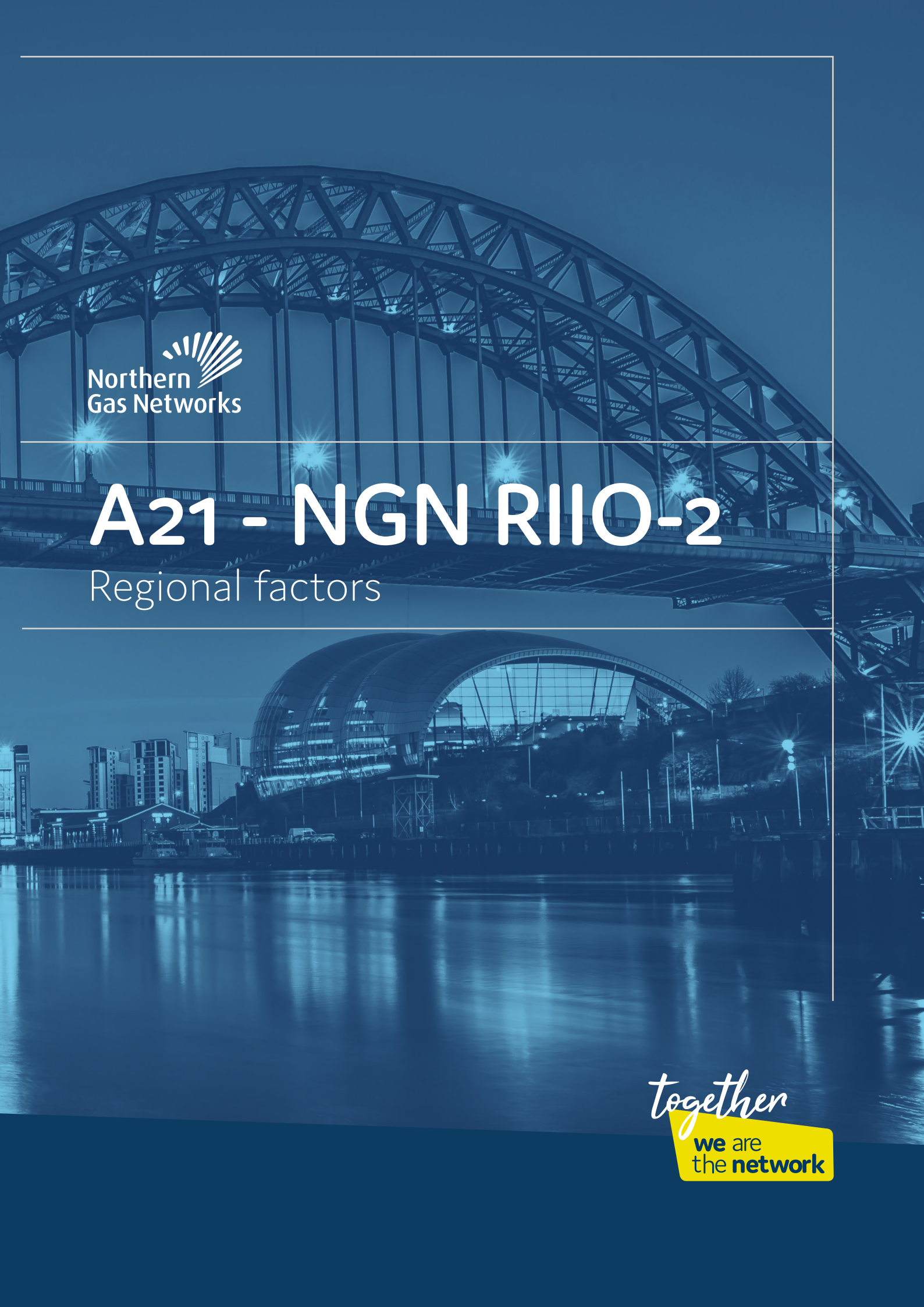


Northern Gas Networks

A21 - NGN RIIO-2

Regional factors

together we are the network

RIIO-GD2 – Regional differences

Executive Summary

Making benchmarking adjustments relating to specific regional factors has been used throughout regulated price controls. These typically consider factors such as regional wages variations and costs associated with the relative density, or sparsity or operating in specific areas. Below we set out NGNs view of the particular issues associated with operating within an area which has both above average rural areas directly serviced by our network and having large conurbations on the geographic edges of the network.

In the "RIIO-2 tools for cost assessment" conclusions Ofgem requested that GDNs should set out their case, including measures and data to support the inclusion of regional specific factors being used to make adjustments claims. In order to ensure that all networks are compared "like with like" a number of specific data sets and calculations should be considered. Measures associated with population or premises alone may not be the most relevant when considering these issues for GDNs as not all properties are serviced by gas, unlike water and electricity where this measure will be more meaningful. To consider specific density of GDNs the available gas industry data can be combined with local authority data to ensure a more robust analysis is carried out. Furthermore, company specific data relating to assets and operational activities is either already available through the annual Regulatory Reporting Pack or is likely to be available on request from Ofgem.

Simple measures such as customers per km of pipeline, and journey times and distances within rural areas, using a combination of census data and company specific data will support NGNs view that we have the most sparsely serviced network. Using a combination of census data and industry data, that can be obtained from Xoserve, provides more accurate information about the proportion of each network that is served by the GDN pipeline. For NGN this shows that although not all towns and villages in extremely rural areas are connected to our network we do providing coverage in all local authority areas and in all of our National Parks. Below we set out a number of measures and data sources to support our analysis.

Geographic and demographic extremes

The NGN footprint has a broad range of geographic and demographic extremes with 5 of the largest conurbations in the UK operating alongside areas of extreme sparsity in and around 4 of the 15 National Parks and 5 Areas of Outstanding Natural Beauty. The urban areas are located mainly on the eastern and southern edges of the network with large areas of National Park or sparsely populated countryside between these areas. This creates a need to maintain a workforce in some of the most rural and remote areas of the network to ensure that the safe and efficient operation of the network continues to serve customer across the whole network.

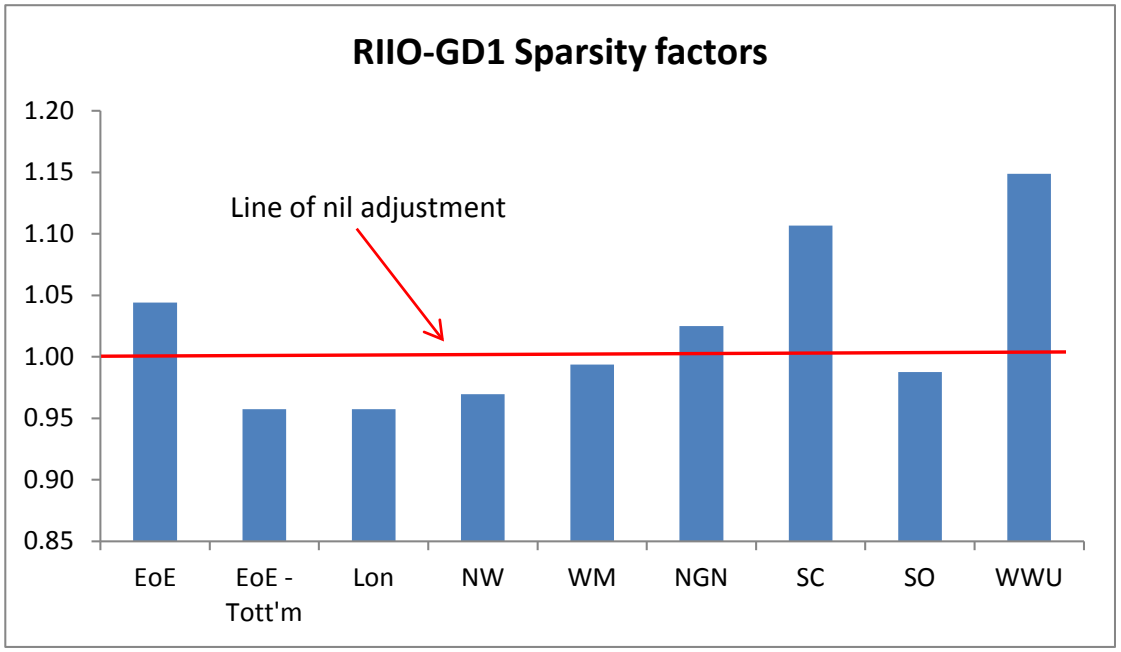
COST IMPACTS

In 2012 NGN was awarded a positive relative cost adjustment for specific regional factors for RIIO-1, mainly related to the sparsity of the network. However it was the lowest positive adjustment, as shown in the diagram below. The assessment by Ofgem considered only the national census data and did not take account of industry data showing that NGN has a relatively larger proportion of premises connected to the network in rural areas than if you just consider population data. The justification and relative data continue to impact NGN operationally.

All operational activities are impacted by the regional factors, in particular sparsity as we are required to carry out maintenance, replacement, connections and our 24/7 emergency service across the network. While it is possible to manage planned activities to take account of the relative sparsity of the area there are additional challenges in removal of spoil and transport which affects both the extreme rurality and deep within the large conurbations.

Costs associated with additional depots and the increased mileage and time required in rural areas was

taken into consideration in the RIIO-GD1 settlement as shown below:



By limiting the additional costs to those relating to emergency and repairs, and by not taking account the industry data NGN believe that this resulted in a lower regional factor being applied to our network than if more extensive analysis had been carried out.

REGIONAL FACTORS

Introduction

It is well acknowledged that regional differences can make a significant difference to costs and the ability of GDNs to operate efficiently. These differences can be driven by operational requirements based on the geography, the behaviors of local authorities impacting on roadworks, or local employment issues such as pay rates or availability of suitably trained staff. NGN has a mixture of extreme urbanity in 4 major conurbations as well as operating in 4 of the 15 National Parks and areas of extreme sparsity.

In this paper we set out how we believe the issues of our unique regional factors impact on the network and provide justification for consideration of adjustments that could be made to account for these differences. In RIIO-GD1 a simplistic assessment utilising district level area and population data was used to assess the differences between the GDNs, which we believe shows an artificial outcome that does not demonstrate the nuances of each network. We propose an assessment criteria which combines local authority and census data along with gas industry data from Xoserve relating to actual Supply Points which we believe will provide a more appropriate assessment of how these regional issues impact on NGN.

Data Availability

Using relevant and up to date data to assess the relative regional density is important to ensure a fair comparison is carried out between networks. NGN has undertaken an initial analysis using the following data sources:

- Census data/local authority to set out clear local boundaries and provide consistent analysis of the level of urbanity/sparsity of the general population;
- Xoserve MPRN data to assess how many customers NGN services on the extremes of the

network where additional challenges are applicable;

- NGN pipelines data to assess customers per km; and
- NGN "Green Road" data to consider how journeys in extreme areas are different from an average journey.

For RIIO-GD1, Ofgem used district and population level data to calculate the relative sparsity of each network area. We believe that by using accurate gas industry data to identify the relative sparsity will provide the most accurate outcome. This combined with network specific data such as pipeline data and travel data will also show the challenges experienced on the extremes of the network.

Network specific data shows that NGNs areas of greater sparsity have relatively high proportions of meter points per head of population, increasing the challenge of maintaining services to rural areas which also then takes up a greater proportion of our operating costs.

Network Configuration

NGN's network covers 26,300 sq km, with 37,473km of pipeline serving 2.7million premises across the north of England.

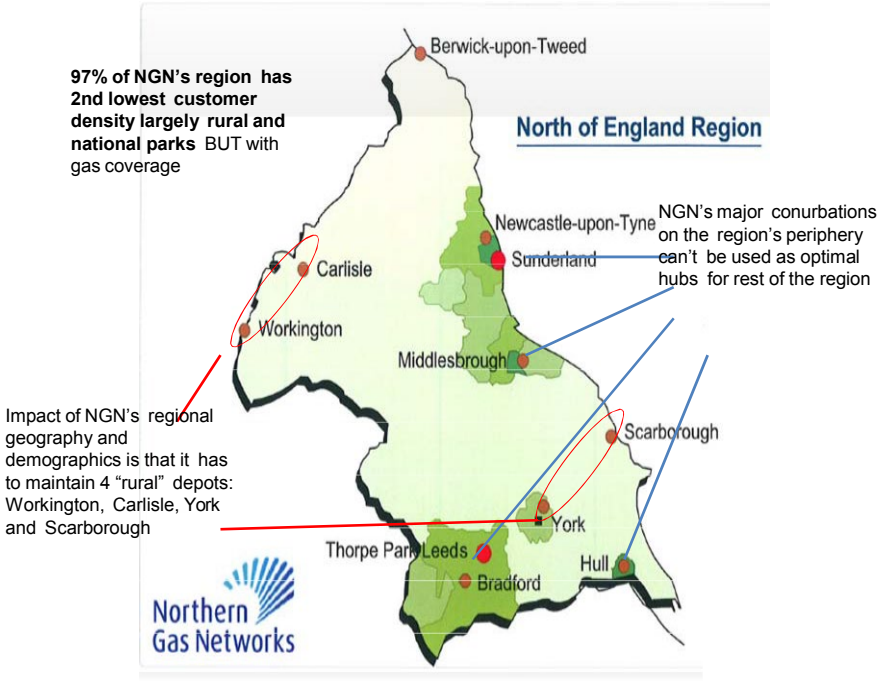
Our geography and demographic features mean that we operate at both ends of the population density spectrum. We serve around 8,000 customers in the 4 national parks located within in our network (Lake District, Yorkshire Dales, North York Moors and Northumberland). Over 20% of the total network is made up of National Park with 0.3% of our customers residing in these areas. Ensuring that we can maintain our 1 hour emergency service in these areas creates challenges in locating multi-skilled staff most efficiently as travel time from depots may become excessive. In addition to the rural spread there are four large conurbations on the East Coast and the southern edge of our network. These provide different challenges to that in rural areas.

The main features of this broad geography and demographic spread are as follows:

- The total NGN area covers 24 local authorities areas, all of which are served by our pipelines, providing a high level of coverage across the region;
- NGN operates in 4 National Parks often with limited road networks;
- NGN has 5 out of the top 25 largest conurbations, making up 54% of NGNs region by population and 56% by Supply Point; and
- 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.

The diagram below summarises the above points



Rural/Urban	Rural/Urban class	Customers	% of all customers	Asset Length (km)	Asset Length (%)	Customers per KM
Rural	Rural Town	322,989	13.16%	5,213.7	14.37%	62.0
	Rural Village	79,670	3.25%	2,778.0	7.66%	28.7
Rural Total		**402,659**	**16.41%**	**7,991.6**	**22.03%**	**50.4**
Urban	Urban City and Town	932,128	37.99%	12,943.9	35.68%	72.0
	Urban Conurbation	1,118,929	45.60%	15,340.9	42.29%	72.9
Urban Total		**2,051,057**	**83.59%**	**28,284.8**	**77.97%**	**72.5**
Grand Total		**2,453,716**	**100.00%**	**36,276.4**	**100.00%**	**67.6**

Table 1: Connected properties

NGN's conurbations

NGN's region has 5 of the UK's largest 25 built up areas:[1]

- West Yorkshire (incl Leeds and Bradford) 4th
- Tyneside (incl Newcastle-upon-Tyne and Gateshead) 8th
- Teeside (Middlesbrough and Stockton-on-Tees) 18th
- Sunderland 21st
- Hull 24th

These areas consist of large towns and cities that run contiguously into each other especially along the East Coast and in West Yorkshire. Throughout this area, which is largely on the extreme edges of NGNs region, a population of more than 3.6m people are connected to 18,464km of pipeline.

Combined the above large conurbations results in over 50% of the population in NGN's region (approx 3.7 million) with a combined area (977 km2) that accounts for only 4% of NGN's overall region. Crucially

[1] http://www.nomisweb.co.uk/articles/747.aspx

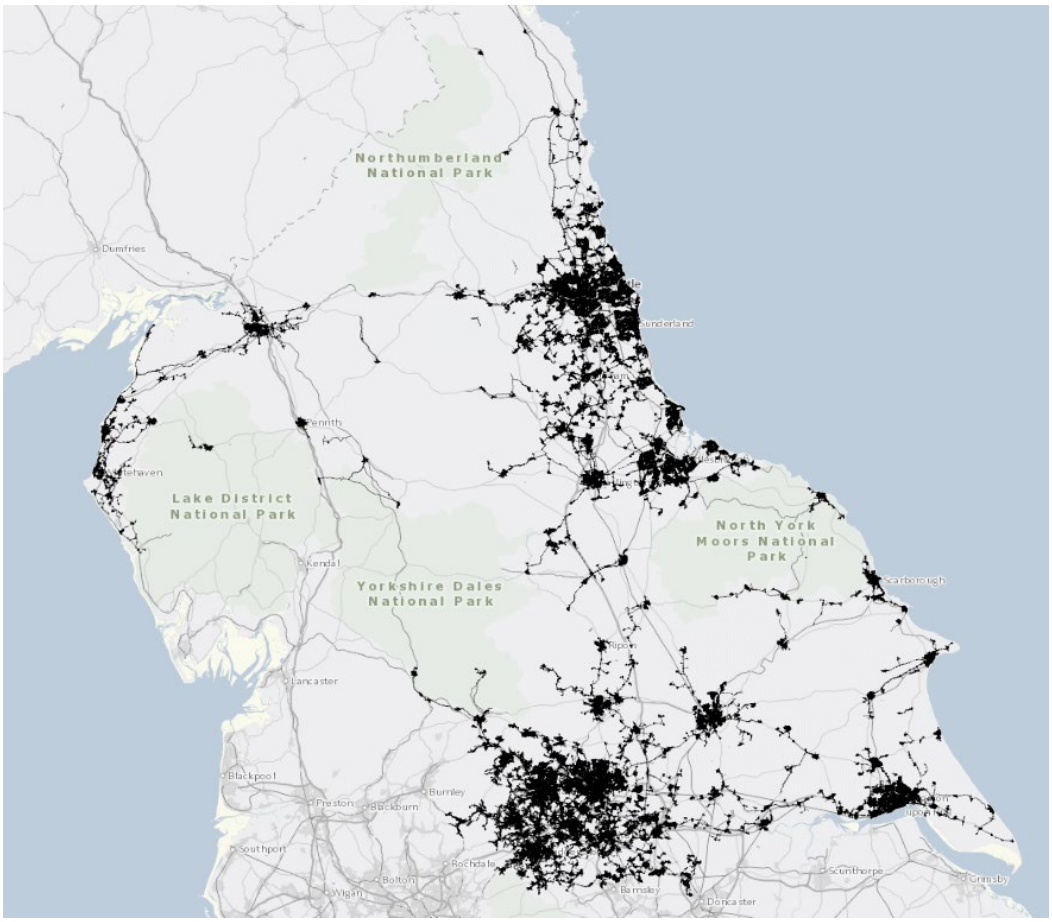
as we show later NGN has gas network coverage across the other 96% of our network are, meaning we must maintain operational coverage across extensive rural areas unlike WWU and SGN who have large areas of their geographic networks without coverage.

In comparison WWU has three of the UK's 25 largest conurbations Bristol (11th), Cardiff (16th) and Swansea (25th) and Scotland two, Glasgow (5th) and Edinburgh (13th) both of which are relatively close within the overall network area.

NGN's rural areas

Outside of these large conurbations we operate in a widely spread sparsely populated geography, especially within the 4 National Parks (the Lake District, Yorkshire Dales, North Yorkshire Moors and Northumberland) and 5 Areas of Outstanding Natural Beauty. Here extreme sparsity of population is reflected in a lower number of customers per km of pipeline (Table 1). Collectively these parks account for 20% of NGN's area (5,579km2) the highest by far in England, comparable to WWU and only lower than Scotland. The key challenges in these rural areas include:

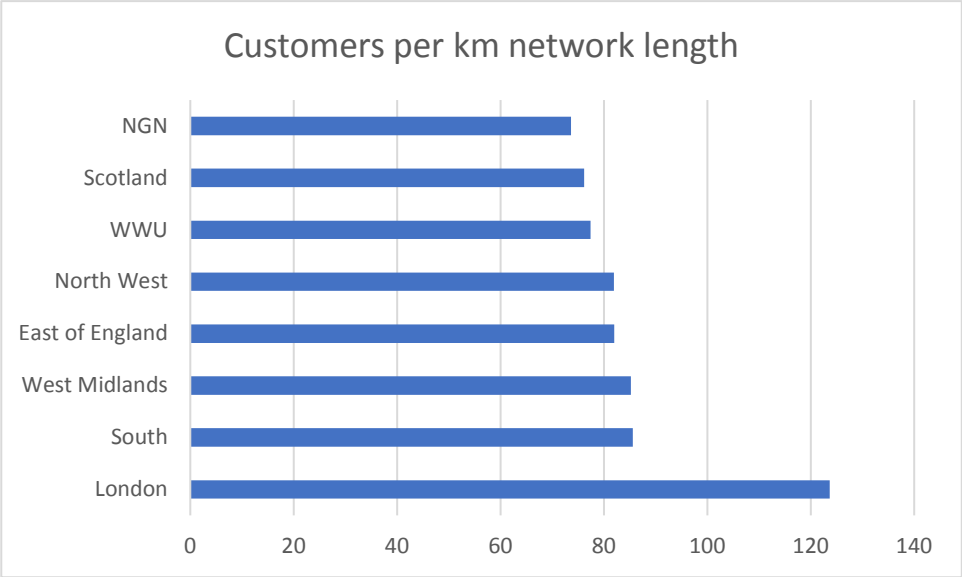
- Lack of main road infrastructure that may be blocked by summer holiday traffic, or becoming inaccessible during extreme winter weather;
- Distance from our regional depots and between Supply Points; and
- Difficulty in creating a cross skilled workforce due to different mix of workload requirements from urban areas.



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; and
- North Cumbria and Northumbria are vast rural areas at the edges of NGN's region well away from all the major conurbations but continue to be connected to our network.

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 at 73.6, 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 SGN' Scotland network (76.2) and WWU (77.4) which have higher customers per 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 which was not reflected in the relative RIIO-GD1 award for regional impacts.

The impact on NGN's operations

NGN has rationalised its operational locations since 2005, reducing the number of depots while seeking to ensure that there is a reasonable access to depots for all operational staff. The diagram below shows the main depot locations:

- NGN depots have clustered around the two largest conurbations, West Yorkshire and Tyneside, in order to serve the largest proportion of customers.
- Despite this NGN has had to maintain four "rural" depots – Carlisle, Workington, Scarborough and York (these are circled in red) at an annual cost of approximately £725k.

Property Locations

NGN's depots each cover an operational patch, and collectively these patches cover the entirety of NGN's region. In the most rural locations there is a necessity to have multiple depots or maintain remote operational staff to be able to maintain the 1 hour standard for emergency attendance. Recruiting and retaining staff in the most rural areas creates issues of its own including training, partnering of staff into teams, and access to depots for stock and briefings. In some cases the most remote area served by our pipeline within an area can be as far as 60 miles from a depot, taking over an hour to travel between them.

In 2010, we considered two particular metrics that show the extreme impact operationally from the requirement to maintain our rural depots. Although we continue to consider the best operational locations, and have undertaken work at many depots to ensure they remain fit for purpose, the locations are unable to be changed materially and therefore the extremes shown below continue to impact our operations.

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
Elland	3.03	49.98
Felnex	2.71	55.94

This shows that although we have meter points connected in these rural regions, the area covered per operative naturally increases significantly. The depots shown in green largely travel through rural areas increasing both travel time and distance.

The km/km2 metric shows the amount of NGN's network in each patch showing NGN's network penetration across its entire region including the four "rural" depots. Naturally the amount of network in these areas is lower than the patches that cover the conurbations. The km2/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.

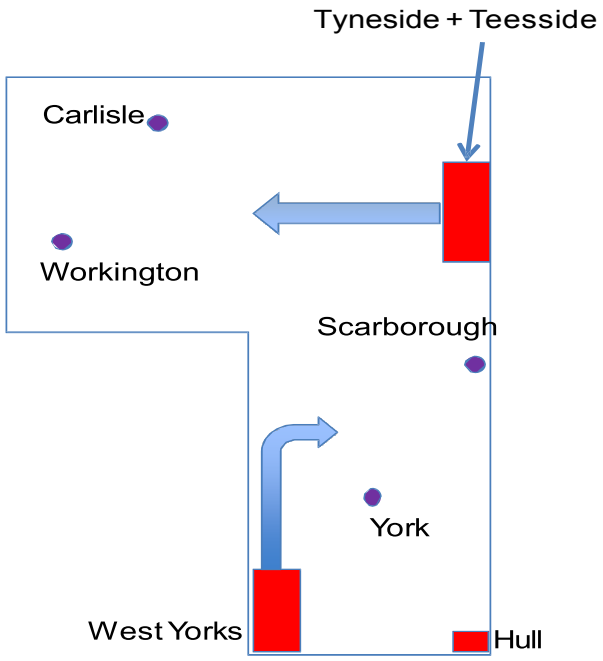
Journey Type	Number of Journeys (2018/19)	% of Total Journeys (2018/19)	Average Journey Time (min)	Average Distance (miles)	Average Miles per minute
Rural to Rural	38,774	6%	22	9	0.43
Rural to Urban	58,701	10%	33	15	0.44
Urban to Rural	58,866	10%	34	15	0.44
Urban to Urban	453,487	74%	24	8	0.34
Grand Total	**609,828**	**100%**	**26**	**10**	**0.37**

It should be noted that although around 16% of the premises connected to our network are within rural areas (table 1), 26% of our journeys start or end in a rural area and journeys needing to move between rural and urban areas take considerably longer at over 30 minutes for our engineers to get to their next job. This is despite having four depots in more remote areas to ensure that we continue to be able to meet our 1 and 2 hour emergency standards.

The need to retain rural depots, especially in Cumbria and the edges of the North Yorkshire Moors National Park necessarily means that NGN incurs additional costs of serving the 400k rural customers within our network.

Characterising NGN's network region

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



As previously discussed supply points in NGN's region are clustered around the densely populated conurbations. Outside of the conurbations the region is mainly rural and one of the UK's most sparsely populated regions. 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. The locations of our more densely populated areas mean that a 360 ° radius cannot be used for many depots. The National Parks and other geographic features further restrict the ability to travel between areas. 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.

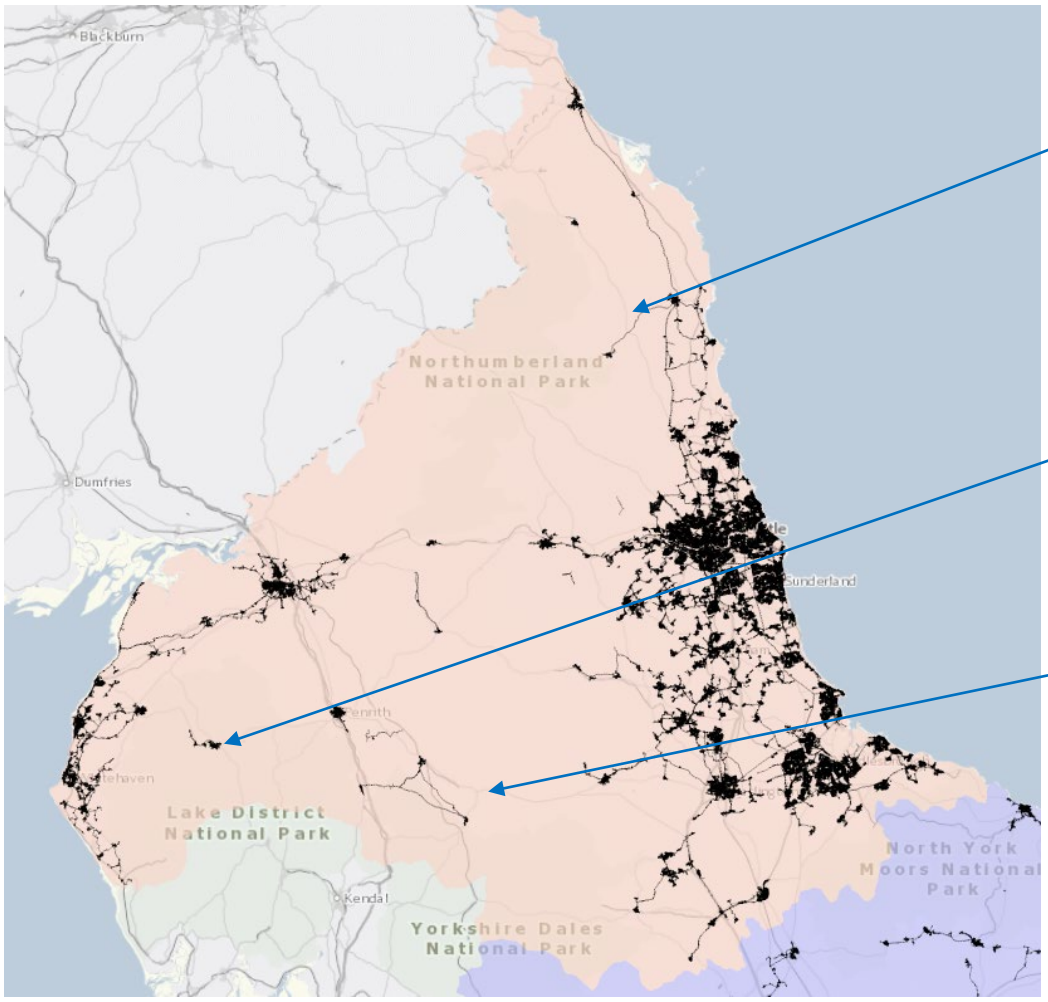
Comparisons to the GDNs

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** 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 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.

Appendix 1 NGN's network coverage

NO LDZ

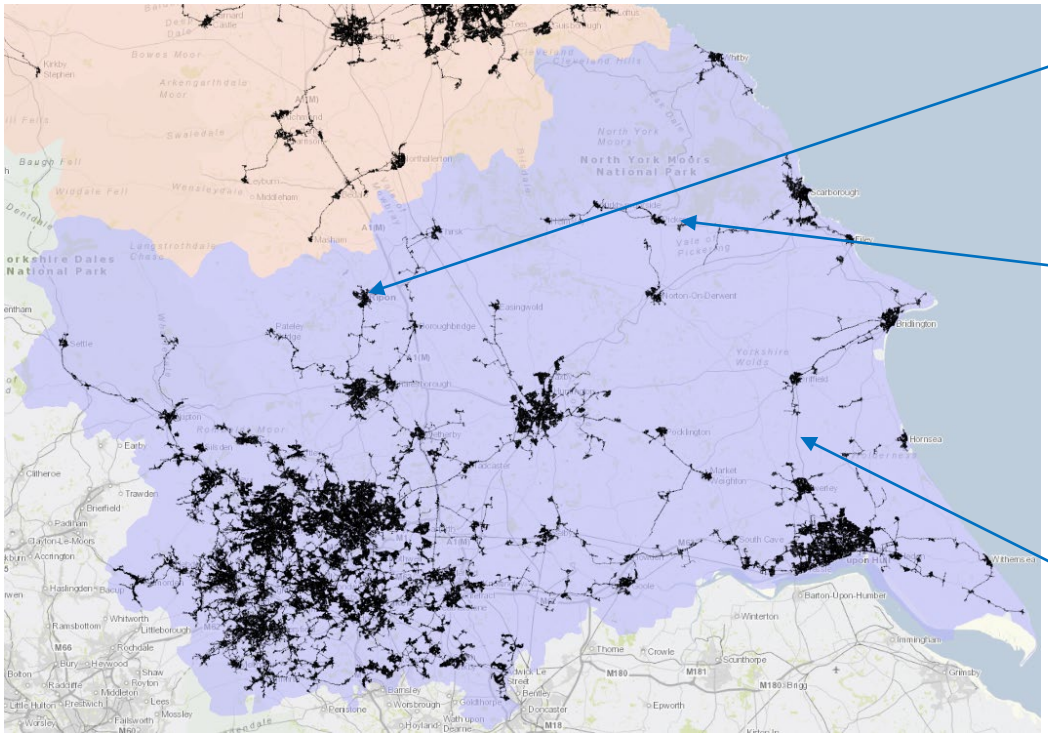


Northumberland: Newcastle to Berwick including towns in between (Alnwick, Seahouses, Rothbury, Wooler etc)

Lake District: Keswick, Penrith

North Pennines AONB: Haltwistle, Alson, Barnard Catle

NE LDZ



North York Moors National Park: Pickering, Helmsley, Kirbymoorside, etc)

Yorkshire Dales National Park: Settle, Conistone, Pateley Bridge, etc)

The Yorkshire Wolds Hedon, Driffield, Pocklington, etc)