Appendix A18

Regional Factors

RIIO-GD1 – Gaining Rewards for Frontier Performance

Overview

Over the course of the electricity and gas distribution price control reviews, one principle which has been established is that companies shown to be frontier performers on costs through benchmarking should be rewarded for setting the benchmark for other companies thus driving additional efficiencies which are returned to consumers. In addition, it is also accepted by Ofgem that such rewards to frontier companies gives greater incentives to improve their performance, further providing future benefits to consumers. In light of the RIIO final proposals "frontier" companies need to consider how they will receive such rewards given that they are also expected to be candidates for "fast tracking".

In the RIIO-GD1 December Strategy Consultation Ofgem acknowledged this problem and suggested that companies could propose their "additional reward" should they be fast tracked. In the December document Ofgem suggested that the reward could be based on:

- a value based on a proportion of consumer benefit as derived by Ofgem benchmarking other companies i.e. the value of having the frontier company as a comparator;
- a value (an allowance) proposed by companies as part of their well justified business plan

Ofgem suggested the first approach had the merit of incentivising companies to put in challenging cost forecasts as part of their business plans. Ofgem also noted the practical difficulty of being able to complete this approach within the fast tracking process i.e. the inability to benchmark all companies based on the July 2011 business plans. In NGN's response to the December document we agreed with the difficulties associated with the first option and stated our preference for the second option which we highlighted would be consistent with the RIIO principles, namely that any proposed value would have to be "well justified". In the March decision document Ofgem reiterated the approach set out in the December consultation as outlined above.

From NGN's understanding of Ofgem's RIIO-GD1 approach, GDNs' forecast business plans will be benchmarked and influence the IQI rate, therefore the GDNs already have a strong incentive to submit challenging cost forecasts. So the issue here is purely about how Ofgem rewards achieved frontier performance based on how such rewards have been derived in the past.

In summary, we propose that the reward for NGN's consistent frontier performance on repex and opex should be £15m p.a. This amount is based in part on the value of consumer benefit driven to date by NGN. In previous price control reviews Ofgem has set frontier companies' allowances with reference to the upper quartile cost benchmark. As will be shown below, the value of £15m is consistent with additional [repex and opex] allowances set using an upper quartile benchmark. Therefore, we believe it is appropriate for NGN to receive an annual allowance of £15m for its consistent frontier performance since GDPCR 1.

There a number of ways such a value could be derived:

- firstly, Ofgem can apply the same rewards in RORE terms as it did for the frontier companies in DPCR 5 – WPD (capex) and SSE (opex)
- secondly, we can quantify the cost reductions NGN has driven from all GDNs since GDPCR 1 (assuming an upper quartile benchmark)
- finally, we can simply look at what NGN's additional allowances would be using the upper quartile

1) RORE based approach

The Electricity Distribution Price Control Review (DPCR 5) reiterated the principle that frontier performers should have scope for outperformance in their cost allowances, in particular:

- Opex allowances for above quartile DNOs like SSE were set using the upper quartile level so that they received additional outperformance as part of their costs.
- WPD argued successfully for consistency and received allowances for frontier performance on non load capex i.e. repex and these unit costs were set at the upper quartile benchmark.

If we look at the premium in baseline RORE figures determined for SSE and WPD compared to the DNOs in aggregate using values taken from the DPCR 5 financial model, we can see that WPD had a premium of 2.67% RORE while SSE received a premium of around 1.43%. We assume here that the baseline RORE figures for WPD and SSE reflect the additional allowances for respective frontier performance. We note that in addition to capex, WPD also received a reward for frontier customer service (IIS), nevertheless, the fact that NGN has also been at the frontier in two cost areas should arguably be comparable to WPD if not more valuable.

For the purposes of this paper will use the above analysis to support a RORE premium of 2.5%, however, as we note arguably this should be higher for NGN. If we apply 2.5% RORE to NGN this translates into approximately £14m (based on present spot RAV and present notional gearing).

2) A **"value of benchmark" based approach**

Under this approach the reward is based on the impact NGN has had on the GDNs' cost reductions driven through benchmarking. Clearly, NGN has driven cost reductions by being the frontier company on opex and repex in order to quantify the impact of this we need to establish the counterfactual i.e. if NGN had no impact since GDPCR 1.

To establish the counterfactual we are using what we believe is an extremely conservative approach to measure NGN's impact assuming NGN's performance is in line with the upper quartile benchmark. Arguably to have no impact at all on the benchmark and cost reductions we would have to assume that NGN was fourth given that the upper quartile is between the second and third GDN. The table below sets out the difference in total GDN costs (using the upper quartile) between the scenario with NGN's actual costs (frontier) and then if we assume NGN only performs in line with the upper quartile The analysis is based on the latest regression data circulated by Ofgem following the resubmission of the RRPs opex is top down.

Aggregate GDN cost reduction - NGN Q1		
	2008/09	**2009//10**
Opex	£4.52m	£6.15m
Repex	£8.95m.	£11.49m
Total	**£13.47m**	**£17.64**
Totex	*£22.33m*	*£31.45m*

As a comparison we have also replicated the same approach using Ofgem's totex analysis (running single year regression on the data from within Ofgem's two year panel). The totex values may illustrate additional value NGN is driving over and beyond just opex and repex.

Aggregate GDN cost reduction - NGN 4th		
	2008/09	**2009//10**
Opex	£10.20m	£18.21m
Repex	£18.61m.	£26.36m
Total	**£28.81m**	**£44.57m**

As a further comparison we replicate the above analysis this time with NGN moved to fourth position so that it does not influence the position of the upper quartile, this arguably shows the full extent of NGN's impact as a comparator since GDPCR 1. The figures in the second table should illustrate the conservative nature deriving a value of benchmark based on NGN performing in line with the upper quartile. .

3) A cost allowance based approach

This would involve establishing what NGN's additional revenue would be if allowances were set using the upper quartile. As with the value of comparator we derive allowances for top down opex and repex, again the same approach using totex is shown for comparison.

	2008/09	**2009//10**
Opex	£3.51m	£5.26m
Repex	£6.77m	£18.75m
Total	**£10.28m**	**£24.03m**
Totex	*£15.19m*	*£25.67m*

Impact of loss of metering and other adjustments

None of the above analysis incorporates key adjustments to NGN's costs for loss of metering, or regional factors which NGN discussed with Ofgem during RIIO-GD1. In particular, NGN believes that Ofgem's analysis is distorted because it does not take account of stranded costs which NGN incurred following the loss of its metering contracts. In a paper submitted to Ofgem on March 23 2011 NGN detailed evidence showing how it had reduced such stranded to efficient levels and reductions of £1.9m should be applied to both NGN's opex and repex for benchmarking. When these reductions are taken into account in the above analysis the resultant rewards for would be larger than being proposed.

NGN will also shortly submit evidence to illustrate regional factors that impact its opex and repex, requiring further reductions in these costs and additional allowances, consistent with the treatment of WWU and the Scotland GDN in GDPCR 1.

Conclusion

The table below takes the results from the above approaches together

DPCR 5 RORE	£14.0m
Value of benchmark (ave)	£15.6m
Upper Quartile allowance (ave)	£17.2m

Simply based on the numbers a reward value of £15m per year seems well justified, however, as discussed we believed this value is understated as we have arguably used conservative assumptions on the RORE and value of benchmark approach. Furthermore, none of the above numbers take into account cost reductions associated with loss of metering and regional factors.

In the context of RIIO-GD1 and fast tracking NGN is proposing that it receive an allowance of £15m p.a. for 2013-21as a justified reward for frontier performance since GDPCR 1 this proposal is an integral component of NGN's RIIO-GD1 business plan.

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Proposed benchmarking adjustments for NGN's costs

This short note sets out the adjustments we believe Ofgem should be applying to NGN's costs in its various benchmarking analyses. The adjustments have previously been discussed with Ofgem.

Removal of stranded costs arising from the loss of metering (LOM)

In March 2011 we submitted a paper (see Appendix 1) setting out evidence to show that following the loss of metering contracts in 2007/08 NGN has been successful in reducing the associated stranded cost (primarily FCO down time) to an efficient level. These efficient stranded costs are incurred in NGN's emergency and repex costs.

In a meeting on 1 June 2011 NGN gave a presentation to Ofgem (Rachel Fletcher & Paul Branston) in which NGN confirmed that the reduction of these stranded costs in particular the limited rationalisation of the FCO workforce had a minimal impact on NGN's emergency response performance during the 2010/11 winter.

2010/11 costs

The table below shows the movement in costs associated with NGN's metering contracts costs to 2009/10 which were presented in the March paper we have now added costs for 2010/11.

Table 1: Impact of Loss of Metering on NGN Regulated Cost Base (2009/10 prices)

2009/10 prices £m	2006-07	2007-08	2008-09	2009-10	2010-11
Total Metering Costs	10.2	7.6	2.0	1.1	1.0
NGN Efficiency	0.0	1.8	3.9	5.2	5.2
Stranded Emergency costs	0.0	0.7	3.4	1.9	0.9
Marginal increase in repex cost*	0.0	0.0	0.8	1.9	3.1
TOTAL	10.2	10.2	10.2	10.2	10.2

*Incremental costs of using direct labour (FCOs) compared to contractors

As is evident from the figures above a key part of NGN's strategy to mitigate the impact of LOM has been to redeploy FCO down time into repex activities such as purge and relight, displacing contractors previously used to undertake the work, this redeployment offsets a significant proportion of these stranded costs. The re-deployment began in 2008/09 following the loss of the contracts and increased to the maximum possible level by 2010/11, NGN intends to maintain the 2010/11 level of redeployment going forward and this is included in NGN's RIIO-GD1 forecasts.

Required benchmarking adjustments

As we have previously discussed with Ofgem we believe that the costs NGN incurred as a result of losing the metering contracts should be removed from NGN's costs being benchmarked to ensure a like for like comparison. NGN is the only GDN to date to have lost meter work contracts and therefore like the regional factors this is an issue specific to NGN that requires an adjustment. Based on Table 1 above table 2 sets out the required adjustments to NGN's costs, given that Ofgem is undertaking panel data analysis involving multiple years we have set out the adjustments for each year. These figures represent what NGN believes to be an efficient level of cost without Meterwork.

Table 2: Requested Adjustments to NGN's annual costs for benchmarking

2009/10 prices £m	2007/08	2008/09	2009/10	2010/11
Totex	-£0.7m	-£4.2m	-£3.8m	-£4.0m
Total Opex - Emergency	-£0.7m	-£3.4m	-£1.9m	-£0.9m
Repex	£0.0m	-£0.8m	-£1.9m	-£3.1m

Forecast LOM costs

NGN believes that it has demonstrated that the above costs are at an efficient level and the 2010/11 costs have been projected forward into our forecasts of the relevant cost category therefore Ofgem should **make the above adjustments for 2010/11 and then for each year to 2020/21 when benchmarking forecast costs.**

Allowances

If Ofgem is basing allowances directly on the benchmarked costs the above adjustments should be added back for NGN.

Furthermore, NGN's stranded cost and the percentage savings NGN has been able to achieve in total and fixed costs can be used to benchmark the other GDNs. This will potentially deliver significant benefits to consumers in addition to the cost savings that will be passed on to NGN's customers. To the extent that NGN's LOM cost benchmarks are assessed to be frontier compared to other companies an additional allowance should be considered for the value created by NGN's actions.

Regional factors

In April 2011 NGN submitted a paper on two regional factors that impact its operations (see Appendix 2) NGN discussed the paper further with Ofgem in May. We believe that with both factors NGN has met the criteria set out by Ofgem namely:

- we can provide evidence of the factor occurring in NGN's region and how it impacts NGN's operations.
- we can quantify the impact of these factors on NGN's costs.
- we can demonstrate that these factors impact NGN adversely in relation to the other GDNs

All of the above points are addressed in the original paper in Appendix 2.

Geographic and demographic extremes

In the original paper we set out evidence to show how NGN is impacted by having two of the UK's largest conurbations at opposite ends of its region coupled with the fact that the remaining 97% of the network region contains 4 national parks and the lowest population density in the UK. These factors impact NGN's operations as it has to maintain 4 "rural depots" as a direct result, based on the associated costs the following adjustments must be made to NGN's costs each year for benchmarking purposes.

Table 3 geographic and demographic extremes benchmarking adjustments per year 2009/10 prices

Totex	-£3.73m
Total Opex	-£3.73m
Emergency	-£1.05m
Repairs	-£1.80m
Maintenance	-£0.72m
Work management	-£0.18m

These costs have remained at the same level throughout GDPCR 1 so we have not calculated adjustments for each year. In the original paper we were able to demonstrate that these costs are efficient. **The adjustments in table 3 should be applied to each historic and forecast year being benchmarked**.

West Yorkshire repex costs

In the original paper we showed that a unique combination of three factors steel rail services, Pennine bedrock and "mill-town" streets increased NGN's repex costs in West Yorkshire. We quantified the impact on NGN's repex and showed that for the purposes of benchmarking repex **Ofgem should make the following adjustments to NGN's unit costs for all historic and forecast years being benchmarked.**

Table 4 West Yorkshire Repex benchmarking adjustments (% adjustments to unit costs per year)

Mains (all diameters)	-5%
Services	-3%

Allowances for Regional factors

We have demonstrated these costs are efficient and like LOM we have included these costs in our RIIO-GD1 forecasts, however, if Ofgem decides to base allowances on benchmarked costs the costs above (in tables 3 & 4) must be added back after benchmarking.

Conclusion

In this note we have brought together all the adjustments we believe Ofgem must apply to NGN's costs for purposes of benchmarking:

- stranded costs arising loss of meter work contracts
- regional factors
    - geographic and demographic extremes
    - West Yorkshire repex

The proposed adjustments should be applied to each year as specified given the supporting evidence we have provided and the discussions we have had with Ofgem. We expect Ofgem to include these adjustments its latest analysis including the 2010/11 RRP data.

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APPENDIX 1 LOSS OF METERING & BENCHMARKING ANALYSIS

Overview

This note builds on the analysis presented by Ofgem at the cost and outputs workshop on 2 March 2011. The main objective is to set out the adjustments NGN believes should be applied to reflect the impact of loss of meter work (LOM) on NGN's historic and forecast expenditure.

We demonstrate below that these costs reflect sound and efficient initiatives taken by NGN to reduce any stranded costs arising from LOM. Specifically, NGN has met the challenge set out in the RIIO-GD1 December Consultation to demonstrate that we have explored all avenues for reallocating labour time freed up by LOM and we will keep this under review going forwards. As a result, NGN has reduced the total potential impact from loss of metering work by over 60% and the fixed cost element by over 40%.

Therefore, we believe LOM for NGN should be treated in the same way Ofgem currently treats regional factors for other GDNs. Specifically NGN believes:

1. the efficient level of stranded costs set out below should be removed from NGN's reported costs each year for the purposes of benchmarking.
2. the stranded costs adjustments set out below should be used as the efficient benchmark for the other GDNs who will include forecasts of such costs in their RIIO-GD1 business plans.
3. NGN must receive an allowance for these stranded costs to ensure that the efficient costs of NGN providing an emergency response service are fully funded. Such an allowance would also recognise the additional value NGN will return to customers through the reduction its own stranded emergency costs and as benchmark to drive the other GDNs to similar reductions.

In the remainder of this note we expand on these points.

Financial Impact of Loss of Metering

NGN has lost most of its metering work from National Grid Metering since 2007. This has impacted significantly upon costs within the regulated business. Table 1 below summarises this impact when compared to the last full year of contract meterwork – 2006/7.

Table 1: Impact of Loss of Metering on NGN Regulated Cost Base (2009/10 Prices)

2009/10 prices £m	2006-07	2007-08	2008-09	2009-10
Total Metering Costs	10.2	7.6	2.0	1.1
NGN Efficiency	0.0	1.8	3.9	5.2
Stranded Emergency costs	0.0	0.7	3.4	1.9
Marginal increase in repex cost*	0.0	0.0	0.8	1.9
TOTAL	10.2	10.2	10.2	10.2

* Additional Costs of using Direct labour compared to Contractors

The key points to note from Table 1 are:

- In 2006/7 NGN held metering contracts that attracted a total cost of £10.2m, made up of the following elements:

Table 1a: Breakdown of Costs Allocated to Meterwork in 2006/7

2009/10 prices (£m)	**2006/07**
Direct Labour	6.3
Sub contractors	2.7
Materials	0.6
Other	0.6
	10.2

- In 2007/8 NGN lost an element of meterwork relating to the provision of services to Onstream.
    - This resulted in £2.6m (£10.2m-£7.6m) of costs for meterwork under this contract being potentially carried by the regulated business.
    - NGN were able to reduce this cost exposure by £1.8m within the year through reductions in contract labour and materials.
    - The element of this contract delivered by NGN Direct Labour resulted in a stranded cost in Emergency of £0.7m within the year.

- In 2008/9 NGN lost the largest element of its metering work with the loss of the contract for domestic meterwork with National Grid Metering (NGM):
    - This resulted in a further £5.6m (£7.6m-£2m) of costs under this contract potentially being carried by the regulated business.
    - NGN were able to reduce this cost exposure through a range of initiatives (including reducing subcontractors and materials and using stranded Direct Labour on repex work) by £3.9m when compared to 2006/7.
    - Despite these initiatives, NGN has incurred stranded costs in Emergency of £3.4m and in Repex of £0.8m. When compared to the £6.3m of direct labour costs used on metering in 2006/7 NGN has successfully limited the impact of this on regulated costs to £4.2m in 2008/9.

- 2009/10 represents the first full year without the Domestic Metering Contract (terminated in July 2008) and NGN carried out further initiatives to reduce the impact upon the regulated business.
    - Increasing further the amount of stranded direct labour (£1.1m) used on Repex work and displacing contractors
    - Completing a redundancy programme for resource that could not be efficiently deployed within the business (£0.5m)
    - As a result by 2009/10, of the £6.3m of Direct labour providing metering work in 2006/7, NGN had reduced further the impact of this on regulated costs to £3.8m in 2008/9.

These figures show the significant efficiencies that NGN has managed to achieve in response to the loss of metering contracts since 2006/7. Of the £10.2m meterwork costs in 2006/7, the residual costs within the business at the end of 2009/10 totalled £3.8m a reduction of 63%, whilst against the fixed costs of £6.3m in 2006/7 this represents a 40% reduction over three years.

This represents a successful positive response to the challenges presented by the loss of meterwork and a challenging benchmark for other GDNs to achieve as they face declining workloads under their metering contracts over the period to 2021.

Loss of Metering & Benchmarking Analysis

The figures set out in Table 1 above represent an efficient response to the loss of meterwork in terms of minimising the impact upon the costs of delivering NGN's regulated activities. As such the benchmarking analysis that Ofgem are carrying out over the period 2007/8 to 2009/10 must:

- ensure that NGN are not disadvantaged by the early loss of meterwork contracts compared to other networks.
- recognise the benchmark level of response delivered by NGN since 2006/7 directly within the analysis.

This approach is consistent with the approach being taken by Ofgem for those companies which qualify for a Regional Factor cost adjustment.

Using this principle and the figures presented in Table 1 above, we propose that Ofgem should make the following adjustments to NGN costs for benchmarking in RIIO-GD1, these adjustments should be applied to NGN's annual costs:

Table 2: Required Adjustments to NGN's annual costs for benchmarking

2009-10 Prices - £m	**2007/8**	**2008/9**	**2009/10**
Totex	**-£0.7m**	**-£4.2m**	**-£3.8m**
Total Opex	**-£0.7m**	**-£3.4m**	**-£1.9m**
Emergency	-£0.7m	-£3.4m	-£1,9m
Repex	**£0m**	**-£0.8m**	**-£1.9m**

These figures represent what NGN believe to be an efficient level of costs without meterwork and should be the basis of the adjustments for comparative benchmarking analysis.

NGN Proposed Allowance for Stranded Emergency Costs

As mentioned above we believe that LOM for NGN should be treated on a consistent basis with regional factors for other GDNs. This means that in addition to the removal of these costs for the purposes of benchmarking, these amounts must be added back to regulatory allowances as they represent the current benchmark efficient level of costs without almost all meterwork contracts.

In the case of stranded costs associated with LOM it is essential that NGN is funded for these costs so that NGN can continue to provide and maintain its existing emergency response service which is a statutory obligation and an integral part of NGN's HSE safety case.

Furthermore, NGN's stranded cost (£3.8m per annum) and the percentage savings NGN has been able to achieve in total and fixed costs can be used to benchmark the other GDNs. This will potentially deliver significant benefits to consumers in addition to the cost savings that will be passed on to NGN's customers. To the extent that NGN's cost benchmark are assessed to be frontier compared to other companies, assessments of efficient costs without meterwork an additional allowance should be considered for the value created by NGN actions.

Conclusion

NGN has responded to the loss of meterwork contracts extremely positively with initiatives that have driven out a significant element of potential stranded costs and minimised the impact upon the regulated business. This action we believe sets the benchmark for all other GDNs to achieve in response to reductions in their metering workload over the period of RIIO-GD1.

Ofgem's benchmarking analysis must account for the impact on NGN's costs of the loss of metering contracts post 2006/7. Adjustments should be made to NGN's expenditure figures within the benchmarking to reflect this change in the same way that regional factors are currently being considered for individual GDNs.

NGN should receive a cost allowance to remunerate its efficient stranded costs associated with LOM in order to:

- Enable NGN to fund, provide and maintain its present emergency response service.
- Reward NGN for the value it has returned to consumers by reducing its own stranded costs and then setting the benchmark for the other GDNs.

- Incentivise NGN to continue to reduce these costs and return further benefits to consumers in RIIO-GD2.

To the extent that NGN's cost benchmark is assessed to be frontier compared to other companies assessments of efficient costs without meterwork an additional allowance should be considered for the value created by NGN actions.

APPENDIX 2 REGIONAL FACTORS

As part of the RIIO-GD1 consultations Ofgem have stated that GDNs will need to provide evidence for any adjustments for regional factors as part of their "well justified" business plans. In GDPCR 1 Ofgem recognised the impact of low customer density on GDN operations and accordingly WWU received an allowance of £2m and Scotland GDN £1m. Ofgem also recognised the impact of dense urban environments with allowances of £1.9m for London and £1.2m for Southern. In all cases corresponding reductions were made to the companies' costs for the purposes of benchmarking.

In this paper we set out what we believe are two regional factors that impact NGN's operations and associated costs:

1. NGN's unique geography and demographic features which mean that NGN has to effectively maintain four "rural" depots which impact NGN's opex - emergency, repairs, maintenance and work management costs. We quantify the impact of this at £3.73m per year on NGN's opex.

2. A number of unique factors in West Yorkshire in particular, "steel rail" services and Pennine limestone bedrock which impact NGN's mains and services repex unit costs. We quantify the impact of this at £3.67m per year on NGN's repex

We take each of these factors in turn, in each case we believe we are able to meet Ofgem's requirements for well justified regional factors:

- we can provide evidence of the factor occurring in NGN's region and how it impacts NGN's operations
- we can quantify the impact of these factors on NGN's costs.
- we can demonstrate that these factors impact NGN adversely in relation to the other GDNs

It is important to bear in mind that NGN has been a consistent frontier company on opex and repex efficiency despite these regional factors, however, this does not diminish the need for Ofgem to take account of these factors, we expect that Ofgem's treatment will be consistent with GDPCR 1 namely:

- NGN's respective costs should be reduced accordingly for the purposes of benchmarking: and
- NGN should receive a revenue allowance to compensate for these factors

Both of these factors have always impacted NGN's operations, however, given the timings of the discussions on these issues in GDPCR 1 these were not fully articulated at the time.

Summary

Based on the following evidence and discussion we are proposing that the impact of NGN's regional factors are treated as follows.

	Geographic & demographic extremes		**West Yorkshire Repex**
Revenue allowance	£3.73m per year		£3.67m per year
Benchmarking adjustments	Work Man Repairs Emergency Maintenance Opex & Totex	-£0.18m -£1.80m -£1.05m -£0.72m -£3.73m	Mains unit costs -5% Service Unit costs -3%

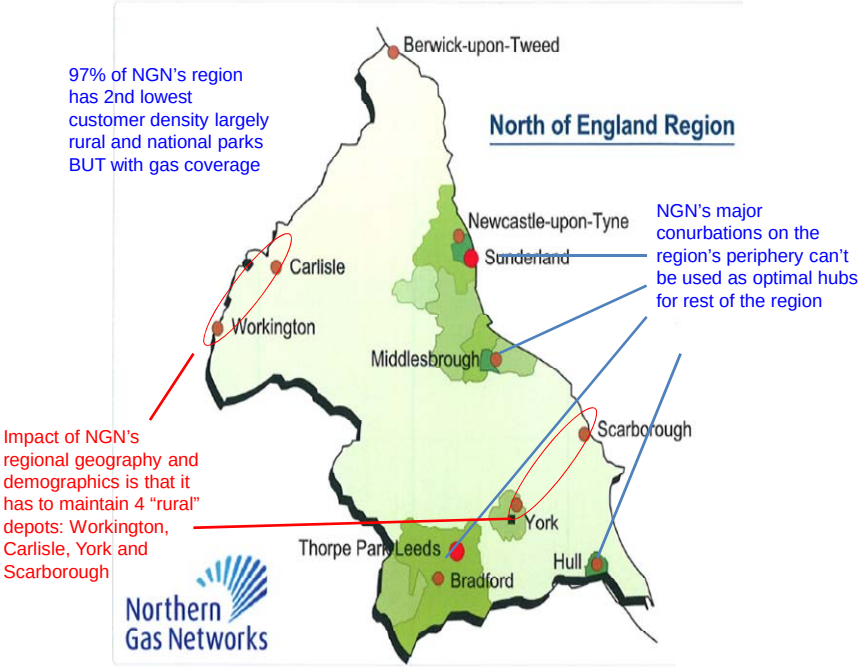
1) Geographic and demographic extremes

Introduction

In GDPCR 1 NGN argued that similar to Scotland and WWU NGN had low population (customer) density in much of its network, despite containing large conurbations, Ofgem determined that NGN was not a significant outlier of population density and therefore no adjustments were made. In this section we show why this conclusion is erroneous and bring in some additional features the main elements of the argument are as follows:

- NGN contains some of the largest conurbations in the UK 4 out of the top 25 the largest being West Yorkshire and Tyneside[1] - the four conurbations account for 50% of the population in NGN's region, in just 3% of the area.
- If these conurbations are excluded the remaining 97% of NGN's area has the lowest population density in the UK after Scotland BUT with network coverage across the region much of this area is rural with 4 national parks and limited road networks.
- NGN's conurbations are all on the periphery of its region in particular on the East Coast this constrains NGN's ability to use the locations as "optimal hubs" to cover the rest of it region.
- Given NGN's network it must maintain operational coverage across the entire region the impact of this regional factor is that **NGN must retain 4 "rural" depots – Carlisle, Workington, York and Scarborough we have quantified the cost of the regional factor at 50% of the cost of these depots £3.73m.**

The diagram below summarises the above points



NGN's conurbations

NGN's region has 4 of the UK's largest 25 conurbations:

[1] Hhttp://www.statistics.gov.uk/downloads/theme_compendia/fom2005/03_FOPM_UrbanAreas.pdfH

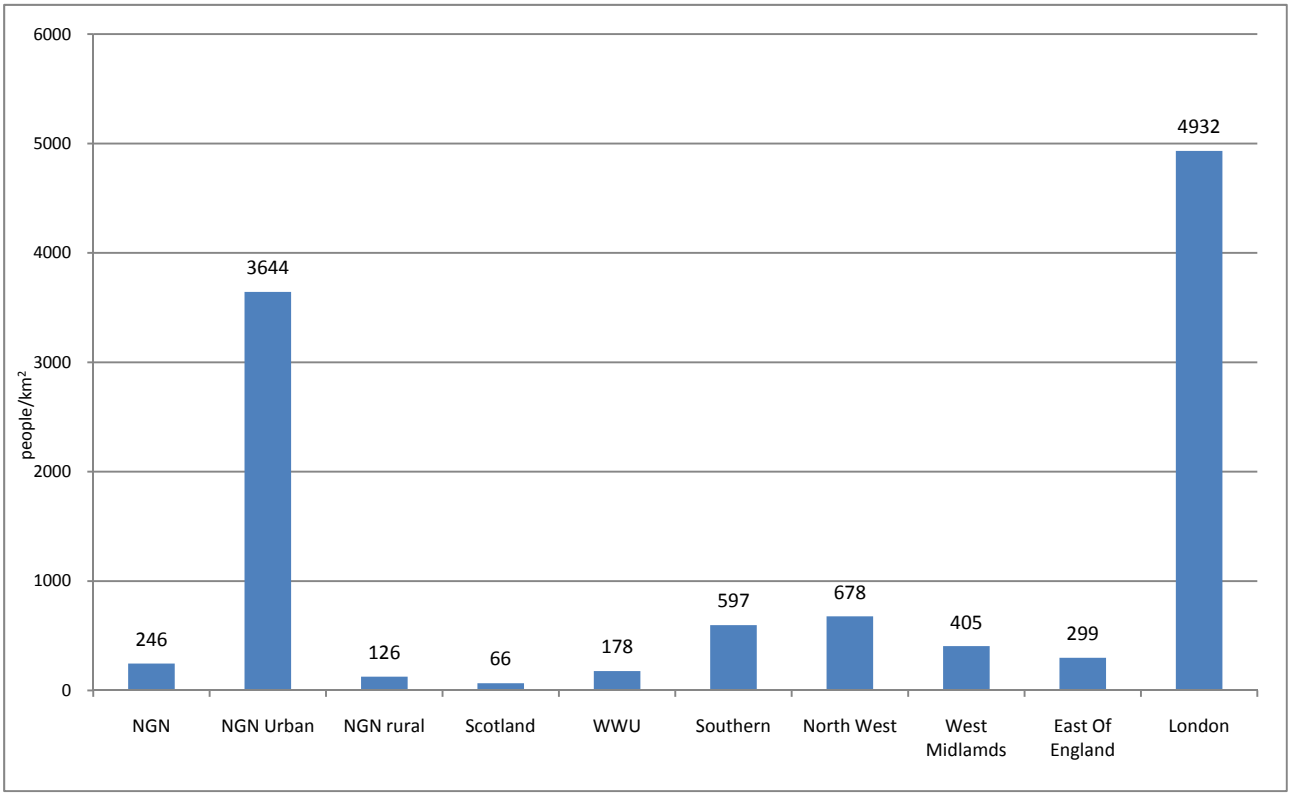
- West Yorkshire (inc Leeds & Bradford) – 4th
- Tyneside (Inc Newcastle & Sunderland) – 6th
- Teesside (inc Middlesbrough) – 18th
- Hull - 24th

Combined the above conurbations contain 50% of the population in NGN's region (approx 3.3 million) with a combined area (913 km^2) that accounts for only 3% of NGN's region. NGN's overall population density is 233 (people/km^2) however the population density of the above 4 conurbations is 3644, if we exclude them NGN's population density drops to 126 which is lower than WWU in essence **97% of NGN's region's has a population density lower than WWU.** Crucially as we show later NGN has gas network coverage across this area and has to maintain operational coverage over an area with comparable or lower population density than WWU. Scotland has a lower population density but Scotland's gas network penetration is proportionally much lower than NGN or any other GDN. .

In comparison WWU has three of the UK's 25 largest conurbations Bristol (10th), Cardiff (21st) and Swansea (25th). WWU's population density is 178 if we exclude these three conurbations and its population density drops to 153 which is still higher than the comparable figure of 126 for NGN.

Contrary to Ofgem's conclusion in GDPCR 1 NGN is actually an outlier at both ends of the spectrum on population density. This is not observed by looking at an overall people/km^2 as Ofgem used in GDPCR 1. No other GDN has such polar urban-rural extremes within its region

The chart below puts NGN's population density into context with the other GDNs reflecting the above discussion.



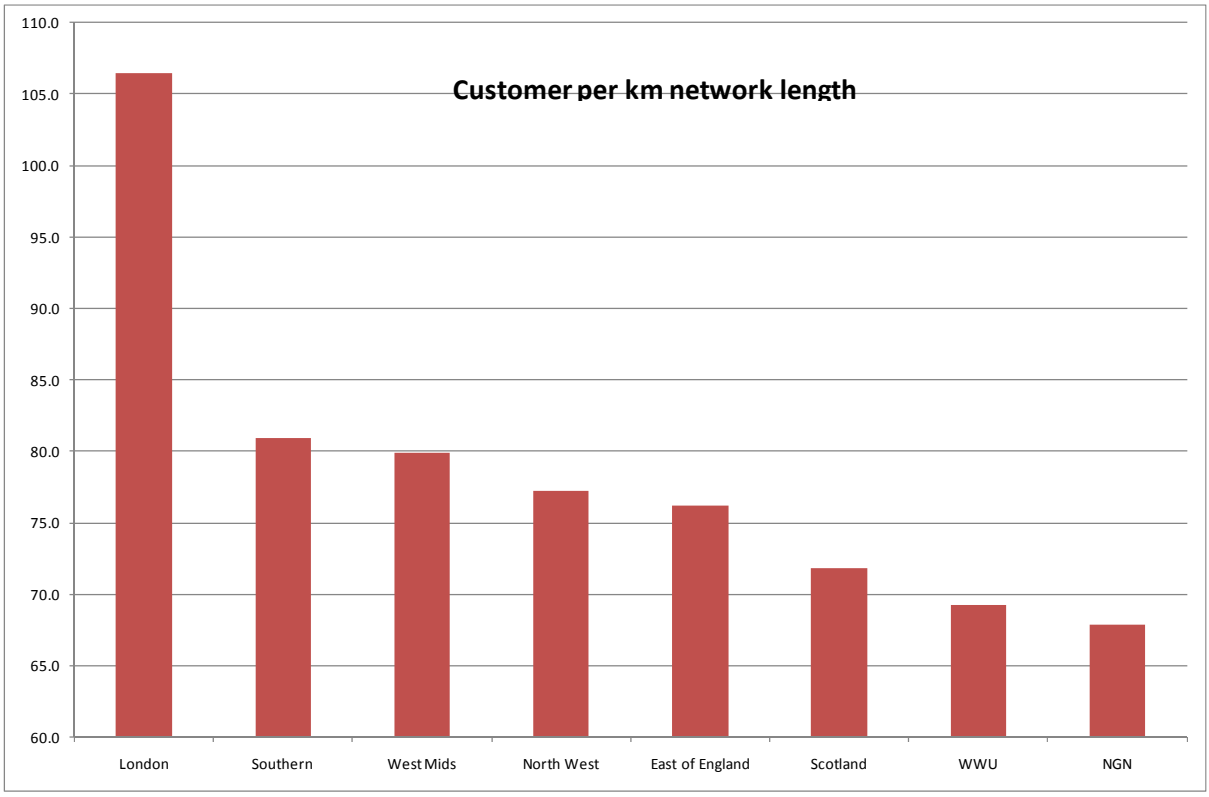
NGN's rural areas

Outside the large conurbations the remainder of region (97%) is in stark contrast extremely rural and sparsely populated including 4 National Parks, the Lake District, Yorkshire Dales, North Yorkshire

Moors and Northumberland. Collectively these parks account for 19% of NGN's area (5397km^2) the highest by far in England, comparable to WWU and only lower than Scotland. In addition to the parks NGN's region is also characterised by the following:

- The Pennines run through both LDZs in particular in the North LDZ it separates North Cumbria from County Durham.
- The Wolds are a significant rural area which effectively separates Hull and Humberside from Yorkshire.
- North Cumbria and Northumbria are vast rural areas at the edges of NGN's region well away from all the major conurbations.

The important thing to note is that NGN's gas network connects towns and villages across the region shown in the network maps in Appendix 1. Another useful statistic is to look at customers/network length as shown in the chart below



NGN has the lowest customers per km taken together with NGN's low population density this tells us that NGN's gas network has greater coverage across its region. This is in contrast to WWU and Scotland which have higher customers/km which indicates both GDNs have less network coverage than NGN. Arguably NGN is the GDN that is most impacted by sparsity in the UK.

The impact on NGN's operations

The diagram below compares NGN's operational property locations in 2000 and then in 2010, two features are observable:

- NGN has achieved a significant rationalisation of its depots over the ten years, primarily focussed around the two largest conurbations West Yorkshire and Tyneside.
- Despite this rationalisation NGN has had to maintain four "rural" depots – Carlisle, Workington, Scarborough and York (these are circled in red).

Property Locations in 2000

Property Locations in 2010

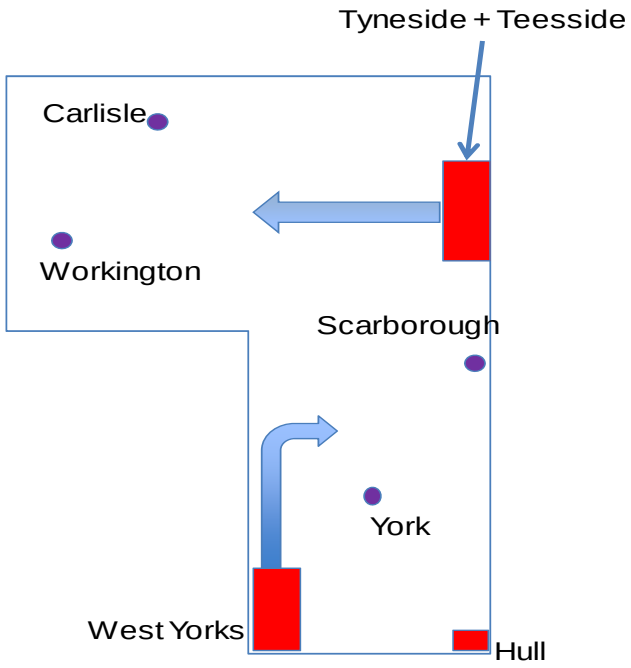
NGN's present depots each cover an operational patch, collectively these patches cover the entirety of NGN's region. It is interesting to look at two particular metrics for all of NGN's depots as shown in the table below

Depots	km/km^2	Km^2/FCO
Workington	0.66	171.22
Carlisle	0.32	445.43
Burradon	1.49	95.11
Hendon	4.11	51.43
Cannon Park	1.95	78.03
York	0.93	175.88
Scarborough	0.39	355.29
Hull	1.50	87.88
Heckmondwick	3.03	49.98
Pottery Fields	2.71	55.94

The km/km^2 metric shows the amount of NGN's network in each patch shows NGN's network penetration across its entire region including the four "rural" depots (shaded in green) naturally the amount of network in these areas is lower than the patches that cover the conurbations. The km^2/FCO metric illustrates the area from each depot each first call operative is covering, it is clear that the rural depots are covering significantly larger areas than the urban patches suggesting that there is little or no scope to rationalise or consolidate the rural depots. In addition to emergency staff there are repairs, maintenance and work management staff at these depots which produce similar area covered statistics.

Characterising NGN's network region

NGN's network region can be conceived as an "upside down L" as illustrated below



As previously discussed NGN's region consists of densely populated conurbations and outside them 97% of the region is rural and the UK's second most sparsely populated region. What is important is that the major conurbations are all on the periphery of NGN's region in particular on the East Coast, which restricts the ability of NGN to use these conurbations as "optimal hubs" to cover the wider NGN region. A key feature of an optimal hub is that it can radiate in 360° i.e. it can be accessed or exited from all angles, clearly this is restricted in a coastal town or city. The restricted hub capability of periphery and coastal conurbations is well understood in operational management and town planning. For example research studies have looked at the impact on utilities and other services in coastal cities surrounded by rural regions such as Dublin, Perth, Cape Town etc. The above diagram illustrates that if West Yorkshire and Tyneside were located more centrally within NGN's region the need for the four rural depots would be significantly (if not entirely) diminished.

Quantifying the impact

The above discussion has shown that the impact of NGN's geographic and demographic polarities is the retention of four rural depots, each depot has emergency, repairs and maintenance staff who are all required to be located at the depots to cover the operational patches. In practice many of the staff will simply use the depot as a base and will be working remotely throughout the patch for days at a time. In addition to the work execution staff above a minimal level of support in terms of operational management are also required to be located at the depots this consists of one or two members of staff at each depot. The table below provides a breakdown of the associated costs consistent with the 2009/10 RRP submission.

	WM	Repairs	Emergency	Maint	**Total**
Carlisle	0.12	1.05	0.46	1.26	**2.89**
York	0.08	0.92	0.53	0.00	**1.53**
Scarborough	0.12	0.79	0.46	0.18	**1.55**
Workington	0.04	0.85	0.60	0.00	**1.49**
Total	**0.37**	**3.61**	**2.05**	**1.44**	**7.46**

The costs above are demonstrably efficient in particular:

- they are part of NGN's opex and totex costs, Ofgem's RIIO-GD1 analysis has shown NGN to be a consistent frontier performer on both these costs areas.
- as shown in the discussion above the four depots are already at optimal deployment, given the vast areas they cover there is little scope to rationalise or consolidate them further without adversely impacting NGN's operations.

The total cost associated with the four rural depots is £7.46m, we believe that an extremely conservative assumption is that 50% of these costs (staff) could be mitigated if NGN's network region was subject to less onerous geography and demography in particular if West Yorkshire and Tyneside were more centrally located within NGN's region. On this basis we propose that this regional factor amounts to a **£3.73m** impact on NGN's operations and consistent with Ofgem's GDPCR 1 treatment NGN should receive a revenue allowance for this amount. Consistent with this the following reductions must also be applied the total reduction to total opex and totex.

Work Management	-£0.18m
Emergency	-£1.02m
Repair	-£1.80m
Maintenance	-£0.72m
Total (total opex, totex)	**-£3.73m**

Comparisons to the GDNs

We have demonstrated that the issues of sparsity and urban concentration have a material impact on NGN's operations though the retention of the four regional depots. One key criterion is to demonstrate that NGN is impacted over and above other networks. We have already shown that in terms of sparsity and taking account of network coverage across a region NGN is impacted the most by sparsity within the UK. In terms of how NGN compares to the other GDNs:

- **WWU and Scotland** we have shown that NGN is comparably sparsely populated BUT NGN has greater network coverage so in terms of actual operations NGN is much more adversely impacted by sparsity issues than these two GDNs. In addition, these two GDNs do not have to contend with such significant conurbations located at the periphery of their regions.
- **North West, West Midlands and North London –** these are much smaller in area higher population density and little rural area. In addition, the urban areas and populations are spread much more evenly across these regions.
- **Southern –** this is a larger region but with a consistent urban and population distribution across the region. Southern has a higher population density than NGN and comparatively less rural areas and National Parks.
- **East of England –** the East Midlands LDZ is essentially similar to the other NGG GDNs as discussed above. East Anglia whilst being more rural still has a higher population density 282 people/km^2, than NGN. East Anglia also has a better road network and perhaps most importantly the major towns and cities e.g. Cambridge, Norwich, Ipswich and Peterborough are better positioned to be used as optimal hubs to cover the region.

2) West Yorkshire Repex

Mains and service replacement in West Yorkshire is impacted by specific factors that are unique within the UK to West Yorkshire. Given that around 28% of NGN's iron mains population is in West Yorkshire any cost premium on repex in this region will impose an overall cost to NGN in total.

Factors impacting mains and service replacement in West Yorkshire

- **Pennine bedrock –** most of the West Yorkshire repex zones sit on top of the Pennines which has a large proportion of bedrock compared to other regions of the UK. This bedrock is naturally much more difficult to excavate and penetrate for repex jobs than the rest of the UK which have much more soil. As a result the bedrock add much more time and complexity to repex jobs in the West Yorkshire
- **"Mill town streets" –** West Yorkshire has many former mill towns, a common feature of such areas was the terraced housing which have narrow pavements and, as a result, iron mains in such areas are located beneath the road rather than the pavement. Clearly excavation of a road given the surface and traffic is more complex and costly than pavements. These costs do not include TMA or NRSWA costs which are recorded separately
- **"Steel rails"** – this was a network design that was peculiar to many former gas districts in West Yorkshire laid in the early 20th century. Typically a steel mains would be run in front of a row of terraced housing and then run round the back of the properties and the services were then connected to the properties through the back gardens. Given that the "rails" at the back of the properties are in such close proximity it is much more prudent to completely abandon them and lay new services through the front of the properties. As evidence of this 40% (400km) of NGN steel mains population predominantly below 2", is in West Yorkshire and typically up to three time more steel is abandoned in West Yorkshire compared to the rest of NGN each year.

As far as we are aware the combination of these factors is unique to West Yorkshire and to the best of our knowledge the "steel rail" design is not seen elsewhere in the UK. The North West has similar "mill towns" but not the Pennine bedrock or steel rails, whilst the Pennines run into East of England this is predominantly the Peak District which is sparsely populated

The impact on repex unit costs

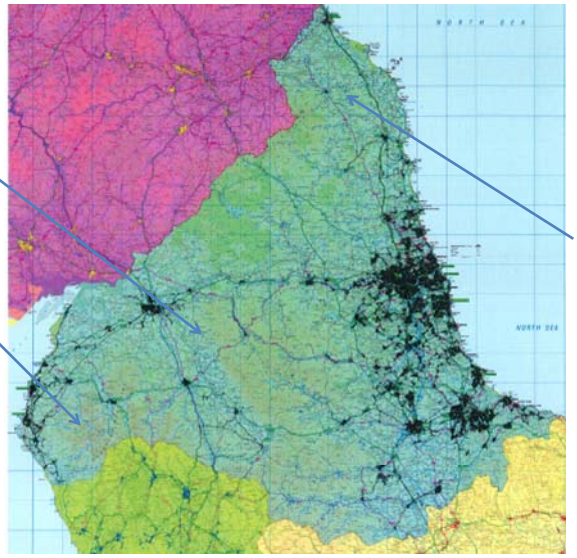
The culmination of all the above issues have caused mains and service replacement costs for jobs in West Yorkshire to be much higher than in the rest of NGN's region, this is reflected in the unit costs that are submitted by our contractors. The map in Appendix 2 shows NGN's repex zones, zones 5 and 6 cover West Yorkshire. Over the years we have observed premium in mains unit costs and 4% in service unit costs in zone 5 and 6 compared to other the zones.

Based on the mains unit costs NGN received back from its contractors for 2009/10 under its framework arrangements zones 5 and 6 have a premium of 28% compared to zones 1 and 2 and 9% compared to zones 3 and 4, weighted on the relative workloads zones 5 and 6 have a premium 8.8% to the other zones combined. If we then weight this differential by the proportion of irons mains in the zones we end up with an overall premium on mains replacement costs of 5.0%. Using an average of the last three years RRP data on mains replacement costs this translates into £2.74m. An equivalent calculation using the service unit costs shows that there is an additional £0.93m on service costs.

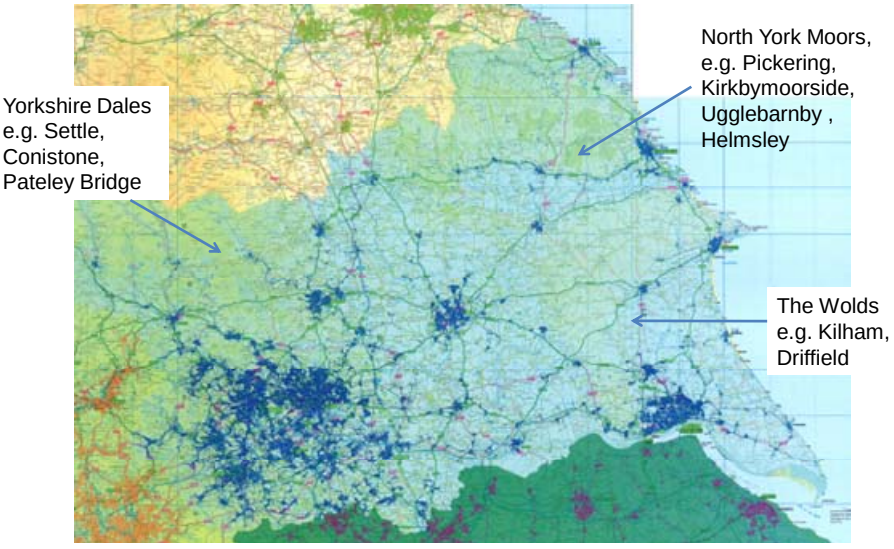
Given the rationale and evidence set out above we propose that NGN receive an allowance of £1.58m for the impact of West Yorkshire repex factors and for the purposes of benchmarking Ofgem reduces all NGN's repex unit costs by 5% and service unit costs by 3%

Appendix 1 NGN's network coverage

NO LDZ



NE LDZ



Appendix 2 NGN's repex zones