	3.29
NW	1.67	0.39	-0.23	0.82	0.52
WM	1.63	1.25	0.36	0.45	0.82
NGN	0.92	0.89	1.46	0.77	0.40
SC	0.31	0.61	1.03	0.45	0.67
SO	0.58	1.38	1.37	0.96	0.77
WWU	1.06	1.31	1.46	0.82	0.61

Figure 12: Mains reinforcement efficiency scores – Ofgem GD-1 method



In 2017/18:

- Scotland efficiency score is 67%, ranked 3rd in the sector; and
- Southern efficiency score is 77%, ranked 5th in the sector.

The chart illustrates some of the difficulties of modelling this cost head. It is clear London is an outlier - this is due to work undertaken on a stretch of pipe in the River Thames which has a unit cost materially higher than the rest of the industry.

Even when adjusting for London, or even excluding London altogether, it does not improve the regression and the subsequent efficiency scores. North West results are negative in 2015/16, as per the GD-1 baseline, while the spread of efficiency in a given year is still implausibly high.

Table 26: **Mains reinforcement efficiency scores – Ofgem GD-1 method (excluding London)**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	0.86	0.86	1.38	0.47	1.33
NW	1.71	0.47	-0.28	1.37	0.79
WM	1.84	1.67	0.41	0.74	1.33
NGN	0.83	0.88	1.53	1.19	0.60
SC	0.28	0.62	1.05	0.65	0.97
SO	0.55	1.30	1.40	1.39	1.10
WWU	0.93	1.21	1.52	1.19	0.87

Similar to connections, mains reinforcement efficiency scores have a large spread across the highest and lowest scoring networks. One reason for this might be because the costs in this category are not particularly large in the context of the overall cost base (around 1% of totex) – so any diversion from an average cost or workload skews the efficiency score much more than in categories that have a larger cost base.

In addition, the data used may not be robust enough to do a robust benchmarking exercise. One example is for 2015/16, normalised costs in the North West turn negative leading to a negative efficiency score in that year. In general, this cost category is one where unit cost can vary materially for reasons entirely unrelated to managerial efficiency – i.e. due to the specifics of any particular project (similar to the London example). This makes the regression results unreliable.

SGN proposed model developments

As with Connections, a combination of relatively small cost head, highly variable costs, and poor data suggests this cost area is not suitable for regression analysis. Smoothing of costs over GD1 may take out some variability, however, there may be other types of analysis suitable for these cost areas, such as bespoke engineering assessments/judgement.

Repex – approximately 40% of totex

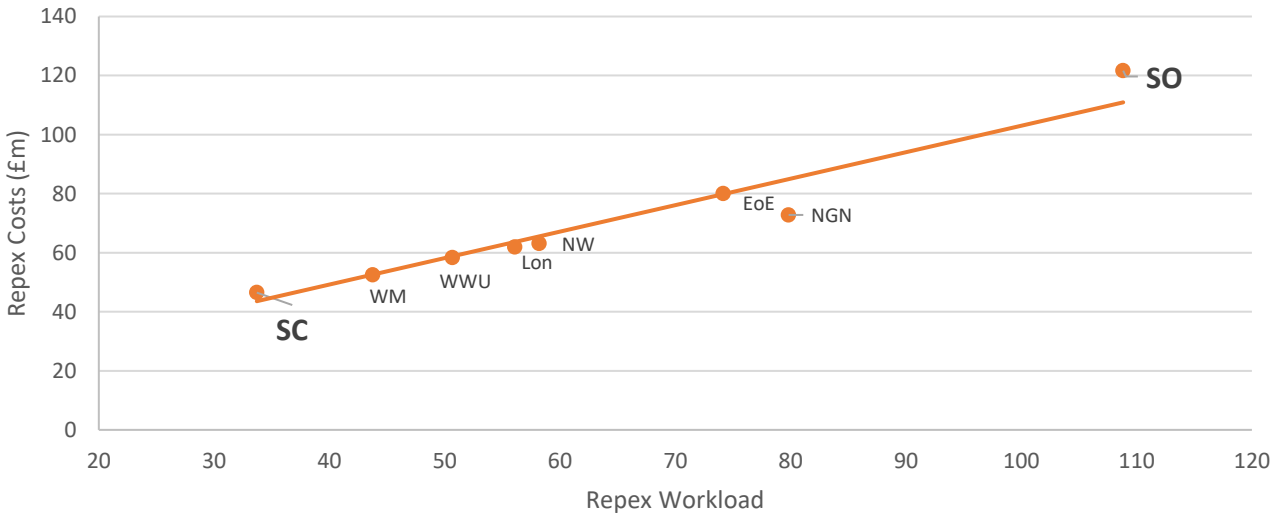
Existing Ofgem model description

Repex costs are normalised for street work costs, MOB riser costs, rechargeable diversion costs, regional labour costs, urbanity cost adjustments. The cost driver used for repex costs is a synthetic unit cost consisting of laid length of pipe by diameter band and other repex cost categories.

Table 27: **Repex efficiency scores – Ofgem GD-1 method**

	Standardised efficiency score				
	2013/14	2014/15	2015/16	2016/17	2017/18
EoE	1.04	1.01	1.00	1.05	1.00
Lon	0.91	0.83	0.95	0.96	0.97
NW	1.00	1.16	1.07	0.99	0.96
WM	1.05	1.11	1.04	0.97	1.01
NGN	0.94	0.90	0.92	0.91	0.86
SC	1.02	0.98	1.01	1.01	1.10
SO	1.04	1.03	1.05	1.16	1.11
WWU	1.02	0.98	0.96	0.95	0.99

Figure 13: **Repex efficiency scores – Ofgem GD-1 method**



In 2017/18:

- Scotland efficiency score is 110%, ranked 7th in the sector; and
- Southern efficiency score is 111%, ranked 8th in the sector.

Repex SGN proposed model developments

It is clear the repex results are particularly volatile. The 2017/18 results appear to be a particular outlier year – particularly for Scotland – but there is broader volatility that can be observed across these results. Such as:

- Between 2013/14 and 2015/16, London's efficiency score swung from 0.92 down to 0.83 in one year, and then back up to 0.95 the year after;
- The score for North West spiked to 1.16 in 2014/15 before falling back to below average by 2016/17;
- Southern and Scotland both exhibit similar spikes, in 2016/17 and 2017/18 respectively; and
- In all years of GD1, except 2017/18, Scotland's performance is approximately equal to the sector average – it is only in the last year the results for Scotland deteriorate (a similar observation holds for Southern as well).

Given the current repex regressions are fundamentally a comparison of unit costs, we do not believe it is credible these very large and rapid swings in efficiency scores could reflect genuine changes in efficiency performance year-on-year. On a unit cost basis, year-on-year changes of 10-15% do not seem realistic. Rather we suggest this indicates some weaknesses in the underlying model which means it is not accurately picking-up genuine changes in efficiency.

Given the importance of repex, in it accounts for more than four times the amount of totex as any other individual bottom up regressions, even relatively low volatility on a cost base which should clearly be unit driven is a concern that could distort eventual results. Therefore, we believe ensuring the accuracy of repex benchmarking should be prioritised.

Therefore, we propose two options for reducing volatility:

- Aggregating cost and workload, and running a single regression; or
- Averaging efficiency scores over five years.

Another important aspect of the repex efficiency scores that may need some adjustment relate to the innovative processes used by the networks to make repex more efficient. For example, our use CISBOT, a robotic device which allows management of risk from large iron mains without the associated costs of laying new pipe. By definition, this does not involve pipes laid – so we incur a cost to undertake this activity, but there are no associated mains laid kilometre value added to the cost driver in this model. Clearly this could distort the results – we believe CISBOT is an efficient approach and this should be captured appropriately for the analysis. Therefore, some adjustments are necessary to account for this. Ofgem may also need to consider if there are any innovative processes adopted by other GDNs which should be taken into account in the benchmarking.

Proposed model - results

With the two adjustments outlined above (adjusting for volatility and for innovative processes) as well as the previously referenced adjustments for WWU, we present some alternative results that are more representative of each network's cost efficiency in repex over the price control period.

Table 28: **Repex efficiency scores – SGN proposed methods**

	Aggregate model		Average of annual model	
	Efficiency score	Ranking	Efficiency score	Ranking
EoE	1.01	5	1.02	5
Lon	0.97	2	0.93	2
NW	1.00	4	1.04	7
WM	1.02	6	1.04	6
NGN	0.92	1	0.92	1
SC	1.03	7	1.01	4
SO	1.07	8	1.06	8
WWU	0.98	3	0.97	3

Other repex issues

There are other, outstanding issues in repex that we have raised for discussion at the CAWG, and which are summarised here:

Unit cost update: As mentioned previously, the repex analysis is essentially a unit cost analysis. That means if Ofgem's unit cost assumptions change since they were set for GD1, that could distort the results. It is our understanding the industry generally agrees Ofgem's unit cost assumptions need updating.

- **Large diameter pipes:** There is an argument wider diameter pipes are more difficult to do a unit cost analysis on. Wider diameter pipe work tends to be more challenging, and often contains more bespoke work. Hence, using a unit cost analysis is unlikely to be a representation of how efficient such a bespoke project is, given it may have some unique factors that are difficult to control for. One option is for Ofgem to commission a bespoke engineering assessment of the larger diameter pipes. However, the impact of excluding these workloads from the repex regression analysis is minimal – the results do not change significantly.

Finally, as we have discussed through the CAWG, we consider it important the benchmarking results are evaluated alongside a sense-check of the quality of service provided by the GDNs. It would be expected there is a link between cost and quality – so if GDNs were failing to meet quality standards/targets, it would be inappropriate for those GDNs to also be informing the cost upper quartile and therefore setting the cost target for other GDNs which are providing better service quality.

A clear example relates to customer service on planned interruptions (which are primarily associated with the repex programme). According to Ofgem's customer service scores, the London network (and Cadent licensees generally) have been underperforming versus the target consistently over the price control. At the same time, the repex benchmarking analysis shows unit costs in London to be highly efficient.

- Similarly, North West perform better than average on the benchmarking in the final two years, and yet are the worst company for customer satisfaction in 2016/17 (and second worst in 2017/18. It is not clear that low performing networks on quality should be rewarded for this on benchmarking.

It is clearly plausible - based on this high-level sense check - the apparent strong efficiency performance in these licensees is achieved (at least in part) due to letting standards of customer service fall behind target. SGN in contrast has consistently outperformed. We believe this should be factored in to any evaluation of our performance compared to the other GDNs.

Business Support – approximately 11% of totex

Existing Ofgem model description

For the bottom-up benchmarking at GD1, Ofgem used a unit cost approach (rather than regression) to assess business support cost efficiency. At final determination Ofgem benchmarked aggregate business support costs covering six activities: non-operational IT and telecoms; property management; finance, audit and regulation; HR and non-operational training; procurement; and CEO and group management. Insurance costs were excluded from the benchmarking exercise and were assessed separately, because differences in risk appetite and insurance coverage levels made it difficult to ensure a like-for-like comparison across companies.

Ofgem assessed business support costs on a group basis (i.e. grouping together the two SGN licensees and the four Cadent licensees), rather than assessing each network licensee separately. The reasoning for this was business support costs are generally derived from central group functions. Ofgem used the same approach at ED1. Because companies generally incur business support costs at a group level, this approach is suitable as it avoids any distortions in benchmarking results that could be caused by different approaches to allocate BSCs to licensees within a group.

Per-unit business support costs were calculated using a composite cost driver as the denominator. This composite driver was based on a weighted average of individual cost drivers for each activity as shown in the table below. Weightings were based on the proportion of each activity cost within total business support costs (excluding insurance), on a company-by-company basis.

Table 29: **Cost drivers for business support costs**

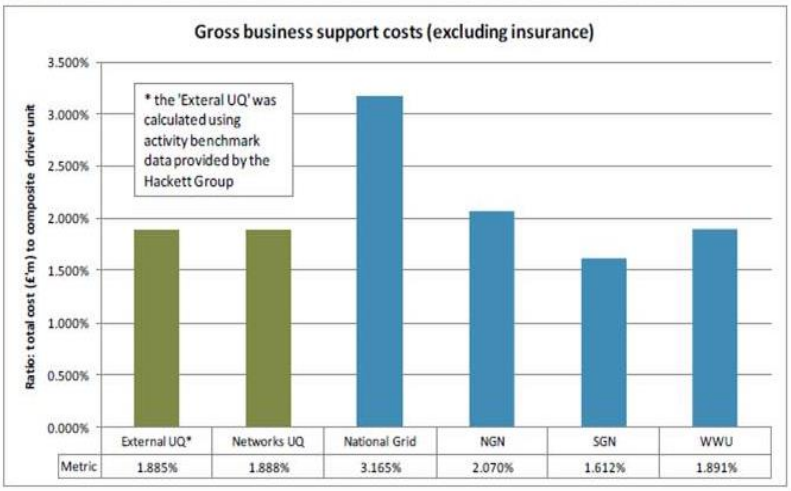
Activity	Cost driver
IT and Telecom	Number of end-users
Property management	Revenue (£m)
Finance, audit and regulation	Revenue (£m)
HR and non-operational training	Number of employees
Procurement	Total spend (£m)
CEO and group management	Revenue (£m)

Ofgem used two comparator metrics as efficient benchmarks:

- A metric based on an external upper quartile for each activity except CEO and group management, developed with the Hackett Group; and
- an upper quartile based on all four network industries: gas and electricity transmission, gas and electricity distribution.

The below chart, from Ofgem's GD1 final proposals, shows the ratio of business support costs to the composite driver for each company. The two upper quartile measures are also shown. The chart shows we were industry leading on business support cost efficiency based on Ofgem's assessment at GD1.

Figure 14: Business support top-down benchmarking comparison



We note there are a number of elements of Ofgem's GD1 approach which we have been unable to replicate.

- We do not have access to Hackett's database of external comparators, neither do we have cost and cost-driver data on the other network sectors.
- We have not been able to replicate a number of the adjustments made by Ofgem due to data being currently unavailable, including:
  - Ofgem made a number of pre-benchmarking normalisations to costs, including to reallocate costs back into business support where companies had allocated these costs out (net to gross adjustment) – an area where Ofgem is seeking to make improvements to the available data;
  - Ofgem made discretionary post-benchmarking adjustments based on evidence that companies submitted on their efficiency; and
  - Certain cost accounting rules through the RIGs and cost-head definitions have changed slightly since GD1.

It is also important to note that a number of alternative approaches to assessing business support costs are being proposed in the Cost Assessment Working Group and in Ofgem's cost assessment consultation, such as regressing business support costs rather than using a unit cost assessment.

One issue that will need particular attention is different GDN groups have different business models and cost allocation practices for overheads. These issues mean care needs to be taken in specifying and interpreting a BSC model. Given all these issues, it is too soon for us to be able to provide a specific set of model results for BSCs.

We expect to provide this analysis once full and proper testing has been through the CAWG and Ofgem's summer cost assessment consultation. However, at a high level, we do not expect our efficiency performance to change from GD1.

External benchmarking by ARUP demonstrates our business support cost efficiency to be upper quartile and concluded that our operating model achieves an 'optimal balance between cost efficiency and function'. The analysis highlighted our 'People and Culture Strategy' as a success factor, driven by investment in our HR

function to provide support and training, with ARUP commenting we are moving 'from transactional business support services to more transformational, strategic support'. Further detail can be found in our Work Management and Business Support appendix.

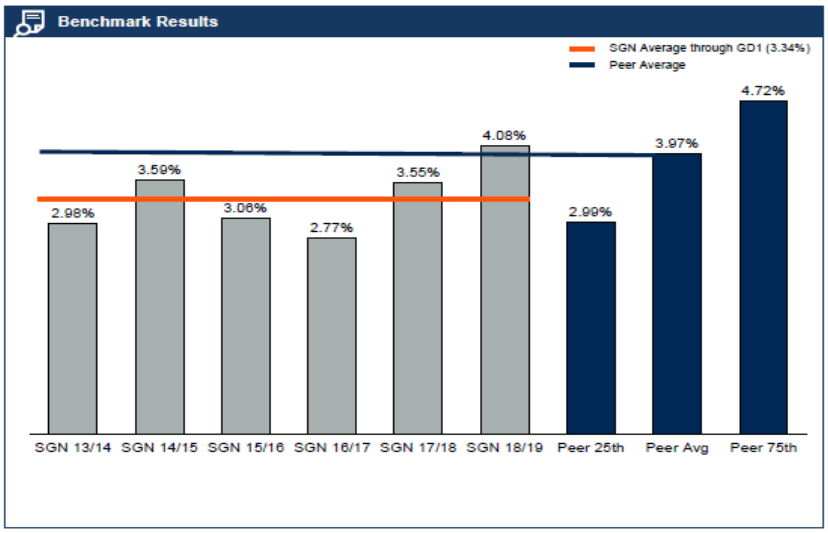
At GD1, Ofgem agreed we should not be treated as part of the SSE group for benchmarking purposes, as this would distort the benchmarking. However, because we were 50% owned by SSE at the time, Ofgem first benchmarked SGN and SSE separately, and then combined the two separate sets of benchmarking results to calculate our allowances. Our baseline allowances were set by taking a weighted average of the SGN baseline and the SSE baseline. SSE's ownership of SGN has now declined to 33.3%, and our reliance on SSE for business support services is reduced and is continuing to decrease. For example, a proportion of our IT support is now being provided by Fujitsu rather than SSE. In light of this, it is clear we should continue to be benchmarked separately from SSE.

IT costs

IT and telecoms costs make up the largest proportion of business support costs – approximately 40% across all GDNs over GD1.

We have commissioned an independent assessment of our IT costs. Based on detailed benchmarking and analysis, we have concluded our historic spend across GD1 as a percentage of revenue is between the peer average and 25th percentile, at 3.34% it is 16% lower than comparable industry peer average. As detailed in the below Figure 14.

Figure 15: Results of the independent benchmarking [13]



Further to this the following was concluded:

- Our BAU technology spend (opex and depreciation) is £1.8m less than the average spend of comparable technology peers and our IT Spend per employee is lower than the peer average;
- Some service level targets are more stringent in comparison to industry standards;

[13] Source: Gartner SGN RIIO2 Business Plan support

- Our IT spend per employee, at £12,017 a year, is 3.4% lower than the peer average of £12,435; placing it within the 'best in class' category of cost efficiency; and
- Our GD2 Investment planning and provision estimates are within the target Gartner equivalent range.

4.4 GD2 benchmarking policy

In the section above, we discussed some specific ideas for modifications to the benchmarking models as established at GD1. These issues will continue to be discussed through the CAWG.

There are also a number of over-arching benchmarking policy issues which we address here.

Weighting of totex vs. Disaggregated

For GD1, Ofgem's historical efficiency assessment approach was based on two sets of models:

- A totex model, where all GDN costs are captured under a single benchmarking model; and
- A set of disaggregated models, which benchmarked various sub-categories of cost individually.

Ofgem's efficiency assessment was based on applying 50% weight to the results of the totex model and 50% weight to the results of the disaggregated models. This 50:50 combination gave Ofgem's overall view of the efficiency of the GDNs. The same 50:50 weighting between totex and disaggregated modelling was also applied in the electricity distribution price control, ED1, which was finalised in November 2014.

We do not consider there to be evidence to suggest that Ofgem should move away from its established policy of placing a substantial focus and weighting on totex modelling for GD2 and expect totex analysis to continue to be central in any assessment of efficiency of the GDNs. This is for the following reasons:

- **Measuring overall efficiency:** Totex models provide a test of overall value for money achieved by the GDNs and provides a test of whether trade-off decisions are being made in an efficient way between different areas of cost - For example between maintenance spend (opex) and replacement spend (repex/capex). This is illustrated by our '4Rs' strategy, outlined in our Historical Expenditure Analysis paper2, where for each intervention we determine the most appropriate strategy according to the condition of the asset, deciding whether to repair, refurbish, replace or rebuild. Different GDNs may have different business models or approaches to evaluating these trade-offs, which can only be appropriately compared when looking at the aggregated Totex level. Comparison at a disaggregated level will overlook some of the trade-offs.
- **Model robustness and incentives:** Placing weight on totex models gives GDNs the right signal that Ofgem expects to see companies challenging themselves to find the lowest total cost solution. A totex approach should encourage GDNs to think carefully about how to spend money in areas where there are trade-offs. In contrast, using different disaggregated models inevitably creates distortions and boundary issues. Results can be distorted simply as a result of different cost allocation approaches; differences in investment cycles; or as a result of the specific modelling choices made within a particular model.
- **Reasonable outcomes:** A risk of disaggregated modelling is that it overlooks the trade-offs that companies make. By combining a selection of disaggregated models, it combines the leading performance for individual categories and does not capture the full costs associated with those strategies. As such it potentially creates a 'cherry picked' benchmark that is impossible to achieve.
- **Transparency:** The more disaggregated the analysis undertaken by Ofgem, the more complex and unclear the overall benchmarking exercise becomes. This creates the possibility of generating arbitrary or

unreasonable results.

In principle, these points suggest that the disaggregated models should be given less weight than the totex model. We also note in practice the disaggregated models appear to be significantly less robust than the totex model. Notably, several of the models produce a very wide range of efficiency score outcomes, which cannot plausibly be interpreted as genuine efficiency differences between the GDNs. Some of the models also exhibit implausible volatility over time and obvious outliers which are likely to distort the results.

Given this, we consider it appropriate a greater emphasis should be placed on the overall value for money test, using a totex benchmark, rather than the conclusions drawn from any specific disaggregated model (or set of disaggregated models).

Cost aggregation

In its cost assessment consultation, Ofgem has introduced the possibility of aggregating activity-level costs, for example in a 'totex and opex plus' type approach and proposed a set of criteria for pooling costs into categories. These criteria are set out below, and we feel that they are broadly sensible principles to use when determining how to aggregate costs for benchmarking purposes.

- **Complementarity:** Is there a strong technical/economic reason to believe that activities or groups of expenditure are complementary and should be benchmarked together and a consistent set of cost drivers can be identified?
- **Cost trade-offs:** Can GDNs make trade-offs in expenditure between the different activities/areas included in the cost pool, and so benchmarking those activities/costs together will help avoid biased relative efficiency results or unintended managerial incentives for the GDNs?
- **Cost boundary complexity:** How complex is the boundary of cost reporting data that needs to be defined to benchmark the identified cost pool/activity (e.g. how well defined is the group of costs within Ofgem's regulatory reporting templates)?
- **Risk of inaccurate/biased models:** Is there too much 'noise' in the data to be confident that including certain types of expenditure within aggregated regressions could lead to inaccurate model results, or coefficient estimates that are difficult to interpret using engineering/economic logic?

The disaggregated models suffer from a number of issues, most importantly they do not capture trade-offs between cost areas and can therefore distort incentives to reduce overall costs. Considering more aggregated models such as a 'totex and opex plus' approach is a step in the right direction to addressing these issues. We note however that activities which do not fall under 'opex plus' may still be well suited to regression benchmarking (possibly alongside expert review). It should not be assumed any activity areas that are not captured under 'opex plus' will not be regressed. Furthermore, if a more aggregated approach to activity-level benchmarking is used, it should be used as an additional cross-check to the totex modelling, not as a replacement.

As well as identifying suitable groups of costs which can be aggregated, it is also important to carefully consider and test cost drivers that could be used for these models. Simply aggregating the cost drivers of the underlying disaggregated models into a CSV should not be the preferred solution.

Other issues

Other benchmarking policy decisions will also need to be made by Ofgem in due course, including:

- The use of the upper quartile;
- Benchmarking historical costs vs. business plans and the weighting on these;
- Whether to re-introduce 'interpolation' as contained in the GD1 IQI (and other issues associated with the Business Plan Incentive); and
- The combination of cost efficiency with quality performance – how to use quality as a 'sense check' for the benchmarking results (i.e. to ensure companies setting the benchmark are not providing poorer service).

We look forward to engaging with Ofgem on these and other issues through the CAWG.

4.5 Wage analysis

The long-term pay deals we agreed in the first half of GD1, resulted in fairly low (CPI-linked) pay increases and had limited salary cost increases for us.

We undertook salary benchmarking in 2017, using Willis Towers Watson Compensation software benchmark data [14] , comparing salaries paid by us to those paid by comparators across a range of roles, indicated basic salaries for many of our SGNC employees had fallen behind market rates. This was corroborated by increasing churn among our experienced and trained technical employees, and concern among our managers that increasing numbers of valued employees were 'looking for jobs outside'. All of this built significant upward pressure and increasing expectations in advance of our pay negotiations in 2018.

In 2018 we agreed an above-inflation pay increase as part of a further long-term (four-year) pay deal for our SGNC employees. We then repeated a Willis Towers Watson salary benchmarking exercise in 2018 following the pay award. This exercise found while the significant pay award we agreed in 2018 had brought our salaries closer to market median, many remained below. However, taking into account overtime and standby payments, overall remuneration is generally in-line with the average. We therefore believe we are offering competitive and efficient salary levels, albeit there are some challenges associated with employee churn (churn is still increasing, but not at the same rate).

4.6 Outputs performance

It is important to note that there is often a cost associated with delivering higher quality. For example, we look to minimise customer disruption by maximising live insertion work, similarly we operate to a significantly higher repair target (12-hour repair) compared to other networks, particularly given the London environment that we operate in. There is a cost which we incur to deliver at this level, reflected in our high customer scores, and this difference in quality is not reflected within the benchmarking analysis.

We have demonstrated earlier in this appendix our excellent track record on cost efficiency and this should sit alongside the consistent output delivery as set out in Ofgem's last annual report:

[14] Willis Towers Watson https://www.willistowerswatson.com/en-AU/Solutions/compensation-strategy-and-design

Table 30: **GD1 Output performance**

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

Note – the amber on fuel poor represents some unique challenges in London and is not cost efficiency related.

4.7 SGN business management processes

We have invested to ensure our employee development and policies/processes deliver a culture of efficiency and performance that we consider is sustainable into the future. These include:

- **Performance management culture**: Using performance management and objective setting we have installed a cultural commitment to efficient performance standards, which have been cascaded through our management structure to depot level;
- **Training and development:** We have updated and modernised the contractual terms of employees, driven greater flexibility by cross-skilling them;
- **Local accountability**: We have clear local depot accountability, meaning services and customer service levels are optimised and delivered by teams for the diverse communities they serve;
- **Improved planning**: Introducing a single planning department to oversee activity across multiple areas has led to reduced costs, removal of silos to give greater visibility to the interactions between activities and by creating a culture of cost benefit analysis to inform the right decisions every time;
- **Improved data analytics**: We were the first gas network to adopt predicative analytics and to develop our strategy on the iron mains risk reduction programme (repex). We've developed an extensive analytics capability that has allowed us to target pipes that pose the highest safety risk;
- **Contracting strategy**: Moving away from the larger first tier contractors to smaller second and third tier contractors where we have absorbed a proportion of management and general overheads; and
- **Good business decisions:** In advance of the GD1 price control, ex-ante allowances were set based on certain economic assumptions made at the time. As we have moved through the period and established the reality of these assumptions, we have been able to make well-informed business decisions to maximise savings against the allowances. Examples include:

- Utilising employees on meter work: At the outset of GD1 we decided to maintain a metering team, as when our engineers are not responding to emergency and repair work, a large proportion of their 'down-time' is used to repair and maintain the older 'legacy' meters under commercial contracts. With the delay in smart meter roll-out this work has continued for longer than originally expected, and therefore we were able to keep our engineers more productive than we had anticipated, leading to an overall cost saving;
- SIUs: The SIUs are independent networks that are either run on propane or LNG. Prior to May 2016 we sourced the LNG from the National Grid facility at Avonmouth. With the closure of Avonmouth we needed to find alternative solutions that would allow us to sustain supplies to the SIUs, something which we have been able to achieve more cost effectively than originally anticipated.

4.8 SGN's successful innovations

Innovation lowers costs, reduces disruption and improves services for customers and communities. It's critical to how we'll define the pathway to our future, low carbon energy system. Stakeholders want us to do more with innovation, prioritising research into alternative gases and collaborating with academic and commercial partners. We've already saved customers £125m in GD1, and our use of innovation is recognised for challenging convention and pioneering new approaches in all areas of our network.

Innovation has served customers well: keeping costs down, reducing environmental impact, reducing disruption to road users and improving our services to customers in vulnerable circumstances. We also recognise value from the innovation process through collaboration with third parties to share and spread knowledge and insights for broader and long-term consumer advantage.

We can directly attribute £55m of operational (Opex) cost savings and £71m of replacement (Repex) savings to innovation projects in the first five years of GD1. The table below list the top five innovations from Opex and Repex, along with the value (savings) created for customers.

Top 5 innovation projects: Opex savings	Top 5 innovation projects: Repex savings
– Large CISBOT (Cast Iron Joint Sealing Robot) £10.84m – Core and Vac £10.61m – Self-Amalgamating Tape (Stage 2) £7.6m – Opening up the Gas Market £4.08m – RCA GPS Survey (MGDC – GeoField) £3.04m	– Live Mains Insertion (downsize live) £24.10m – 20mm Serviflex for 1 1/4" Steel Services £15.6m – 29mm Mains Inspection Camera £11.90m – Large CISBOT (Cast Iron Joint Sealing Robot) £6.61m – Wask PE Riser System III £4.89m

By the end of GD1, we expect the benefits from successful innovation projects to be realised in business as usual, setting a new benchmark for normal performance. See Appendix 008 - Innovation

5 Future efficiency

This part of the Appendix sets out our position on future cost efficiency. We set out how our GD2 business plan will deliver efficient costs and outcomes for customers throughout GD2. We explain how we have built on our existing position as an industry-leader on cost efficiency, innovation and outputs, and how this flows through into our plan projections, delivering incremental productivity throughout the period.

This section is structured as follows:

- In Section 5.1 we explain the process we have been through to develop, and stress test our business plan, to ensure we set stretching targets for cost efficiency;
- In Section 5.2 we show how our business plan costs evolve over time;
- In Section 5.3 we explain the assumptions we have embedded in the plan for productivity and efficiency improvements;
- In Section 5.4 we discuss how regional factors affect our costs; and
- In Section 5.5 we describe how real price effects have impacted us so far in GD1 and the consequences of this for GD2.

5.1 Process for developing the business plan

Our planning process started by listening to our customers to understand what matters to them and what they'd like us to do. We have developed ambitions for GD2, and these have helped us contextualise the outputs we have been discussing with our customers and stakeholders. In delivering our outputs, we have been very conscious of the balance of risk between ourselves and our customers and have put forward a mixture of firm deliverables and uncertainty mechanisms. We aim to deliver our outputs by building on our current efficient position as set out in Section 2 of this appendix. We have set out the drivers for this performance which we consider are sustainable into the future.

Cost-benefit analysis

The value provided to customers from each investment project or programme that costs more than £0.5m has been defined in one of circa 150 cost benefit analyses (CBA) and engineering justification papers (EJPs) which accompany our plan.

Potential interventions to reduce asset risk are set out in the EJPs. The associated costs and the durability of the intervention are then assessed against the value of the risk removed through a CBA.

The CBA methodologies are important decision support tools. However, the ultimate responsibility for the safety of the network and our customers remains with the company and individual Asset Managers. Therefore, there may be exceptions where overriding safety, customer or stakeholder considerations will lead to our Asset Managers applying their engineering judgement and proceeding with a project where it is judged that the CBAs methodologies do not appropriately reflect all the factors involved.

External assurance

We have engaged with a number of independent third parties to review and evaluate our business plans for GD2. They continued to challenge us as we finalised our submission and their detailed reports accompany this December submission.

Levels of IT expenditure have been independently assessed by an independent and globally recognised technology research and advisory company called Gartner. [15] Gartner has assessed our IT costs against like-for-like companies i.e. UK asset-based utilities. As part of the detailed benchmarking the costs and data assessed was for the 2018/19 financial year. This was our highest year of spend in GD1 due to our cloud investment and double running of services whilst we transition from our on-premise data centres and service providers to our new public cloud provider and associated services and suppliers.

Work management and business support costs have been subject to independent assessment by ARUP, which benchmarked our costs against the other GDNs in addition to comparable European network organisations of varying sizes, maturity, and with/without an Iron Mains Replacement Programme. Based on the 2018/19 financial year, our cost efficiency was rated as upper quartile, with our performance on functional regulatory outputs being best in class.

Repex costs have been subject to independent assessment by Hargreaves Jones, a cost consultancy focusing on engineering and building projects, who carried out work to assess the actual impact of cost increases in our repex contracts across the GD1 period

Regional Factors within London were assessed by consultants NERA/Arcadis (also for other London region utilities) to help us understanding the baseline level of efficiency in London

[15] Gartner IT Cost & Capital Investment Assessment Project Report

5.2 Key cost trends

The tables below compare the average annual cost incurred in the first six years of GD1, the forecast for the last two years of GD1, and a GD2 range of expenditure (based on both like-for-like costs and costs for additional GD2 outputs as explained below).

Figure 16: Totex summary

SGN (£m 18/19 prices)	GD1 6 Year actuals	GD1 Last 3 years (inc 2 yr. forecast)	GD2: Like-for-Like	GD2: Additional Outputs	GD2: Total
Opex	189	196	193	13	206
Capex	115	118	120	22	143
Repex	244	270	244	19	263
Totex (Exc Xoserve)	**548**	**584**	**557**	**54**	**612**
Xoserve	13	6	6	0	6
Totex	**561**	**590**	**563**	**54**	**618**

Scotland (£m 18/19 prices)	GD1 6 Year actuals	GD1 Last 3 years (inc 2 yr. forecast)	GD2: Like-for-Like	GD2: Additional Outputs	GD2: Total
Opex	66	66	67	5	73
Capex	49	46	52	9	61
Repex	62	68	60	6	66
Totex	**177**	**180**	**179**	**20**	**200**
Xoserve	4	2	2	0	2
Totex	**180**	**182**	**181**	**20**	**201**

Southern (£m 18/19 prices)	GD1 6 Year actuals	GD1 Last 3 years (inc 2 yr. forecast)	GD2: Like-for-Like	GD2: Additional Outputs	GD2: Total
Opex	122	130	126	7	133
Capex	66	72	68	13	81
Repex	183	202	184	13	198
Totex	**371**	**404**	**378**	**34**	**412**
Xoserve	9	4	4	0	4
Totex	**380**	**408**	**382**	**34**	**416**

Totex

We forecast that on a like for like basis, our totex in GD2 will be in line with the first six years of GD1 and 5% lower than the last three years of GD1. While we are experiencing cost pressures, we are looking to absorb these wherever possible. Further, we look to include £54m a year of additional outputs, resulting in an 10% increase on GD1 first six-year expenditure.

Opex/capex/repex

Figure 17: Southern

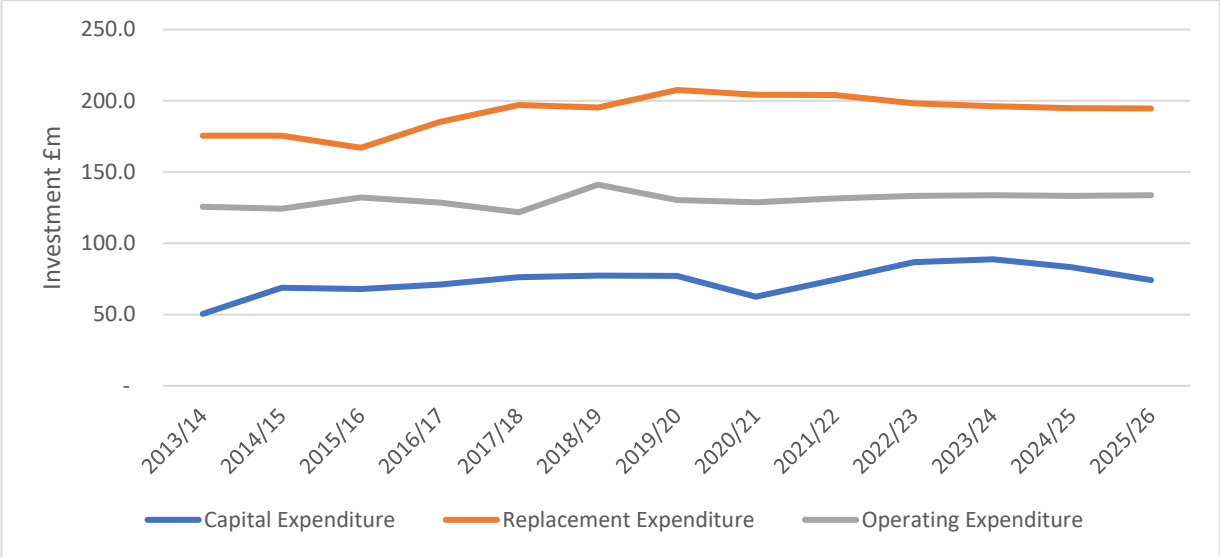
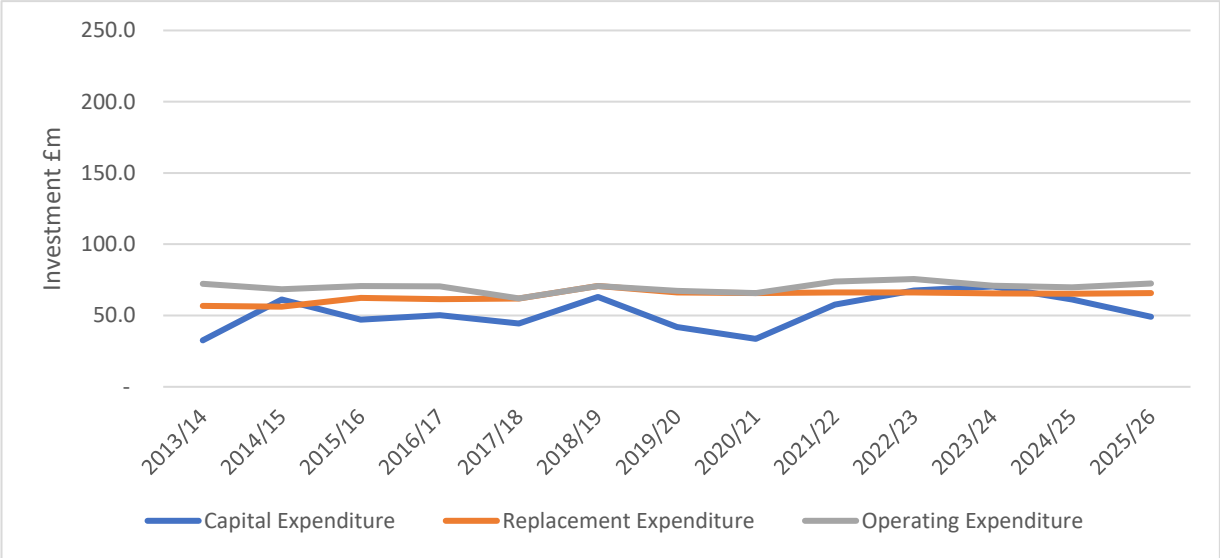


Figure 18: Scotland



On a like-for-like basis, before the reclassification of Xoserve in GD2, the GD2 totex averages £563m a year which is broadly in line with the first six years of GD1. This is despite additional cost pressures of £17m a year (largely driven by labour, loss of meter work and growth) which have been absorbed by productivity savings of £15m a year. In addition, we are proposing to deliver additional outputs in GD2 at a cost of £54m a year:

- Increased costs relating to cyber security (£5m p.a.);
- Responsible demolition of obsolete assets / additional riser surveys (£5m p.a.);
- Emerging Asset replacement and removal of iron stubs (£4m p.a.);
- Additional Steel replacement programme (£5m p.a.);
- Accelerated Tier 1 (£10m p.a.);

- IT Technology readiness (£2m p.a.);
- DCC Membership and Open data and Whole System platforms (£2m p.a.);
- Additional Growth (£4m p.a.);
- Fleet strategy including accelerated replacement and electrification of vehicles (£4m p.a.);
- Additional environmental measures (£8m p.a.);
- Smart meter interventions (£2m p.a.); and
- Customer Vulnerability Allowance, LAEP officers, Environmental reporting personnel and additional Biogas support (£2m p.a.).

5.3 Productivity assumptions in our plan

Historically, Ofgem has assessed productivity through growth accounting analysis using the EU KLEMS dataset. This is a standard approach which is widely understood and well established in regulatory precedent for a number of reasons, including:

- Long-term datasets such as EU KLEMS allow for a long-term assessment of productivity. This is important because not all productivity improvements will be repeatable, and so looking at a short period of recent data could lead to misleading productivity estimates; and
- External datasets such as EU KLEMS offer a wide and independent set of evidence to assess productivity[16].

This section sets out in detail the productivity assumptions that underpin our business plan projections, including:

- The level of economy-wide productivity that we consider can be expected at GD2; and
- Our headline productivity assumptions.

[16] Annexe 3 of Ofgem's Cost Assessment Consultation - CEPA (June 2019) RIIO-GD2 cost assessment – frontier shift, pages 6-8

Top-down approach

Estimates of frontier shift are typically obtained by referring to historical rates of productivity growth in industries with similar characteristics. Table 21 summarises the relevant data.

Table 31: **Average annual total factor productivity growth by sector**[17]

UK Sector	TFP (gross output)		TFP (value added)	
	1970 to 2007	1990 to 2007	1970 to 2007	1990 to 2007
Construction	0.3%	0.2%	0.7%	0.6%
Manufacturing	0.6%	0.7%	1.8%	1.9%
Machinery	0.5%	0.9%	1.2%	2.3%
Chemicals and chemical products	1.3%	1.3%	3.8%	3.7%
Electrical and optical equipment	1.5%	1.8%	4.1%	4.8%
Transport and storage	1.0%	0.7%	2.1%	1.7%
Electricity, gas and water supply	0.7%	0.3%	2.2%	0.9%
Sale, maintenance and repair of motor vehicles; retail supply of fuel	1.0%	1.4%	2.0%	2.6%
Finance, insurance, real estate and business services	(0.5%)	0.1%	(0.9%)	0.2%

In its GD1 review, Ofgem interpreted the evidence in table 21 to mean a frontier gas distribution network would be able to reduce its opex by 1.0% a year and its repex and capex by 0.7% a year. Table 22 shows this tallies very closely to views expressed by the Competition Commission (CC) and the Competition & Markets Authority (CMA) in recent regulatory decisions, as well as estimates made by other economic regulators.

Table 32: **Assumptions made by regulators about rates of annual frontier productivity growth** [18]

	Opex	Capex
Ofgem, RIIO-GD1/T1, 2012	1.0%	0.7%
CC, Northern Ireland Electricity, 2014	1.0%	1.0%
Ofgem, RIIO-ED1, 2014	1.0%	0.7% to 1.0%
Utility Regulator, NI Water, 2014	0.9%	0.6%
CMA, Bristol Water, 2015	1.0%	-
Utility Regulator, GD17, 2016	1.0%	1.0%
Ofwat, PR19, 2019 (current consultation range)	0.6% to 1.2%	

[17] First Economics paper – Table 2

[18] Ofwat (July 2019) PR19 draft determinations: Securing cost efficiency technical appendix, Annexe 3, https://www.ofwat.gov.uk/wp-content/uploads/2019/07/PR19-draft-determinations-Securing-cost-efficiency-technical-appendix.pdf

One noteworthy feature of the figures in Tables 21 and 22 is they capture rates of productivity up to 2007. Since the global financial crisis, it is evident there has been a marked slowdown in productivity growth across many industries. Where previously, it might have been natural and obvious companies should roll-forward the kind of figures shown in Table 21, a key question for Ofgem's RIIO-2 reviews, will be how far this slowdown should be reflected in forward-looking productivity growth estimates.

The reasons for stalled productivity, not just in the UK but also in many other western economies, are not well understood. Possible explanations include:

- Low business investment since the financial crisis, as firms have chosen to deleverage and horde cash rather than invest in new productive capital;
- The adverse effect that ultra-loose monetary policy might have had on creative destruction within the economy (i.e. the processes by which unproductive firms go out of business and are replaced by more efficient rivals);
- Increasing concentration within many industries, leading to a weakening of competitive pressures on firms; and
- A fundamental slowing of the rate of human technological progress.

Several of these factors may be temporary, but others could have longer-lasting implications for productivity growth. The feeling that there may have been a 'paradigm shift' has prompted the Bank of England and the Office for Budget Responsibility (OBR), among others, to significantly reduce their short-term forecasts of productivity growth. The Bank of England's February 2019 forecasts for total factor productivity growth are reproduced as table 23.

Table 33: **Bank of England estimates of annual total factor productivity growth**

	1998-07	2008-10	2011-14	2015-18Q3	2018Q4-22Q1
TFP growth	1.0%	-0.6%	-0.1%	0.2%	0.3%

Gas distribution networks are not immune from the productivity trends affecting the wider economy, not least because they rely heavily on supply chain alliances and contractors. Recent empirical evidence suggests productivity might have been broadly flat across the network industries in the last 10 years. Table 24 summarises the electricity distribution networks' experiences (as the sector in which data availability allows for the clearest pre- and post-crisis comparisons).

Table 34: **Electricity DNOs' average annual total factor productivity growth**

	DPC1/2	DPCR3	DPCR4	DPCR5	RIIO-ED1
TFP growth	3.3%	4.0%	3.2%	-1.2%	0.4%

The 'productivity puzzle' makes it difficult to know how much new productivity improvement companies should be anticipating in their RIIO-2 plans. Prima facie, the evidence in this paper suggests it would be a considerable leap of faith for a company to factor pre-2007 frontier productivity improvement (as reflected in tables 23 and 24) into future cost projections. In the circumstances, we would therefore not consider it unreasonable if networks were to follow the Bank of England and the OBR's lead and choose to aim down from Ofgem's GD1 assumptions during part or all of the RIIO-2 period.

We have included the First-Economics paper[19] commissioned through the ENA supporting this section with this Business Plan submission.

Ofwat's productivity analysis

We are aware Ofwat has proposed an efficiency assumption of 1.5% for water companies for PR19. We have not undertaken a detailed review of the methodology and analysis used by Ofwat, but at a high level we consider the Ofwat approach has no particular read-across to GD2 for the following reasons:

- Ofwat's productivity assumption was drawn from a combination of two sources – a standard productivity assumption of 0.6% - 1.4% estimated by Europe Economics based on EU KLEMs data; and a second component of 0.2% - 1.2% estimated by KPMG arising from Ofwat's totex and outcomes framework. We believe the latter source of Ofwat's productivity assessment should be discarded since equivalent circumstances do not exist in RIIO-GD2;
- In relation to the Europe Economics analysis of frontier shift, Ofwat has noted that the bottom-end of the range is based on the most recent post crisis period (2010-2014) while the top-end of the range is based on the growth of 'better performing sectors, the pre-crisis period and longer time series data'. We consider the First Economics data is based on more recent data and explains why it is incumbent on regulators now to evaluate whether a return to pre-financial-crisis levels of productivity can realistically be expected. This report is included with this submission.

Productivity included in our plan

Our business plan takes as its starting point our existing efficient performance. On top of this, we factor in an additional £15.2m a year of stretch targets, to be generated through productivity and efficiency – equivalent to a total productivity assumption across the cost base of 1% a year. Overall, we consider this to be a stretching target, more than treble the productivity projected by the Bank of England. Our productivity assumption includes productivity in the following areas:

- 1.4% a year on opex (£7.7m saving a year);
- 0.7% a year on capex (£2.6m saving a year);
- 0.7% a year on repex (£4.9m saving a year).

This means by the end of the next price control, we will have saved customers £76m relative to today.

We plan to achieve this through a combination of innovation savings rolled forward from GD1 and process efficiency, in particular to absorb some of the impact of increased unproductive time in Emergency following the loss of legacy meter work contracts. We think our assumptions are stretching in the context of the introduction of volume drivers for much of the capex/repex programme; more reliance on third party contractors in GD2 vs. GD1; the loss of legacy meter work contracts; and the wider productivity slowdown in the UK.

5.4 Regional factors

It is clear that regional variations in cost exist and are driven by external factors outside of any GDNs' control. There is substantial regulatory precedent and evidence of these factors. We therefore consider it essential these factors are addressed in the benchmarking analysis, so to generate a fair and robust outcome.

Ofgem set out in its cost assessment consultation three criteria which companies should be able to

[19] Frontier Productivity Growth First Economics February 2019

demonstrate any regional factors meet:

- The regional or company-specific factor in question is clearly defined;
- This factor, and the subsequent costs it drives, are beyond the control of an efficient company (having taken all the feasible measures to mitigate the costs); and
- The company (or a small number of companies) are impacted by a significant amount, and in a materially different way to others.

We broadly agree with these criteria, and we believe the urbanity, sparsity and regional wages adjustments that were made at GD1 will continue to be justified against the proposed criteria. There is a clear rationale and precedent for these adjustments.

In terms of controlling for regional factors, there are two potential suitable methods: making pre-modelling adjustments or adding within-model variables. As we explained in our response to Ofgem's cost assessment consultation, we believe there is value in testing both approaches and using each as a cross-check on the other. Weighting together the results of both approaches could also be considered. For now, we have continued with the GD1 approach of pre-modelling adjustment.

Below we discuss evidence on the following sources of regional costs:

- London-specific costs;
- Sparsity costs in Scotland;
- Costs associated with operating on the Isle of Wight; and
- Other sources of regional costs.

London-specific costs

At GD1, Ofgem made two specific adjustments across all GDNs, one for labour cost differences across licence areas, and another for differences in 'urbanity'. Both of these adjustments were mainly accounting for the higher costs of operating within the M25.

Ofgem's regional labour adjustments were based on indices that set out the relative differences in direct and contract labour costs in different licensee areas. These indices were based on the Office of National Statistics (ONS) Annual Survey of Hours and Earnings (ASHE). These indices were applied to the direct and contract labour component of costs to calculate a regional labour adjustment. The indices used for labour adjustments are shown in Table 25 below.

Table 35: **Labour and sparsity indices**

	Contract labour			Direct labour			Sparsity
GDN	2009	2010	2011-21	2009	2010	2011-21	2009-21
EoE	0.97	0.97	0.97	0.98	0.98	0.98	1.04
Lon	1.18	1.16	1.18	1.15	1.14	1.16	0.96
NW	0.96	0.96	0.96	0.96	0.97	0.97	0.97
WM	0.96	0.96	0.96	0.96	0.97	0.97	0.99
NGN	0.96	0.96	0.96	0.96	0.97	0.97	1.03
Sc	0.96	0.96	0.96	0.96	0.97	0.97	1.11
So	1.10	1.09	1.09	1.10	1.08	1.07	0.99
WWU	0.96	0.96	0.96	0.96	0.97	0.97	1.15

The urbanity adjustment accounts for two impacts:

- Additional costs of reinstatement when working in highly dense urban areas; and
- Reduced labour productivity associated with working in the London area.

Urbanity adjustments were made as individual adjustments for specific companies based on evidence provided by the companies. For example, Ofgem applied a 15% one-way productivity adjustment for London and

southern GDNs' capex and repex mains and services, and capex connections work carried out within the M25. The annual average adjustments made for each GDN for labour and urbanity are shown in the first and third rows of Table 26 below.

Table 36: **Annual average RIIO-GD1 regional labour and company specific factors adjustments, £m**

Adjustment factor	EoE	Lon	NW	WM	NGN[1]	Sc	So	WWU	Industry
Labour	4.31	-25.1	4.42	3.47	4.89	3.61	-17.5	4.89	-17.0
Sparsity	-0.8	0.72	0.50	0.07	-0.5	-1.3	0.44	-2.6	-3.5
Urbanity	-0.5	-14.0	0.13	0.09	0.19	0.10	-5.5	0.09	-19.4
Salt cavity			-0.6						-0.6
Total	3.01	-38.4	4.47	3.63	4.58	2.38	-22.5	2.34	-40.5

[1]NGN's salt cavity adjustments is applicable only to the GDPCR1 period

For GD2, evidence suggests that there are still significant and material costs associated with operating in the London area.

It is our view that further work needs to be done to improve Ofgem's GD1 approach to regional adjustments. While there is some recognition of the additional costs of working in London, usually defined as operating within the M25, we think it is important to recognise these costs now extend well beyond the M25 boundary and through the South East, with elevated wage, cost pressures and customer expectations across the southern region compared to other parts of the UK. We think it is important to recognise these additional cost challenges within any consideration of relative efficiency.

We commissioned independent work by NERA and Arcadis[20] to assess the impact of regional costs in our Southern network area, which we provide in this submission. The study looked in depth at the key factors affecting the cost of performing utility services in London, as compared to other parts of the country, and quantified the effect of these differences. In particular, the paper identified we incurred material incremental costs to operate in London, due to issues such as:

- The nature of streets and other factors which relate to the physical make-up of the network surroundings (e.g. more expensive footpath materials which drive reinstatement costs) which differs in London vs. the rest of the country. The paper estimates these factors impact on productivity and drive an incremental £11.5m in costs a year for us.
- Additional cost of labour for workers in London. The paper estimates this drive an incremental £18.2m in costs a year for us.

These elements alone drive an incremental c.£30m p.a. in 2018/19 prices, and the study identifies a number of other factors that drive higher costs. It is clear these factors represent a material difference vs. GDNs in the rest of the country, and these cost increments need to be adjusted for in any benchmarking analysis. The cost estimates provided by NERA and Arcadis suggest the overall magnitude of the regional adjustment should be similar in GD2 to the level it was at GD1. [21]

Sparsity

Our Scotland GDN operates in a significantly more sparsely populated environment than other GDNs. This creates additional costs caused solely by our operating environment. In particular, to meet emergency standards, we need to station FCOs (first call operatives) and managers at depots within a one-hour travel radius of all populated areas. However, depots in sparsely populated regions will have lower utilisation rates,

[20] Understanding the Baseline Level of Efficiency in London NERA/ Arcadis 31/10/2019

[21] Ibid. (Table 1 Page v)

leading to higher labour costs relative to the number of emergencies and repairs carried out.

Over the course of GD1, we have worked to upskill all our FCOs to undertake activities that are beyond their core emergency role. This includes, for example, supporting repex activities (e.g. extending customer pipework or installing steel risers); supporting maintenance activities (e.g. service regulator maintenance) and supporting capex activities, including customer connections work. However, in sparse areas even these types of work can be limited.

Ofgem recognised at GD1 it is not possible to mitigate all the costs related to sparsity, and an adjustment is required for GDNs operating in sparse areas. In 2011 Deloitte prepared a report for us on the impact of sparsity on gas distribution networks. Deloitte's key conclusion was as follows:

> *"Our review of Scotland GDN's depots' data shows that employee utilisation varies significantly between sparse and non-sparse locations. In the Edinburgh main depot for example, each FCO attends on average over 600 emergency jobs per year (or 12 jobs per week), compared to less than 70 jobs per year (or 1 job per week) in the Bute sub-depot.*
>
> *If it were assumed that all sparse depots could achieve the utilisation of its non-sparse peers, Scotland GDN could reduce its emergency and repair staff by 48 FTEs. These 48 FTEs add roughly £2.3m [in 2010/11 prices] to Scotland GDN's emergency and repair costs. However, it is unrealistic to assume such utilisation could be achieved in all sparse depots owing to the need to provide emergency response and repair service within specified timeframes, which requires a trade-off of lower utilisation in order to have response staff appropriately geographically deployed."* [22]

We have updated Deloitte's analysis, using the same methodology, with our latest data for each depot on employee numbers (full time equivalent), number of emergency and repair jobs per year, and labour rates. The key results are shown in table 27 below. The updated results indicate that sparsity increases Scotland's labour-related costs by £3.38m (in 2018/19 prices). In addition to labour-related sparsity costs, Scotland experiences property-related costs due to sparsity. This is because Scotland is required to have sub-depots in sparse areas, which would not be needed if the population were concentrated in a smaller area. The rent and rates associated with these sub-depots adds an additional £29,727 in 2018/19 prices to Scotland's costs. This gives a total sparsity cost of £3.41m in 2018/19 prices (equivalent to £2.6m in 2010/11 prices). This is a slight increase from the sparsity estimate of £2.3m Deloitte calculated in 2011 (in 2010/11 prices).

Table 37: **Summary [2018/19 prices]**

Sparsity impact – annual Scotland GDN	**Field employees**	**Team manager**	**Total**
Emergency	17.6	2.8	
Repair	41.8	2.3	
Sparsity labour cost (£)	£3,032,207	£349,054	£3,381,261
Sub depot property cost (£)			£29,727
			£3,410,988

Given we have found that the sparsity costs associated with operating in Scotland are still present and have increased slightly, it is important Ofgem continues to adjust for sparsity-related costs. It may be worth reassessing Ofgem's methodology (set out below), as this approach did not adjust for all the costs identified in Deloitte's 2011 paper.

[22] Deloitte (November 2011) Gas distribution networks – sparsity impact, p.3.

Ofgem's approach to sparsity at GD1

At GD1 Ofgem made sparsity adjustments to emergency and repair cost activities only. Adjustments to costs were made based on GDNs' relative level of sparsity vs. the national average, as measured by sparsity indices. The sparsity indices were calculated based on district-level population and area data, which can be seen in Table 36 below.

Table 38: **Labour and sparsity indices in Final proposals**

	Contract labour			Direct labour			Sparsity
GDN	2009	2010	2011-21	2009	2010	2011-21	2009-21
EoE	0.97	0.97	0.97	0.98	0.98	0.98	1.04
Lon	1.18	1.16	1.18	1.15	1.14	1.16	0.96
NW	0.96	0.96	0.96	0.96	0.97	0.97	0.97
WM	0.96	0.96	0.96	0.96	0.97	0.97	0.99
NGN	0.96	0.96	0.96	0.96	0.97	0.97	1.03
Sc	0.96	0.96	0.96	0.96	0.97	0.97	1.11
So	1.10	1.09	1.09	1.10	1.08	1.07	0.99
WWU	0.96	0.96	0.96	0.96	0.97	0.97	1.15

The size of the pre-benchmarking sparsity adjustment was -£1.3m for Scotland and +£0.44m for Southern – see Table 37.

Table 39: **Pre-benchmarking regional labour and company specific adjustments at final proposals (annual average, £m 09/10)**

Adjustment factor	EoE	Lon	NW	WM	NGN[1]	Sc	So	WWU	Industry
Labour	4.31	-25.1	4.42	3.47	4.89	3.61	-17.5	4.89	-17.0
Sparsity	-0.8	0.72	0.50	0.07	-0.5	-1.3	0.44	-2.6	-3.5
Urbanity	-0.5	-14.0	0.13	0.09	0.19	0.10	-5.5	0.09	-19.4
Salt cavity			-0.6						-0.6
Total	3.01	-38.4	4.47	3.63	4.58	2.38	-22.5	2.34	-40.5

Ofgem allowed a sparsity adjustment for Scotland at GD1. We have re-assessed our sparsity costs, using the same Deloitte methodology we used for GD1, which implies an additional increased cost of £3.41m in 2018/19 prices for our Scotland GDN. This is the adjustment we are proposing for GD2.

Costs associated with operating on the Isle of Wight

Our Southern distribution area includes the Isle of Wight (IoW). Operating a gas distribution business on the island 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:

- Minimal competition in tender events: Due to the restricted geography of the island there are a limited number of vendors available for competitive procurement events, hence competition is low in this vendor controlled environment;[23]

[23] An example of this is the reinstatement contract for the IoW. During the last tender event in 2015 there were only three bidders with one bidder subsequently withdrawing their bid. The contract was awarded to the best priced bid. Compared to identical rates for reinstatement in Aldershot, Oxford, Sussex, Surrey, London, Solent and Poole, the IoW

- Requirement to maintain baseline number of resources available on the island: We operate a sub-depot on the IoW. Due to the high ferry costs and duration of the journey to the island (approximately three hours from the parent depot in Poole to the IoW depot in Ryde) it is necessary for us to have a sub-depot and employees permanently stationed on the island to ensure a twenty-four seven emergency service provision, including repair and maintenance activities. Ferry transport also causes other issues.[24] As a result, we have a total of 29 employees working there. To maximise the efficiency of the IoW operation our industrial operatives are multiskilled;[25]
- Additional costs associated with shipping of plant, equipment and materials**.** This also poses challenges on the IoW since there are limited resources upon the island. There is availability for plant hire on the island, however there is limited supply of plant and equipment due to a sole supplier and demand from other utilities.

We have assessed how much additional cost we have incurred during GD1 so far from operating on the IoW (over and above the normal cost of operation). This is a high-level assessment based only on the costs that can be easily quantified (see Table 30 below). Our assessment suggests that the additional costs we incur because of the geographical location of the IoW are an additional £122,741 per year on average. This implies total additional costs of over £600,000 over five years. To account for these costs, we propose a specific pre-benchmarking adjustment to our costs, corresponding to the cost of operating on the Isle of Wight.

contract is approximately £110 more expensive per rate (on average).

[24] E.g. during the summer months and school holiday periods it is not uncommon for ferry crossing availability to be zero at short notice. To provide the emergency service we therefore have to have people stationed on the island. This also means we cannot export labour from the IoW when experiencing resource surplus during periods of low workload. The ferry timetables and weather variability can create further impracticalities - high winds and/or dangerous tides can delay or postpone crossings, and during the winter the ferry ceases at approximately 22:00 and does not commence again until approximately 06:30. In addition, on the mainland when specialist services are required, such as flow-stopping services or specialist repair techniques, contractors can be mobilised quickly. However, due to the ferry crossing and requirements upon declaring hazardous substances prior to travel, and having permission granted to transport hazardous substances, contractors mobilise to site less quickly.

[25] The multi skilling, or 'cross-flexing' of our engineers on the IoW means that an operative trained in maintenance activities will also be trained to perform emergency 'first call operative' activities and repair activities.

Table 40: Quantifiable additional costs for operating on Isle of Wight

£ 2018/19 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Annual average
Non-Ferry Related Travel and Accommodation	3,454	4,311	7,235	8,766	9,802	6,629	6,700
Ferry Costs	73,002	53,477	53,383	39,933	32,575	41,772	49,024
Waiting and Unproductive Time	22,681	15,776	19,292	22,983	20,402	1,072	17,034
Reinstatement premium compared to Poole and Solent	No data	No data	23,374	37,648	48,354	90,558	49,984
Total	-	-	105,396	111,923	112,656	140,031	122,741

Note: The costs associated with waiting and unproductive time is calculated by multiplying the difference in average wait and unproductive time per FTE between the Isle of Wight and other depots and multiplying by the number of FTEs on the Isle of Wight.

Other sources of regional costs

There are a range of other potential sources of additional costs in Scotland in particular and some of these areas are identified below. We have not yet sought to quantify these (or other) potential sources of incremental cost.

- Scottish Government policy deviations from wider UK, e.g.:
  - Lane rental not yet introduced in Scotland.
  - Low emission zone now created in Glasgow city centre and other Scotland cities to follow.
- Harsher weather conditions vs. rest of the UK can hamper productivity:
  - Unable to reinstate excavations.
  - Impact on travel due to ice and snow.

Another source of potential incremental cost in Scotland is around contracting, specifically procurement challenges. In particular, there is a limited contractor pool in Scotland, which is despite efforts to stimulate the market during procurement events. We also find bought-in specialist engineering services tend to be from firms based in England, so we experience longer lead-times and travel expenses.

5.5 Real price effects

In this section we discuss our input cost pressures. For GD2 we believe that RPEs exist for the following input costs:

- Direct labour;
- Contractor labour; and
- Materials.

These input costs make up a significant proportion of our total expenditure. We have found they are subject to RPEs, and therefore RPEs affect a very material proportion of our total expenditure.

- Spending on direct labour makes up 23% of our total expenditure. Of that, we have found roles representing 80%[26] of our wage bill have experienced wage growth faster than CPIH during GD1 so far.

- Contract labour makes up 43% of our totex. A study of our repex contracts (more details below) has found of 115 rates reviewed, 72% outstripped CPIH. We believe our opex and capex contractor spend is experiencing similar pressures.

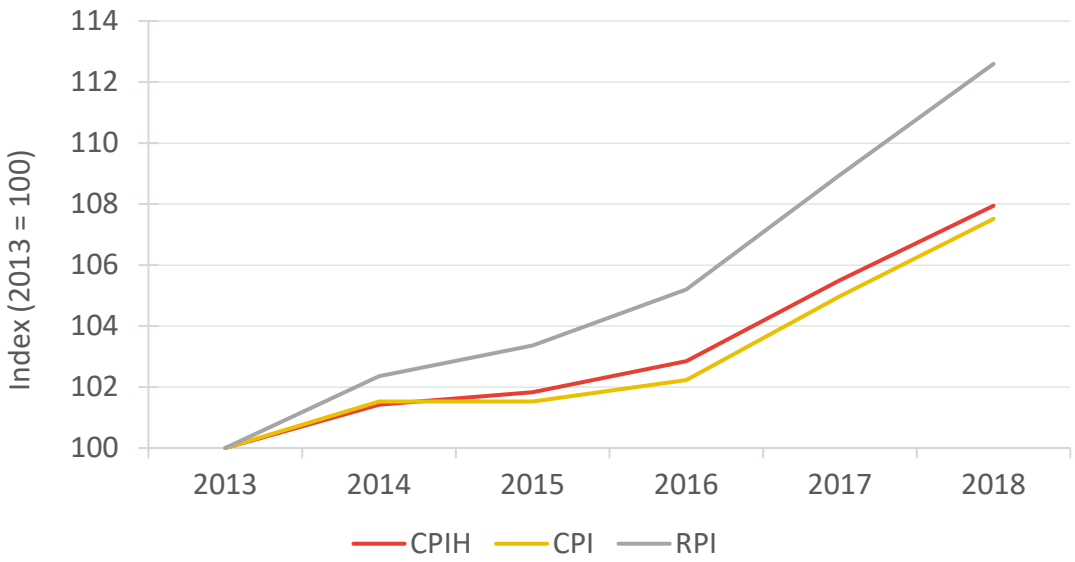
- Materials make up 31% of our totex. Our most substantial materials category is PE plastic pipe, which made up c. 23% of our materials cost in 2018. We have found materials costs increased by 4.1% (annualised) between 2013 to 2018, outstripping CPIH over the same period by 2.56%.

We understand Ofgem's current planning assumption is to use CPIH as the general measure of inflation at RIIO-2 to calculate RAV indexation and allowed returns, and therefore also as a baseline against which RPEs will be assessed.[27] The chart below shows the movement of CPIH, CPI and RPI indices from 2013. Over the period, the annualised rate of RPI growth has been 0.86 percentage points higher than CPIH. In this section we compare all our costs to CPIH.

[26] This proportion has been calculated conservatively, excluding apprentices and employees that haven't been grouped into any of the key roles identified, as these roles contain too few employees to be sure that increases in average wages have been driven by wage inflation, rather than by changes in the composition of the groups over time.

[27] Ofgem (December 2018) Sector-specific methodology consultation, paragraph 1.36, https://www.ofgem.gov.uk/system/files/docs/2019/01/riio-2_sector_methodology_0.pdf

Figure 19: Inflation comparison



Historical costs show evidence of significant cost pressures over and above baseline CPIH inflation over the course of GD1, as discussed below. The majority of these cost pressures are driven by market conditions that we expect to continue into GD2.

In the following sections, for each input cost category, we set out evidence of material and sustained deviations between costs and CPIH inflation. To account for these costs, we also set out proposed indices for GD2.

Our approach to selecting appropriate indices is set out below, and broadly follows the approach proposed by CEPA in its frontier shift annex to Ofgem's cost assessment consultation.

- We have compiled a long list of possible indices based on those which have been used or considered by Ofgem at GD1, ED1 and T1, as well as any other indices reviewed by Ofwat for PR19, and some alternatives from well-known data providers;
- Starting from this long list of indices, we have excluded from our assessment any indices for which data is not available from 2013 onwards, and any indices which we do not consider to be relevant to the gas distribution sector. We have also excluded any indices for which we cannot access data (for example, where it is not publicly available). In these cases, we feel Ofgem should review these indices further.[28]
- We then assess these indices against a set of criteria. These criteria broadly reflect the criteria suggested by CEPA in its frontier shift annex to Ofgem's cost assessment consultation and are described in the table below. We have adapted CEPA's criteria by consolidating some criteria to simplify the framework and omitting certain criteria where we feel that Ofgem is better placed than the GDNs to carry out the assessment. The two final criteria are marked as lower priority, as we feel they are not essential. The other

[28] As explained in our response to Ofgem's cost assessment consultation, we feel that If Ofgem identifies a good index that requires a subscription to be accessed, and there are no good alternatives that are publicly available, this shouldn't be a barrier to using that index. While ideally all stakeholders would be able to access the data and replicate the calculations, this is not essential, and index suitability should take priority over this.

criteria should take precedence over these.

Criteria	Rationale	How this is assessed	Unit of measurement
1. Materiality	Proposed RPEs should be material relative to either totex or to CPIH, or both (such that the overall impact of the RPE is material)	1a) Materiality to totex	The proportion of totex made up by the input category
		1b) Materiality to CPIH	The absolute difference between the percentage change in the index and the percentage change in CPIH (both annualised)
2. Accuracy	Proposed indices should accurately reflect input cost pressures		The absolute difference between the percentage change in our input costs and the percentage change in the index (both annualised) For some input costs it may also be relevant to look at whether year-on-year changes in input costs are tracked by the index
3. Usability	Proposed indices should be credible, well-established have a low likelihood of being manipulated by the actions of the sector	3a) Precedent for use	Where the index has been used previously (e.g. used by Ofgem at GD1)
		3b) Independence	Red/amber/green assessment based on the number and type of companies in the sample
		3c) Time lag for publication of values	Time lag between reference period and publication of provisional/final values
		3d) Publicly available *(Lower priority)*	Yes/No
		3e) Availability of comparable forecast *(Lower priority)*	Yes/No

In the sections below, for each input cost category we first present evidence of RPEs, we then present our assessment of indices against the criteria shown above, and our recommended indices.

Labour

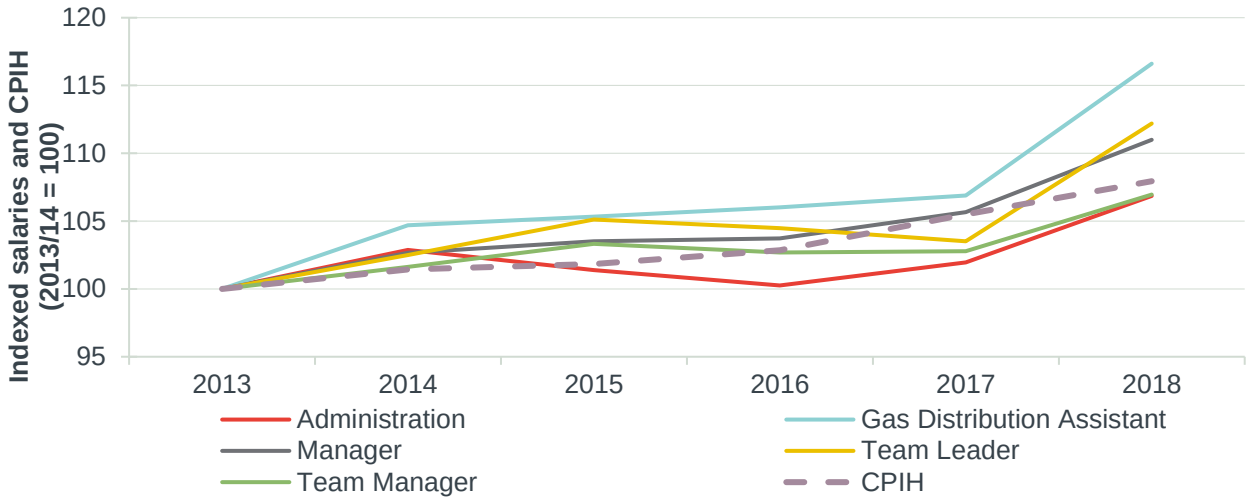
Historical evidence of RPEs – Direct labour

Direct labour costs make up a significant proportion of our totex, at approximately 23%. This is comprised as follows:

- 46% of opex;
- 13% of repex; and
- 10% of capex.

We have assessed our direct labour costs against CPIH over the course of GD1 and found evidence of RPEs over the period. The chart and table below summarise the growth in wages across a range of roles during GD1 to date, and growth in CPIH.[29] Across the period wage inflation overall has outstripped CPIH. Over the course of GD1 to date, the weighted[30] average salary (across five key roles representing 80% of our expenditure on wages) has increased by 2.6% between 2013/14 to 2018/19, compared to a much lower increase in CPIH of 1.5% over the same period. The chart below also shows there have been some significant increases in wages from 2018/19, when the previous four-year pay deals were renegotiated.

Figure 20: Wage growth over GD1



29 The roles shown cover 80% of our total expenditure on wages, as at 2018/19. The remaining expenditure covers a long tail of roles that cover small numbers of employees. Tracking these roles over time is unlikely to give accurate results because the small sample sizes mean that a lot of the movement in wages is driven by the mix of seniority of employees within roles. We have also excluded apprentice wages from this analysis. Annualised wage growth for apprentices has been 8.9% over the period and has significantly outstripped CPIH. However, we do not present this data because there has been a change in the mix of apprentice roles in recent years, which may be driving this apparent growth.

30 Average wages have been calculated by dividing our total wage expenditure by the total number of FTEs. This means it is effectively weighted according to the relative wage levels of each role.

Table 41: **Wage growth over GD1 – aggregate**

	CAGR	Outstrip CPIH?
Administration	1.34%	N
Gas distribution assistant	3.12%	Y
Manager	2.11%	Y
Team leader	2.33%	Y
Team manager	1.35%	N
Weighted average of wages	2.57%	Y
CPIH	1.54%	

The table above shows that wage growth has been broadly in line with CPIH in the early years of GD1 but has increased dramatically since 2017. We undertook a salary benchmarking exercise in in 2017 using a Willis Towers Watson benchmark data [31], comparing salaries paid by us to those paid by comparators across a range of roles. This indicated basic salaries for many of our SGNC employees had fallen behind market rates. This was corroborated by increasing churn amongst our experienced and trained technical employees. All of this built significant upward pressure and increasing expectations in advance of pay negotiations in 2018.

In 2018 we agreed an above-inflation pay increase as part of a further long-term (four- year) pay deal for our SGNC employees.

We repeated a Towers Watson salary benchmarking exercise in 2018 following the pay award. This exercise found while the significant pay award we agreed in 2018 had brought our salaries closer to market median, many remained below. However, taking into account overtime and standby payments, overall remuneration is generally in-line with the average.

We therefore believe we are offering competitive and efficient salary levels, albeit there are some challenges associated with employee churn (churn is still increasing, but not at the same rate). We therefore expect the trend of pay growth outstripping CPIH to continue.

The upward real wage pressure we have experienced is consistent with the wider macroeconomic trends of upward pressure on labour costs. ONS statistics as at April 2019 show there is currently relatively low unemployment and fairly strong real wage increases (ONS showing wages up by 3.4% nominal, or 1.5% real).[32]

[31] https://www.willistowerswatson.com/en-AU/Solutions/compensation-strategy-and-design

32 https://www.bbc.co.uk/news/uk-47947205

Historical evidence of RPEs – contractor labour

Contractor labour costs make up approximately 43% of our totex, comprised as follows:

- 23% of opex;
- 71% of repex;
- 24% of capex.

Prior to GD1, our contracting strategy was through an EPC (Engineering Period Contractor) with a sole supplier in Southern to cover 95% of mains replacement activity. Scotland also used an EPC but with a limited geographical footprint supported by smaller contractors where necessary. This was possible due to only 50% of workload was outsourced to the market at that time.

In order to drive efficiency, value for money and improved performance it was agreed the EPC contracting model was not best suited to meet the challenges ahead. It was anticipated we could make significant savings on contractor costs by changing contracting strategy.

Recent networking with counterparts across the water, electricity and gas industry has highlighted although Alliances have been in place with Tier 1 Contractors, moves towards Tier 2 & 3 suppliers through separate Framework Contracts is now taking place for work types like our distribution programme. Note this does not replace the Alliance which continues to deliver major capex programmes for some companies. There are various pricing strategies in the market, some such as Severn Water, are similar to ours.

The Contracting strategy for GD1 is built on a series of Framework Agreements. Due to diversity in requirements and various geographical challenges within both Scotland and Southern regions, separate contracts exist. These Frameworks were supplemented by various one offs which became necessary due to contractors leaving the contract or due to liquidation/insolvency.

The contracting strategy to-date has met the objectives set out, but due to market conditions and scarcity of resources current conditions are extremely challenging. Key challenges include mitigating for risk of contractual failure, and market constraints leading to difficulties in attracting and retaining contractors. We have taken a number of practical steps to address these challenges.

We commissioned Hargreaves Jones [33], a cost consultancy focusing on engineering and building projects, to carry out work to assess the actual impact of cost increases in our repex contracts across the GD1 period. We issued a significant number of contracts relating to mains replacement and associated works ('repex'). Framework contracts which were extended from 2016 onwards, included amendments to the rate structure and rate inclusions, so it is not possible to undertake a consistent analysis of the change in individual rates beyond September 2016. Given this, Hargreaves Jones carried out two separate assessments of our historical contractor rates:

- An analysis of the average total cost of a typical package of work using various contractors from 2013 to date; and
- An analysis of individual contractor rates for high volume activities up to September 2016.

Both sets of analysis show we have experienced significant contractor labour cost pressures – we discuss these

[33] Hargreaves Jones SGN GD2 Procurement Strategy Review of Inflation Indices and Impact on Existing SGN Contracts

results in more detail below.

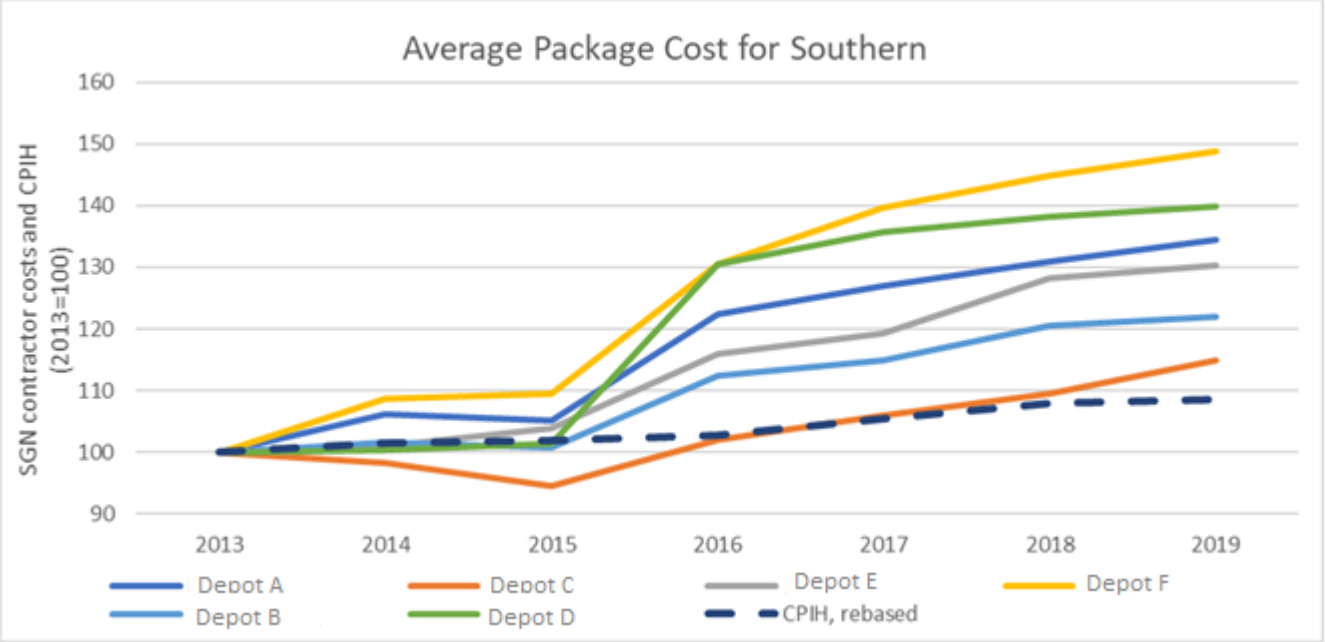
Average total cost of a typical works package over GD1

To take account of the changes in rate structure after 2016, Hargreaves Jones carried out an analysis of the cost of a representative package of work over time.

We award contracts for different 'lots' (different geographic and working boundaries), and the cost for the same work package may differ across lots depending on the specific geographic and contractor market characteristics of that lot. The analysis undertaken here calculated the average total cost this typical work package would cost, if undertaken by various contractors across all our Southern network depots, using their contracted rates at GD1.

Commercial Confidentiality

Figure 21: **Average package cost for Southern by Depot**



Analysis of individual contractor rates up to September 2016

Hargreaves Jones has also undertaken a detailed review of our individual contractor rates. Their analysis of our repex contracts focussed on selected representative contractors and specific rates that were considered to be appropriate for the analysis, based on the number of contracts available and the amount of work being undertaken by each contractor.

A number of key rate categories were selected that were material (attracting costs over £50k and quantities over 500 units) and applicable to the majority of the contract documents. The selected rates fall under the following four categories:

- PE main laying - open cut;
- PE main laying - insertion;
- Renew service; and
- Resources - managed by contractor.

For each contractor Hargreaves Jones compared the average percentage rate change for each contract category from 2010 to 2018. The detailed result of this review is provided with this Submission

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- Commercial Confidentiality

On the whole, the evidence points towards the majority of contract rate increases outstripping CPIH, particularly from 2016 onwards, after the new contracts agreements came into place.

[34] *Hargreaves Jones SGN GD2 Procurement Strategy – Review of Inflation Indices and Impact on Existing SGN Contracts, August 2019, page 26.*

[35] *Hargreaves Jones SGN GD2 Procurement Strategy – Review of Inflation Indices and Impact on Existing SGN Contracts, August 2019, page 26.*

Proposed index for GD2 Labour Costs

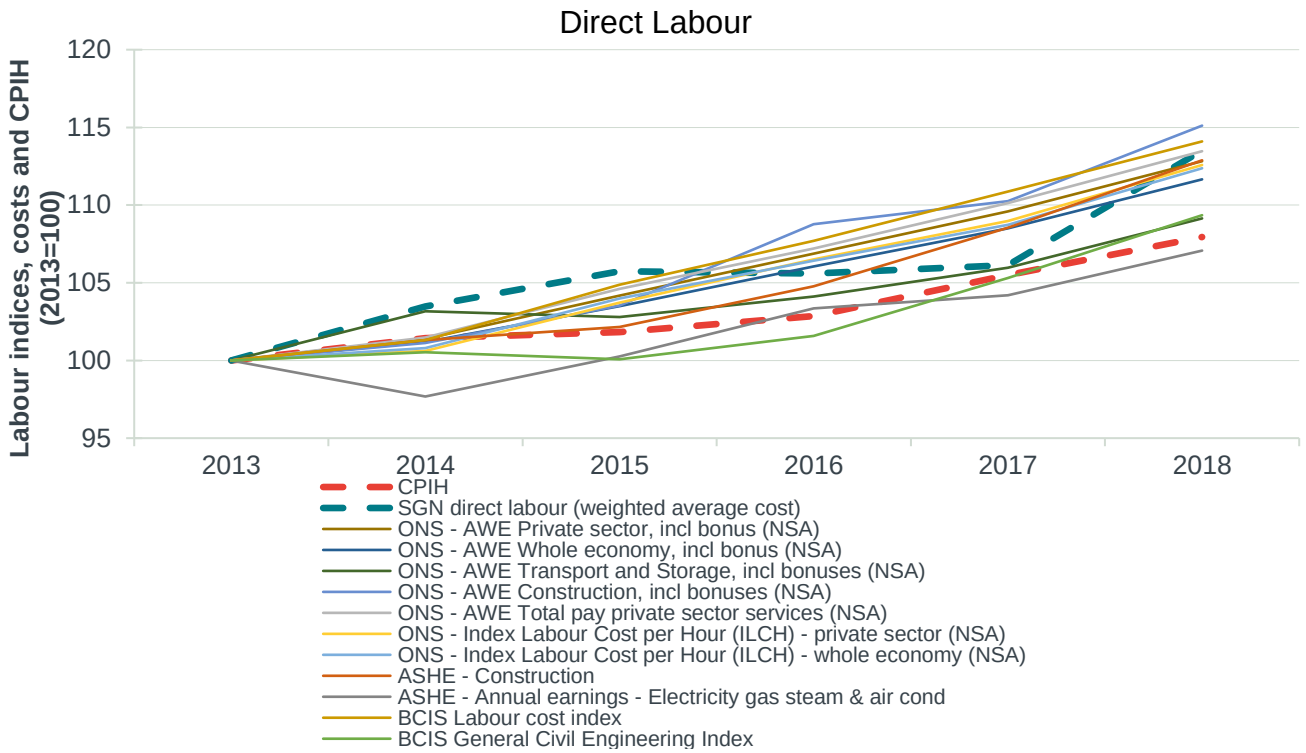
Below we provide the results of our review of a long list of possible labour indices against the criteria set-out at the start of this section.

The starting point of our assessment is the long list of possible labour indices set-out in the table below. We exclude two indices from our assessment, either because data is not available or because we do not consider them to be relevant for the gas sector.

Index	Considered?
ONS - AWE Private sector, inc bonus (NSA)	Yes
ONS - AWE Whole economy, inc bonus (NSA)	Yes
ONS - AWE Transport and Storage, inc bonuses (NSA)	Yes
ONS - AWE Construction, inc bonuses (NSA)	Yes
ONS - AWE Total pay private sector services (NSA)	Yes
ONS - Index Labour Cost per Hour (ILCH) - private sector (NSA)	Yes
ONS - Index Labour Cost per Hour (ILCH) - whole economy (NSA)	Yes
ASHE – Construction	Yes
ASHE - Annual earnings - Electricity gas steam & air conditioning	Yes
BCIS Labour cost index	Yes
BCIS General Civil Engineering Index	Yes
BEAMA labour cost index for electrical engineering	No (not relevant for gas sector)
ONS - AEI Private sector, inc bonus	No (index withdrawn)

The chart below shows how the remaining indices have moved over time, compared to both CPIH and our direct labour costs. Almost all labour indices show cost increases that have outstripped CPIH. There are some indices which have experienced an increase over the period, similar to the increase in costs we have experienced.

Figure 22: Direct labour indices

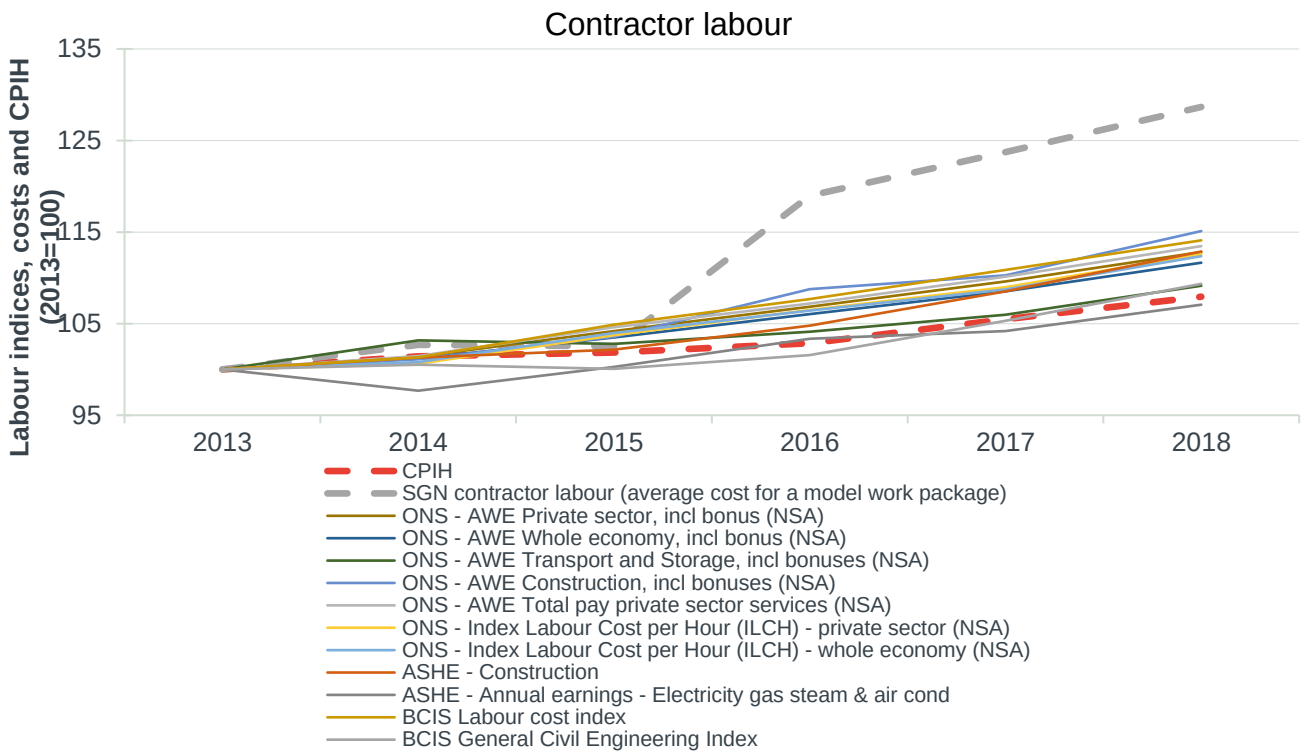


Note: Where data providers offer seasonally and non-seasonally adjusted indices (NSA), the non-seasonally adjusted versions have been used. This is to ensure a consistent comparision with SGN's costs, which are not seasonally adjusted.

The chart below shows the same indices compared to our contractor labour costs for Southern (a similar analysis has not been carried out for Scotland, but we would expect to see a similar movement in contractor costs in Scotland). Market pressures resulted in a large increase in rates in 2016 when our repex labour contracts were renegotiated. Contractors signed for an initial two years, with the option of extending for an additional three years. Cost increases over the period may have been driven by uncertainty around the continuation of the repex programme and competition from other utilities in a shrinking contract market, which meant contractors tendered higher rates. In addition, some smaller contractors exited the market in the later years of GD1, requiring additional tenders which have resulted in higher rates.

As can be seen, these pressures are not reflected in any of the labour indices. This should be explored further, particularly to see if these cost pressures have been experienced across the whole industry.

Figure 23: **Contract labour indices**



Note: Where data providers offer seasonally and non-seasonally adjusted indices, the non-seasonally adjusted versions have been used. This is to ensure a consistent comparision with our costs, which are not seasonally adjusted.

Our full assessment of these indices against the criteria set out at the start of this section is summarised in the table below.

Table 42: **Labour**

Indices **Assessment**

			Materiality		Accuracy		Usability				
			1a Materiality to totex								
			Direct labour	23%							
			Contractor labour	43%							
Category	Source and Index Name	Considered	1b Materiality to CPIH		2 Accuracy		3 Precedent	4 Independence	5 Time lag	6 Publically available	7 Forecast availability
		(eg. Availability of years, accessibility of data, relevance for gas sector)	*Abs difference between percentage change in index and percentage change in CPIH (both annualised)*		*Abs difference between percentage change in SGN's input costs and percentage change in the index (both annualised)*		*Where the index has been used previously*	*Red/amber/green assessment based on numberand type of companies in the same*	*Time lag between reference period and publication of provisional/final values*	*Yes/No*	*Yes/No*
Labour	ONS - AEI Private sector, incl bonus	No (index withdrawn)	NA		NA		Considered by Ofgem - GD1	NA	NA	Yes	NA
Labour	ONS - AWE Private sector, incl bonus (NSA)	Yes	0.90%		Direct labour:	0.12%	Used by Ofgem - GD1	**Wide sample:** GB, all private sectors inc.gas, elec and water. Main data source is the Monthly Wages and Salaries Survey.	**Short lag:** Provisional estimates provided c. 6 to 7 weeks after end of refernce month, final estimates c. 10 to 11 weeks after reference month	Yes	No
					Contractor labour:	2.73%					
Labour	ONS - AWE Whole economy, incl bonus (NSA)	Yes	0.69%		Direct labour:	0.34%	Considered by Ofgem - GD1	**Wide sample:** 9000 businesses, GB, public and private sectors inc. gas, elec and water. Main data source is the Monthly Wages and Salaries Survey.	**Short lag:** Provisional estimates provided c. 6 to 7 weeks after end of refernce month, final estimates c. 10 to 11 weeks after reference month	Yes	Yes
					Contractor labour:	2.94%					
Labour	ONS - AWE Transport and Storage, incl bonuses (NSA)	Yes	0.22%		Direct labour:	0.80%	Used by Ofgem - GD1	**Wide sample:** GB, sampled companies in Transportation and Storage sectors (incl. postal). Main data source is the Monthly Wages and Salaries Survey.	**Short lag:** Provisional estimates provided c. 6 to 7 weeks after end of refernce month, final estimates c. 10 to 11 weeks after reference month	Yes	No
					Contractor labour:	3.40%					
Labour	ONS - AWE Construction, incl bonuses (NSA)	Yes	1.31%		Direct labour:	0.29%	Used by Ofgem - GD1	**Wide sample:** GB, sampled companies in Construction sector. Main data source is the Monthly Wages and Salaries Survey.	**Short lag:** Provisional estimates provided c. 6 to 7 weeks after end of refernce month, final estimates c. 10 to 11 weeks after reference month	Yes	No
					Contractor labour:	2.32%					
Labour	ONS - AWE Total pay private sector services (NSA)	Yes	1.02%		Direct labour:	0.01%	Related alternative indices	**Wide sample:** GB, total pay for all private sector services. Main data source is the Monthly Wages and Salaries Survey.	**Short lag:** Provisional estimates provided c. 6 to 7 weeks after end of refernce month, final estimates c. 10 to 11 weeks after reference month	Yes	No
					Contractor labour:	2.61%					

Table 43: **Labour indices assessment**

			Materiality		Accuracy		Usability					
			1a Materiality to totex									
			Direct labour	23%								
			Contractor labour	43%								
Category	**Source and Index Name**	**Considered**	**1b Materiality to CPIH**		**2 Accuracy**		**3 Precedent**	**4 Independence**	**5 Time lag**	**6 Publically available**	**7 Forecast availability**	
		(eg. Availability of years, accessibility of data, relevance for gas sector)	*Abs difference between percentage change in index and percentage change in CPIH (both annualised)*		*Abs difference between percentage change in SGN's input costs and percentage change in the index (both annualised)*		*Where the index has been used previously*	*Red/amber/green assessment based on numberand type of companies in the same*	*Time lag between reference period and publication of provisional/final values*	*Yes/No*	*Yes/No*	
Labour	ONS - Index Labour Cost per Hour (ILCH) - private sector (NSA)	Yes	0.86%		Direct labour:	0.17%	Considered by EE for Ofwat at PR19	**Wide sample:** GB, all private sectors inc, gas, electricity and water. Main data sources are the Monthly Wages and Salaries Survey and Labour Force Survey.	**Medium lag: Published quarterly, a**pproximately 10 weeks between the publication date and the end of the period to which the data refer	Yes	No	
					Contractor labour:	2.77%						
Labour	ONS - Index Labour Cost per Hour (ILCH) - whole economy (NSA)	Yes	0.82%		Direct labour:	0.21%	Considered by EE for Ofwat at PR19	**Wide sample:** GB, all public and private sectors. Main data source is Monthly Wages and Salaries Survey and Labour Force Survey.	**Medium lag:** Published quarterly, approximately 10 weeks between the publication date and the end of the period to which the data refer	Yes	No	
					Contractor labour:	2.81%						
Labour	ASHE - Construction	Yes	0.91%		Direct labour:	0.11%	Considered by EE for Ofwat at PR19	**Small sample:** Great Britain, 1% sample of employee jobs taken from HMRC's PAYE records for the construction sector. <1,860 jobs in 2018 sample.	**Long lag:** Time lag is c. 6-7 months from reference period. Provisional results for April reference period are published in November of the same year, revised results in November the next year.	Yes	No	
					Contractor labour:	2.72%						
Labour	ASHE - Annual earnings - Electricity gas steam & air cond	Yes	0.16%		Direct labour:	1.19%	Considered by EE for Ofwat at PR19	**Small sample:** Great Britain, 1% sample of employee jobs taken from HMRC's PAYE records for the electricity, gas, steam and air conditioned sector. < C. 9,740 jobs in 2018 sample.	**Long lag:** Time lag is c. 6-7 months from reference period. Provisional results for April reference period are published in November of the same year, revised results in November the next year.	Yes	No	
					Contractor labour:	3.79%						
Labour	BCIS Labour cost index	Yes	1.13%		Direct labour:	0.11%	Related alternative indices	**Wide sample:** UK construction industry	**Short - Medium lag:** Approximately 8 weeks time lag for provisional results, 5 months for firm results	No	Yes	
					Contractor labour:	2.50%						
Labour	BCIS General Civil Engineering Index	Yes	0.26%		Direct labour:	0.76%	Used by Ofgem - GD1	**Wide sample:** UK construction industry	**Short - Medium lag:** Approximately 8 weeks time lag for provisional results, 5 months for firm results	No	Yes	
					Contractor labour:	3.37%						
Labour	BEAMA labour cost index for electrical engineering	No (not relevant for gas sector)	NA		NA		Used by Ofgem at ED1	NA	NA	No	NA	

Our assessment suggests there are several indices which might be suitable for Ofgem to use to benchmark RPEs for GD2. The following indices appear to be suitable on the basis of our assessment against criteria:

- ONS – AWE private sector inc bonus (NSA);
- ONS – AWE construction, inc bonuses (NSA); and
- BCIS labour cost index.

The reasons for excluding other indices were as follows:

- Two indices (ONS AWE for Transport and Storage and BCIS Civil Engineering and) were found not to be materially different from CPIH and did not accurately reflect our historical labour cost pressures;
- Four indices (ASHE and ILCH indices) were excluded due to the long-time lag for publishing provisional and final index values; and
- Two further indices met the criteria but were excluded because they were a subset of other indices. For example, the ONS AWE Whole Economy index was excluded because it was considered by Ofgem at GD1 but not used because of the overlap in index composition and results with the ONS AWE Private sector index. Similarly, the ONS AWE Total pay private sector index was excluded because of the overlap with the ONS – AWE Private sector index.

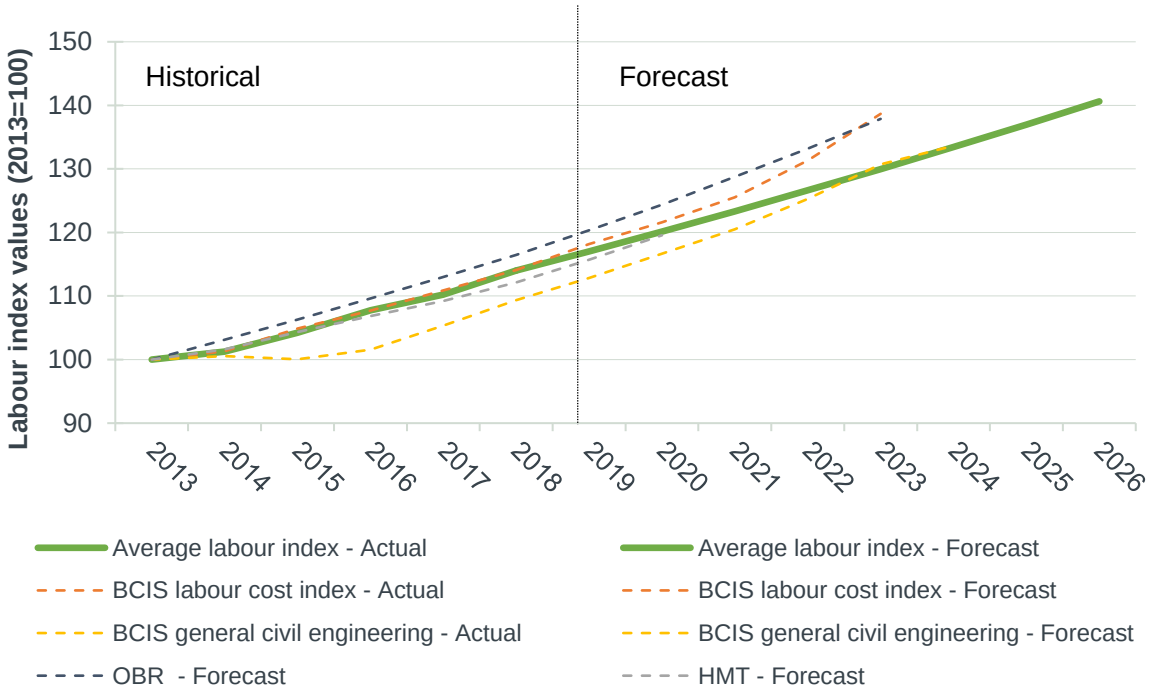
Given there are multiple indices which appear to be suitable, Ofgem could use an average basket of the indices which pass the criteria. This would be similar to Ofgem's approach at GD1. It also reduces the risk around relying on a single index, particularly because of the cyclicality of certain sectors and it avoids any cherry-picking of specific indices. It also combines economy-wide and more sector-specific indices, which reflects the actual cost pressures faced by GDNs.

Proposed forecasts for GD2

Our proposed forecast for labour RPEs is based on a linear extrapolation of an average (unweighted) index for materials. The indices that have been included in the average are those listed above which has passed our assessment against the materiality, accuracy and usability criteria. We have not proposed separate indices for labour and contractor labour, in-line with Ofgem's approach at GD1.

Our proposed average labour index and forecast is set-out in the chart below, and compared to other available forecasts from the HMT, OBR and BCIS (the BCIS Labour Index forecast and the BCIS General Civil engineering forecast). The chart shows that our proposed average labour index is on the conservative end of the range of forecasts. Our average labour forecast is also in-line with the HMT consensus forecast and conservatively below the OBR forecast.

Figure 24: Labour Indices



Average labour index is based on an unweighted average of the following indices: 1) ONS – AWE Private sector inc bonus (NSA), 2) ONS – AWE Construction, inc bonuses (NSA); and 3) BCIS Labour cost.

Adjustment for region-specific or licensee-specific factors

Ahead of the Draft Determination, Ofgem should consider whether there may be region-specific and/or licensee-specific drivers of real price effects. If these are identified, they should be factored into the index, or into baseline allowances (potentially through an uncertainty mechanism). The issues identified below are most likely to affect labour costs (e.g. through increases in contractor unit rates) – similar issues may affect materials prices albeit we expect regional variation is less likely there.

An example of a potential external driver of region-specific RPEs is differences in environmental standards across local authorities or devolved Governments. For example, in April 2019 London introduced the Ultra-Low Emission Zone (ULEZ). This was an expansion of the existing Low Emission Zone, and so it now affects a lot more vehicles. Low emissions zones are also being introduced in Scotland – e.g. Glasgow introduced a low emission zone at the end of 2018 (which is currently focused on local bus services, but after 2022 will cover all vehicles) and the Scottish Government has also committed to introduce low emission zones by 2020 into Edinburgh, Dundee and Aberdeen.

Some other cities in the UK may follow suit, others may choose not to – and clearly this could drive a regional difference in ongoing prices, e.g. causing an increase in contractor rates as contractors seek to pass through any incremental costs. While these examples may just represent one-off cost increases, it is clear certain cities/local authorities may generally be more proactive at pushing environmental standards such as this, which will tend to mean contractor costs (and hence prices) will increase faster in those areas.

Ofgem should therefore be confident its selected RPE indices reflect these external drivers of prices. One option to cover this might be to allow for a re-opener, where GDNs can apply for a modification to the RPE index if it turns out that local policies are driving prices at different rates to the headline index. Alternatively, a re-opener (or similar uncertainty mechanism) for baseline allowances could be introduced, to cater for any large one-off cost changes driven by environmental policy.

Materials

Historical evidence of RPEs

Materials costs make up approximately 31% of our totex, comprised as follows:

- 25% of opex;
- 17% of repex;
- 66% of capex.

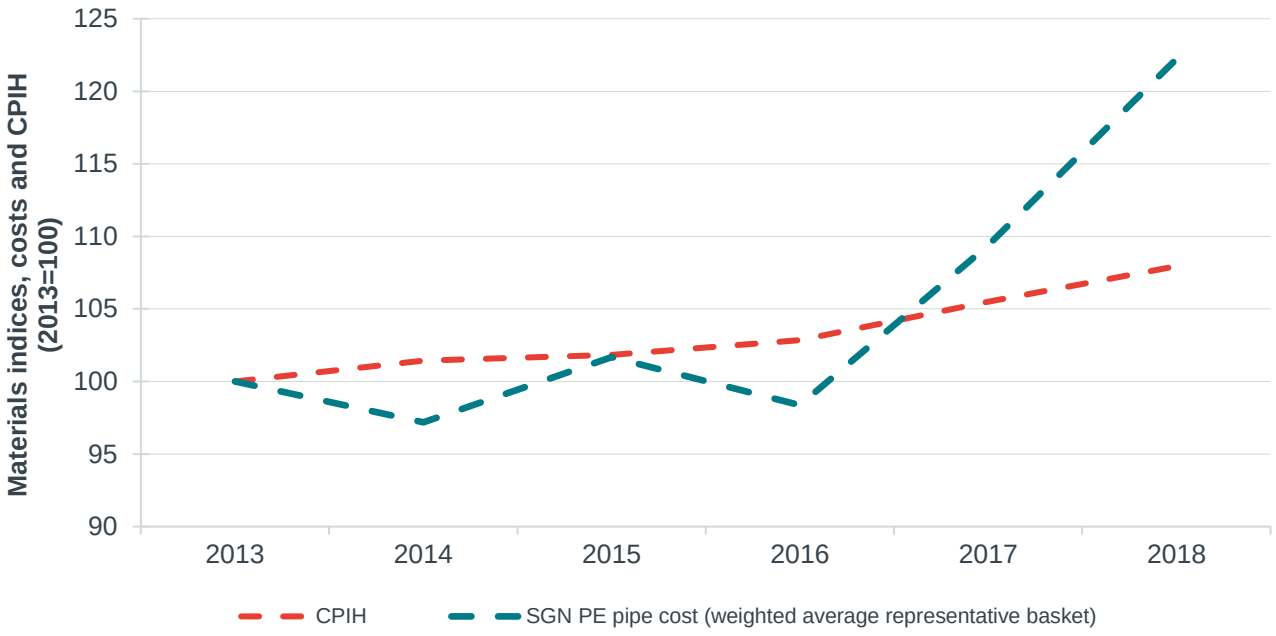
We have assessed our materials costs against CPIH over the course of GD1 and found evidence of RPEs over the period. Because materials are sourced through numerous contracts, our assessment has been based on tracking the cost of a representative basket of PE pipe rates. PE pipe is our single largest area of materials spend and made up 23% of our total materials spend in 2018.

The table and chart below summarise the weighted (by quantity) average price of this basket during GD1 to date and compares this to growth in CPIH. Between 2013 to 2018, the cost of the basket has clearly outstripped CPIH, with an annualised growth rate of 4.10% compared to CPIH of 1.54% over the same period.

Table 44:

SGN input cost	CAGR	Outstrips CPIH by?
PE plastic pipe	4.10%	2.56%
CPIH	1.54%	

Figure 25: **Material indices**



It is clear from the chart above that materials costs can be volatile and that CPIH does not track these costs well. For example, our PE pipe contracts are linked to a number of underlying indices (including diesel prices, polymer prices, power prices and base metal prices), and are therefore subject to market fluctuations. Because

materials make up a significant proportion of totex it is therefore important to adjust allowances for these costs against a suitable index (or several indices).

Proposed indices for GD2

Below we provide the results of our review of a long list of possible materials indices against the criteria set out at the start of this section.

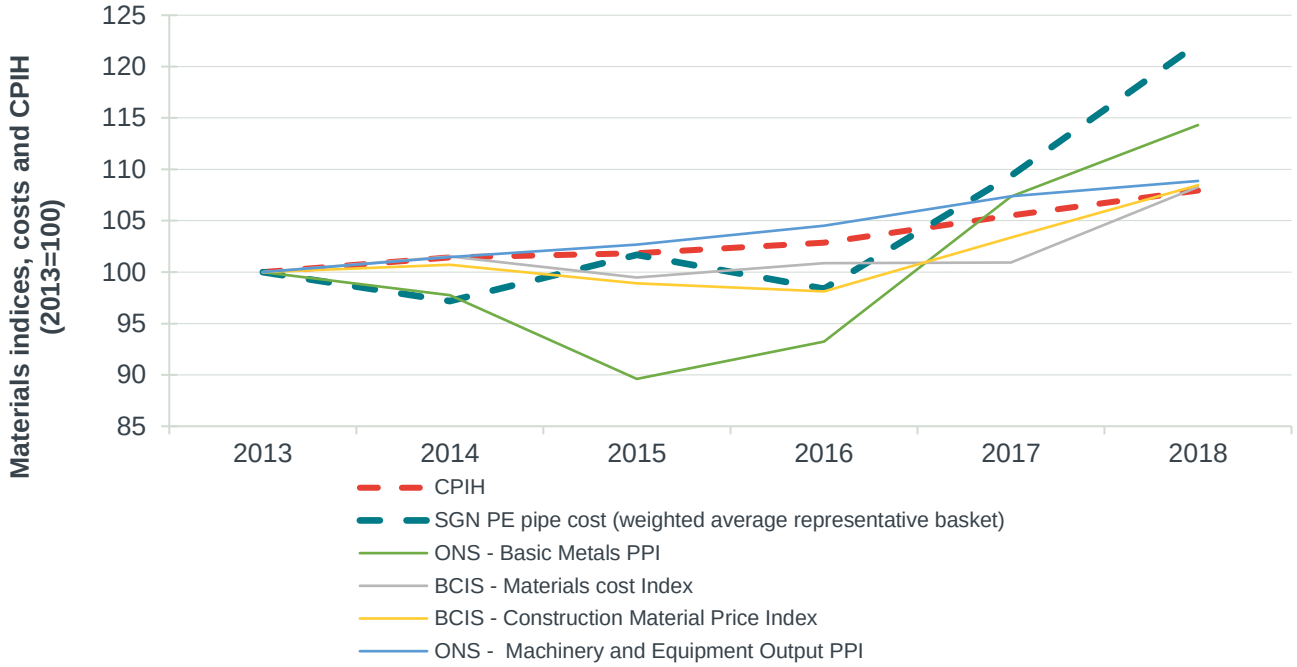
The starting point of our assessment is the long list of possible materials indices set out in the table below. We exclude three indices, either because data is not available for the GD1 period or because we do not consider them to be relevant for the gas sector. We exclude a further four indices, as the data is not publicly available, and we have not been able to access it.

Table 45:

Index	Considered?
ONS - Basic Metals PPI	Yes
BCIS - Materials cost Index	Yes
BCIS - Construction Material Price Index	Yes
ONS - Machinery and Equipment Output PPI	Yes
BCIS - PAFI Index for aluminium	No (not relevant for gas sector)
BEAMA electrical material cost index	No (not relevant for gas sector)
BCIS - PAFI structural steelwork for civil engineering	No (not able to access data)
FOCOS - Resource Cost Index of Infrastructure (RCI) for infrastructure materials	No (no data available after 2014)
BCIS - PAFI Index for steel works	No (no data access)
BCIS - PAFI Index for plastic pipes	No (no data access)
BCIS - PAFI Index for copper piping	No (no data access)

The chart below shows how the remaining five indices have moved over time, compared to both CPIH and our PE pipe costs. All indices have experienced an annualised rate increase over the period 2013 to 2018 which outstrips CPIH to varying degrees. However, there is clear volatility across indices and over time, meaning no single index tracks our costs very closely over the period. As we have only been able to consider general materials indices, we would recommend Ofgem also further considers more granular indices, including specific indices for plastic pipes, which may reflect cost pressures more accurately.

Figure 26: **Materials indices**



The results of our detailed review are set out in the table below.

Table 46: **Materials indices assessment**

			Materiality	Accuracy	Usability				
			1a Materiality to totex						
			Materials 31%						
Category	Source and Index Name	Considered	1b Materiality to CPIH	2 Accuracy	3a Precedent	3b Independence	3c Time lag	3d Publically available	3e Forecast availability
		(eg. Availability of years, accessibility of data, relevance for gas sector)	*Abs difference between percentage change in index and percentage change in CPIH (both annualised)*	*Abs difference between percentage change in SGN's input costs and percentage change in the index (both annualised)*	*Where the index has been used previously*	*Red/amber/green assessment based on numberand type of companies in the same*	*Time lag between reference period and publication of provisional/final values*	*Yes/No*	*Yes/No*
Materials	FOCOS - Resource Cost Index of Infrastructure (RCI) for infrastructure materials	No (no data available after 2014)	NA	NA	Used by Ofgem - GD1 (materials -opex)	NA	NA	Yes	NA
Materials	ONS - Basic Metals PPI	Yes	1.17%	1.38%	Considered by Ofgem - GD1	**Wide sample:** UK manufacturing sector, based on ONS statutory monthly survey and Metal Bulletin. Metal Bulletin	**Short lag:** Approximately 2-3 weeks between publication and the reference month	Yes	No
Materials	BCIS - Materials cost Index	Yes	0.07%	2.49%	Related alternative indices	**Wide sample:** UK construction industry	**Short - Medium lag:** Approximately 8 weeks time lag for provisional results, 5 months for firm results	No	Yes
Materials	BCIS - Construction Material Price Index	Yes	0.10%	2.46%	Related alternative indices	**Wide sample:** UK construction industry	**Short - Medium lag:** Approximately 8 weeks time lag for provisional results, 5 months for firm results	No	No
Materials	BCIS - PAFI Index for steel works	No (no data access)	NA	NA	Used by Ofgem - GD1 (materials - capex/repex)	NA	NA	No	NA
Materials	BCIS - PAFI Index for plastic pipes	No (no data access)	NA	NA	Used by Ofgem - GD1 (materials - capex/repex)	NA	NA	No	NA
Materials	BCIS - PAFI Index for copper piping	No (no data access)	NA	NA	Used by Ofgem - GD1 (materials - capex/repex)	NA	NA	No	NA
Materials	BCIS - PAFI Index for aluminium	No (not relevant for gas sector)	NA	NA	Used by Ofgem at ED1	NA	NA	No	NA
Materials	BCIS - PAFI structural steelwork for civil engineering	No (no data access)	NA	NA	Considered by Ofgem at GD1	NA	NA	No	NA
Materials	BEAMA electrical material cost index	No (not relevant for gas sector)	NA	NA	Considered by Ofgem - GD1	NA	NA	No	NA
Materials	ONS - Machinery and Equipment Output PPI	Yes	0.17%	2.38%	Considered by Ofgem - GD1	**Wide sample:** UK, whole manufacturing sector. Compiled using ONS statutory monthly survey.	**Short lag:** Approximately 2-3 weeks between publication and the reference month	Yes	No

As noted above, we have only been able to assess the indices for which we can access data. The results of this assessment suggest:

- Of the indices, which we can access data, there is no single index which appears to reflect our materials costs closely (see criteria '2. Accuracy' above);
- Some indices alo appear to be less material to CPIH (criteria '1.b Materiality to CPIH' above). However, we have not excluded these, as the materiality to totex (criteria '1.a Materiality to totex' above) would suggest the overall impact of the index on totex would still be material. As set-out at the start of this section, we consider an appropriate index should be material either to totex, or to CPIH or to both (such the overall impact of the RPE is material).

The results of this initial assessment suggest the four indices for which we have data could be suitable for indexing RPEs:

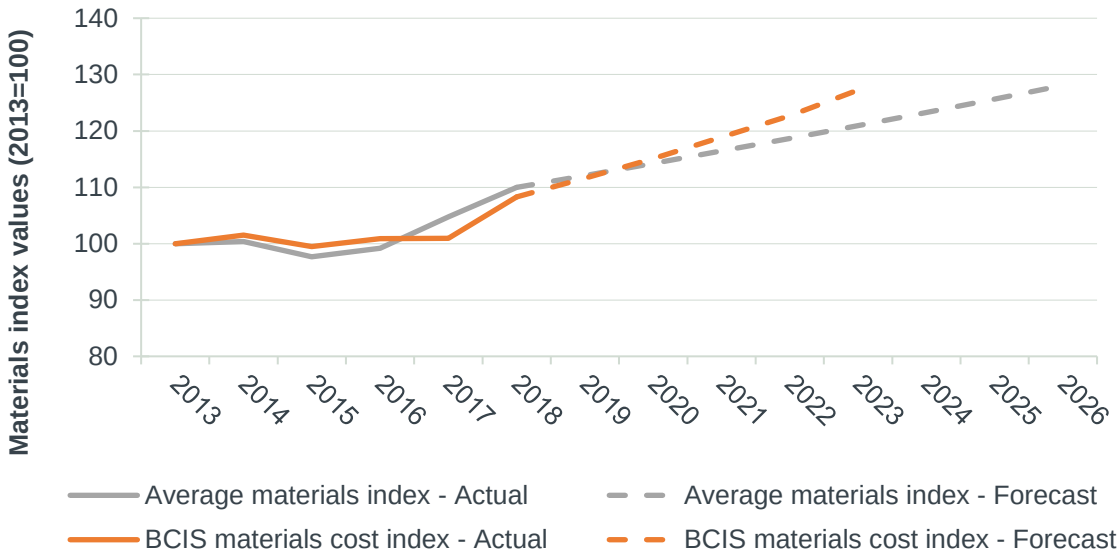
- ONS Basic Metals PPI;
- BCIS Materials Cost Index;
- BCIS Construction Material Price Index; and
- ONS Machinery and Equipment Output PPI.

However, as discussed above, we have not been able to access the detailed BCIS indices for steel, plastic or copper as used by Ofgem at GD1. We would propose Ofgem should consider these indices. If they meet the key criteria around materiality, accuracy and usability, we would propose these indices are combined with the indices listed above to give a basket of indices. As explained above, this approach reduces the risk around relying on a single index, it avoids any cherry-picking of specific indices, and it reflects the various sources of cost pressures faced by GDNs.

Proposed forecasts for GD2

Our proposed forecast for materials RPEs is based on a linear extrapolation of an average (unweighted) index for materials. The indices that have been included in the average are those listed above which has passed our assessment against the materiality, accuracy and usability criteria. The chart below shows our initial proposed average materials index and forecast, as compared to the BCIS materials forecast. We note our proposed forecast is conservative, and lower than the BCIS forecast. As discussed above, we would recommend this forecast is reviewed an updated to account for the additional materials indices, such as the BCIS indices mentioned above.

Figure 27: Materials indices



Average materials index is based on an average (unweighted) of the following indices: 1) ONS Basic metals PPI; 2) BCIS Materials cost index; 3) BCIS – Construction Material Price Index; 4) ONS – Machinery and Equipment Output PPI

Plant and equipment

Plant and equipment costs make up a relatively small proportion of totex. At GD1 Ofgem reported it was approximately 1% of totex for GDNs.[36]

Our plant and equipment costs are comprised as follows:

For Scotland:

- 2.1% of opex;
- 1.1% of repex; and
- 0.5% of capex.

For Southern:

- 2.1% of opex;
- 0.5% of repex; and
- 0.2% of capex.

Ofgem made an allowance for plant and equipment RPEs at GD1. We believe this should continue.

[36] Ofgem (December 2012) RIIO-T1/GD1: Real price effects and ongoing efficiency appendix, final decision

6 Assurance Statement

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 Chief Financial Officer was appointed as the Sponsor for the Cost Efficiency 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 workshops on: cost matrix, overarching cost drivers, operating costs inc. efficiency GD1 and GD2 plans, CBAs and productivity.

Both Senior Manager and Director sign-off was obtained. 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
Frontier Economics	Frontier Economics provided specialist input in relation to our benchmarking analysis. They reviewed our proposed cost assessment approach and advised on its legitimacy from a technical perspective. Frontier also worked closely with our internal benchmarking specialists to test the robustness of our modelling of the efficiency performance in GD1 to date.
Hargreaves Jones	Consultancy on real price effects and indices.
First Economics	Consultancy on productivity conducted on behalf of ENA.
Arcadis and Nera Economics	Regional Factors and Productivity assumptions on behalf of several London Utilities.

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
PwC	Business Plan Data Template review: Real Price Effects (RPE) & Ongoing Efficiency

7 Glossary

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