



RIIO-GD2

Strategic Commentary

2021-2022

we are
the **network**

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1 Chief Executive's Update

This report sets out the details of our performance in 2021/22 and represents the first year of the new five-year RIIO-2 Regulatory Period. The RIIO-2 Regulatory Contract introduced a new set of operating, customer and financial targets that stretched the levels of performance required to new levels. Responding to these new challenges has required us to continue to adapt and innovate at an ever-increasing rate, to meet the expectations of our customers and stakeholders. We continue to strive to lead the industry in terms of cost and service levels. Our performance in 2021/22 continues to push the frontiers of performance in the sector, delivering significant long-term value not only for our own customers, but for all gas customers in the UK.

The external environment continues to provide additional significant challenges for us all. The impact of Covid-19 continued to be felt in 2021/22 even as we emerged from the restrictions imposed by the pandemic. It is clear to us that the actions and decisions we took during that time and the fundamental changes we made to our business in RIIO-1 meant we were well placed to return to 'business as usual' safely and efficiently.

I am very pleased that we have been able to recover performance in the limited number of areas where we were unable to fully deliver on our commitments in RIIO-1. All elements of our outstanding capital investment programme were delivered in the first year of RIIO-2. We also delivered an additional 8km of our Iron Mains Replacement Programme, whilst achieving an improvement in our Customer Service scores, and maintaining our levels of operational efficiency, safety and reliability. Inevitably we have had to reprioritise and reschedule some of our commitments for the RIIO-2 period to accommodate the additional workload in the first year. However, we have worked extremely hard to ensure that all our commitments will be delivered over the five-year period.

This year also saw the significant impacts of the energy price increases in international energy markets on the stability and viability of the energy supply market in the UK. We saw the failure of a large number of energy suppliers and significant price rises start to feed through into customer bills. Both further increasing the prevalence of fuel poverty across our region and severely impacting those who are most vulnerable. It was again heartening to see the significant collaboration at a national level between NGN, the other energy network companies in the UK and the energy regulator Ofgem to explore all available options to minimise the impact of this crisis on energy customers. Supported by

our shareholders we further increased the levels of funding available to help those who are vulnerable and continue to work closely with our well-established partners we have across our region to ensure that support is targeted to those in most need.

Whilst addressing these high priority and immediate issues I am delighted that we, along with the other energy networks, Ofgem and BEIS have been able to make significant progress in developing the options to deliver our shared goal of achieving Net-Zero carbon emissions by 2050. This included the successful delivery of the HyDeploy 2 Project to demonstrate the feasibility of blending up to 20% Hydrogen, completing the final details of the H21 programme to understand the safety case for Hydrogen, and development of the feasibility study for the potential Hydrogen Village Trial in Redcar. Experience is now showing us that a safe, reliable and affordable pathway to 2050 is critical to the UK's long-term economic prosperity.

The challenges facing us all remain significant. In addition to those seen in 2021/22, additional issues such as the cost of living crisis and UK energy security imperative are adding to the challenges that must be addressed. However, we will meet these challenges head-on and NGN will continue to strive to lead the way in identifying how we balance customer bills, ensure safe and secure supplies of energy, whilst increasing the levels of customer service, meeting our environmental objectives and ensuring that nobody gets left behind on that journey. We look forward to identifying and delivering sustainable solutions to these challenges.



Mark Horsley, Chief Executive Officer, Northern Gas Networks

2 Board Statement

The company's business strategy is to provide, develop and maintain a safe, affordable, and secure gas distribution pipeline system for the provision of gas supplies to the people and businesses within our region.

Underpinning this strategy is a strong compliance culture which the Board directly monitors through its risk management, audit, treasury, and compliance committees. The integrity of our reporting and information provided to customers and stakeholders remains a key focus. With this in mind, we further enhanced the level of internal and external (independent) assurance of our reporting processes this year. I was pleased to receive the results of this review that showed that NGN's reporting process and associated controls align with examples of good practice across the industry.

During 2021/22 we continued to demonstrate strong customer, safety, reliability, and environmental performance. We are pleased with NGN's performance and in particular the performance against the output targets agreed as part of the RIIO-2 price control, as well as the recovery of the deliverables impacted by the Covid-19 pandemic in RIIO-1. Incentive arrangements for the senior management team are directly linked to the safety, customer, and efficiency targets within the regulatory contract. These targets are updated annually.

The focus of the Board continues to be to support NGN in its ambition through significant investments and innovations in the network, supporting infrastructure and people aimed at improving the performance of the business in both the short and longer term.



Andrew Hunter, Chairman, Northern Gas Networks

Performance Summary

3 Performance Summary

Outputs Summary	
Meeting the needs of consumers and network users	
Consumer vulnerability minimum standards	
Number of Fuel Poor connections	
Complaints metric	
Guaranteed standards of performance	
Emergency response – 97% controlled gas escapes	
Emergency response – 97% uncontrolled gas escapes	
Loss of supply – duration of unplanned interruptions	
Planned interruptions survey (score out of 10)	
Emergency response and repair survey (score out of 10)	
Connections survey (score out of 10)	
Maintaining a safe and resilient network	
Repex – tier 1 mains replacement	
Repex – tier 1 services	
Capital projects	
Delivering an environmentally sustainable network	
Shrinkage and environmental emissions	
Biomethane connections information	
Environmental action plan and annual environmental report	
Business Carbon Footprint (BCF) reporting	

We delivered 854 Fuel Poor Connections against a target of 1,000. We consider this to be a good performance as the qualification criteria have changed restricting the number of customers who can apply.

We delivered more Tier 1 mains replacement work than targeted and will continue to do so in order to recover the shortfall seen during the Covid-19 pandemic.

We are behind target on the Shrinkage and Environmental Emissions output but expect to recover the position over RIIO-2.

Financial Summary	21/22	22/23	23/24	24/25	25/26
£m, 18/19 prices					
Regulatory Asset Value	2,265.8	2,297.8	2,325.2	2,347.8	2,365.1
Allowed Revenue	385	511	450	431	426
Return on Regulatory Equity	6.82%	6.57%	5.47%	5.06%	5.01%

The Regulatory Asset Value (RAV) increases year on year in line with expectations as we continue to invest in our assets.

Allowed Revenue includes £82m and £20m in 2022/23 and 2023/24 respectively for Supplier of Last Resort charges, which is a pass-through cost.

The Operational Return on Regulatory Equity reduces throughout the price control as we expect our outperformance against the allowances to reduce over time.

Totex Incentive	21/22	22/23	23/24	24/25	25/26	Total
£m, 18/19 prices						
Actual costs	215.6	228	238.8	241	236.6	1160.0
Adjusted Allowances	253.7	258.0	248.3	241.8	238.5	1,240.2
Outperformance	(38.1)	(30.0)	(9.5)	(0.8)	(1.9)	(80.2)
Outperformance %	15.0%	11.6%	3.8%	0.3%	0.8%	6.5%
Return to customers	19.4	15.3	4.8	0.4	1.0	40.9

We outperformed the allowances by 15% this year, but expect workload increases and cost pressures against a reducing allowance will reduce outperformance in the remaining years of RIIO-2. We expect to deliver a 6.5% outperformance over RIIO-2.

Other Incentives	21/22	22/23	23/24	24/25	25/26	Total
£m, 18/19 prices						
Customer service	1.4	1.6	1.7	1.7	1.8	8.1
Complaints	-	-	-	-	-	-
Unplanned Interruptions	-	-	-	-	-	-
Environmental Emissions	(0.3)	(0.0)	0.2	0.1	0.1	0.1

We expect to increase our customer service performance each year, delivering an £8.1m incentive over RIIO-2. We expect to pay no penalties under the Complaints and Unplanned Interruptions. We are in penalty in the first year under the Environmental Emissions incentive but expect to recover this over RIIO-2.

Financial Performance

4 Financial Performance

4.1 Return on Regulatory Equity

Ofgem use the Return on Regulatory Equity (RORE) to measure the potential financial returns or penalties on the portion of the value of the company that is financed by equity. RORE is calculated by using the cost of equity (Allowed Equity Return) as the starting point as this amount is funded directly in revenue. The cash value of any outperformance from the incentive mechanisms is then divided by the 40% notional equity portion of the Regulatory Asset Value to calculate the additional return on equity earned.

Return on Regulatory Equity	21/22	22/23	23/24	24/25	25/26
Allowed Equity Return	4.52%	4.56%	4.54%	4.56%	4.58%
Totex outperformance	2.15%	1.81%	0.71%	0.25%	0.17%
Business Plan Incentive	0.13%	0.13%	0.13%	0.12%	0.12%
Customer Satisfaction Survey ODI	0.15%	0.18%	0.18%	0.19%	0.19%
Complaint's metric ODI	-	-	-	-	-
Unplanned Interruption Mean Duration ODI	-	-	-	-	-
Shrinkage Management ODI	(0.04%)	-	0.02%	0.01%	0.01%
Network innovation input for RORE	(0.02%)	(0.04%)	(0.04%)	(0.02%)	(0.02%)
Carry-over Network innovation	(0.02%)	-	-	-	-
Strategic innovation	-	-	-	-	-
Penalties and fines	(0.07%)	(0.06%)	(0.06%)	(0.06%)	(0.06%)
RoRE – Operational performance	6.82%	6.57%	5.47%	5.06%	5.01%

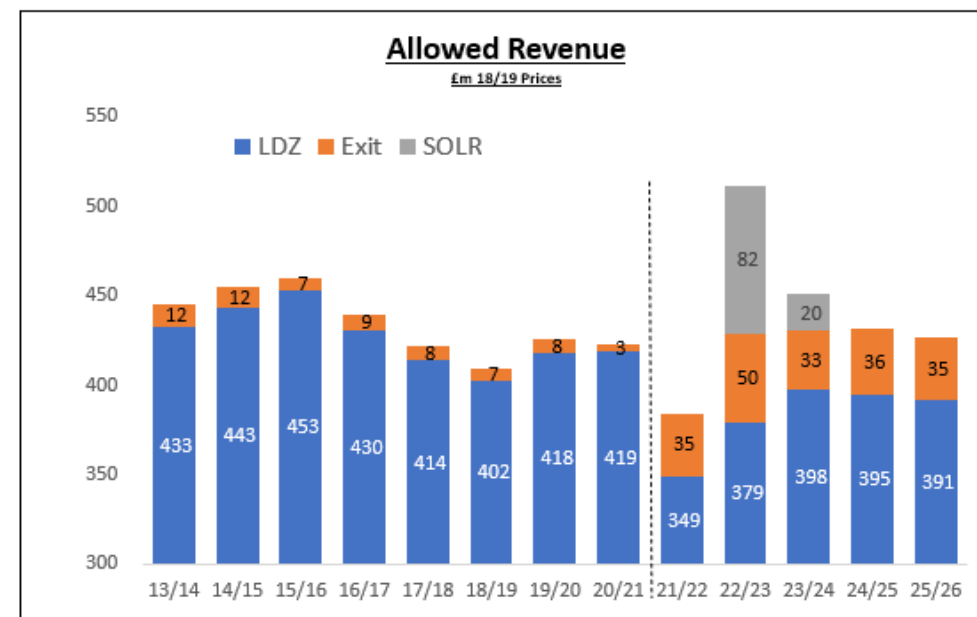
Our RORE starts at 6.82% and reduces over the price control to 5.01%, an average of 5.71%. After the Allowed Equity Return, the main driver is the Totex incentive mechanism. We expect our out-performance against the Totex allowances to reduce over time, partly due to workload movements, but also due to the tightening of the allowances, which include a very stretching efficiency assumption. We expect to earn further rewards under the Customer Satisfaction Incentive, whilst the Shrinkage Management Incentive will break even over the price control.

4.2 Revenue and Customer Bills

4.2.1 Allowed Revenue

At the beginning of the price control Ofgem set our Base Revenue, assuming we deliver in line with the allowed costs and workload. Our Allowed Revenue is then calculated based on our actual cost and workload performance and is used to set customer bills. However, because of movements in customer numbers and levels of consumption our Collected Revenue for that year is unlikely to match the Allowed Revenue. Any under or over collection is simply adjusted for in the following years' Allowed Revenue.

In addition to our LDZ (own) Revenue, the gas networks collect revenue to pay for the National Transmission System (NTS) Exit Capacity charges, and the Supplier of Last Resort payments. These are pass through costs – the gas networks have no control over the charges and simply collect the revenue to be passed on. However, they are a significant part of the end customer's bill.

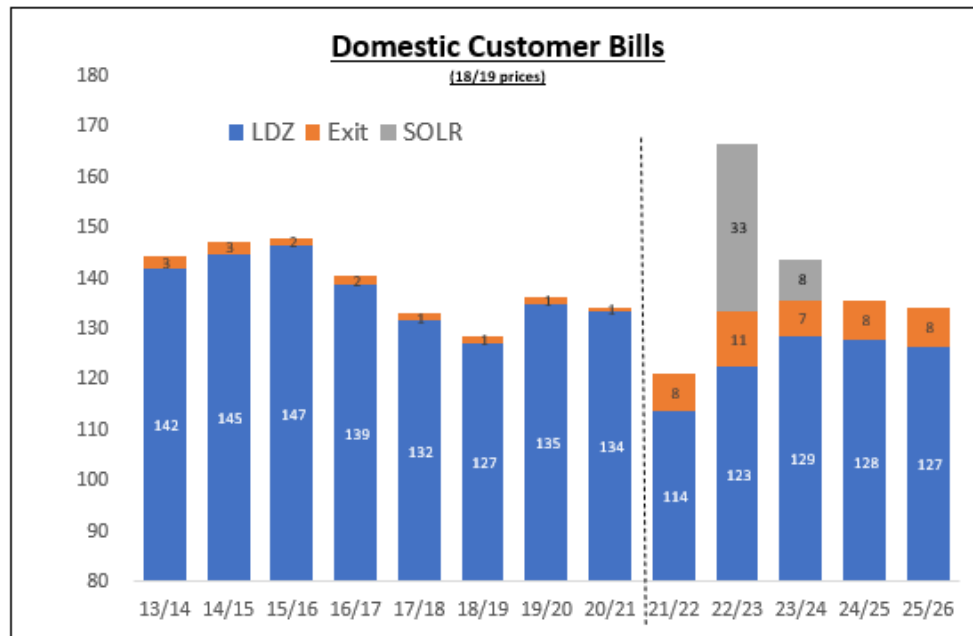


Our average Allowed Revenue for RIIO-2 falls in real terms to £383m, a 10.5% reduction from the RIIO- 1 average of £427m, reflecting the challenging nature of the RIIO-2 settlement. NTS Exit Capacity charges increase from an average of £8m in RIIO-1 to £38m in RIIO-2. We also expect to collect c£102m in Supplier of Last Resort Payments in years 2 and 3 of the price control.

4.2.2 Customer Bill Impact

The amount each customer pays through their bill is driven by three factors – Allowed Revenue for the year in question, changes in the number of customers, and changes in the level of gas consumption for these customers. For instance, if the number of customers increases for a fixed allowed revenue, then each customer would pay proportionally less.

Our domestic customer bill analysis shown below is calculated using NGN's average Annual Quantities (AQ) consumption and peak daily capacity requirements.



The average Domestic Customer Bill falls to £124, a 9.9% reduction from the RIIO- 1 average of £137. This reduction is smaller than the reduction in Allowed Revenue which is a function of changing gas consumption. Exit costs increase significantly from £2 to £8 on the bill. Supplier of Last Resort payments increase the bill by £33 and £8 in 2022/23 and 2023/24 respectively.

Our performance against the allowances

5 Our performance against the allowances

5.1 Totex performance

Totex	21/22	22/23	23/24	24/25	25/26	Total	Allowed	Variance
Opex	74.5	86.9	88.6	87.9	87.6	425.5	468.5	(43.1)
Capex	40.3	43.6	53.8	56.8	53.2	247.6	266.8	(19.1)
Repex	100.7	97.5	96.4	96.3	95.8	486.6	504.9	(18.3)
Totex	215.4	227.9	238.7	241.0	236.6	1197.0	1240.2	(80.6)
Allowance	253.7	258.0	248.3	241.8	238.5	1,240.2		
Variance	(38.2)	(30.0)	(9.6)	(0.8)	(1.9)	(80.6)		
Cumul. Variance	(38.2)	(68.3)	(77.8)	(78.6)	(80.6)			

This year we outperformed the Totex allowance by £38.2m. Controllable Opex saw the largest outperformance of £21.4m, largely from three factors:

- Reduced emergency and repair workload due to the mild winter weather we have seen. Our forecast assumes more severe weather conditions.
- Lower than expected maintenance costs. Accelerating this workload in line with our plan post the Covid-19 pandemic has proved more difficult than we anticipated. Our forecast assumes we recover this over the next four years.
- Lower than expected costs in Business Support, which we expect to increase. Our Cyber Security resource will increase, rents and utility bills will increase, we expect insurance claims to return to the longer-term average, and to accelerate expenditure on Vulnerable Customers and Carbon Monoxide under the use it or lose it allowance.

Capex saw a £11.8m outperformance. Third party driven works account for c25% of this, with Connections, Reinforcement and the Transpennine Rail Electrification project all lower than expected. Vehicle purchases have been delayed due to worldwide delays in vehicle delivery, we have delayed investment in buildings whilst we review our requirements post Covid-19 and are assessing new equipment to be used for pressure control prior to rolling it out.

Repex saw a £5m outperformance, driven by lower-than-expected costs for Tier 1 Stubs. We delivered the expected workload broadly in line with the allowance.

5.2 Opex performance

5.2.1 Controllable Opex

Controllable Opex (2018/19 prices)	20/21 Actual	21/22 Actuals	22/23 Forecast	23/24 Forecast	24/25 Forecast	25/26 Forecast	TOTAL Forecast
Holder demolition	1.0	3.1	3.1	3.3	3.7	2.8	16.0
Env. Remediation	0.5	0.4	0.3	0.6	0.9	1.2	3.4
Asset management	2.4	1.8	2.0	2.0	2.0	2.0	9.8
System control	0.9	0.6	0.7	0.7	0.7	0.7	3.4
Operations Mngt	9.4	6.8	7.6	7.6	7.5	7.5	37.0
Customer Mngt	1.3	1.2	1.4	1.4	1.4	1.4	6.8
Work Mngt	15.5	13.9	15.1	15.6	16.2	15.6	76.4
Emergency	10.5	9.0	10.6	10.5	10.3	10.2	50.6
Repair	18.1	14.3	15.3	14.9	14.5	14.1	73.1
Maintenance	11.3	12.9	15.4	17.6	16.9	17.2	80.0
Other direct activities	3.8	3.1	3.6	3.6	3.6	3.6	17.0
Work Execution	43.8	39.4	44.9	46.6	45.3	45.1	220.7
IT and telecoms	5.9	5.6	6.6	6.6	6.6	6.6	32.0
Property	2.0	2.3	2.8	2.8	2.7	2.7	13.3
Human resources	1.0	1.1	1.2	1.2	1.2	1.2	5.9
Audit, Finance, Reg	3.8	2.6	3.0	3.0	3.3	3.6	15.5
Insurance	2.4	2.2	3.3	3.3	3.3	3.3	15.4
Procurement	0.2	0.3	0.3	0.3	0.3	0.3	1.5
CEO and Group	4.7	5.2	6.2	5.7	5.7	5.7	28.5
Business Support	20.1	19.3	23.4	22.9	23.1	23.4	112.1
Training / Apprentices	2.1	1.9	3.5	3.5	3.3	3.5	15.7
Total Costs	81.4	74.5	86.9	88.6	87.9	87.6	425.5
Final Allowance	-	95.9	94.5	93.8	91.9	92.5	468.5
Variance	-	(21.4)	(7.6)	(5.2)	(4.0)	(4.9)	(43.1)
Cumulative Variance	-	(21.4)	(29.1)	(34.2)	(38.2)	(43.1)	

Our Controllable Opex costs were £74.5m this year, £6.9m lower than the previous year. We expect costs to increase and be more in line with our business plan over the rest of RII0-2. We expect to outperform the 5-year Final Allowance (workload adjusted and including forecast RPEs) by c£43.1m.

Work Management and Work Execution

Holder Demolition and **Environmental Remediation** costs can vary materially by size, condition and other site factors. This year both costs and holder demolition workload (5 demolitions) were in line with our plan. We expect this to be the case over the 5 years of RIIO-2. We spent £1m less this year on Environmental Remediation than planned, purely down to timing. These projects are often complex and require significant planning. We expect to complete our planned work over RIIO-2 in line with our planned costs.

We spent £0.6m less on **Asset Management** this year, slightly below the £2m assumed in our business plan. This was driven by staff turnover and variances in the use of professional and consultancy services. We expect to spend in line with our plan for the remainder of RIIO-2.

We spent £0.3m less on **System Control** this year and expect costs to increase marginally to £0.7m over the remainder of RIIO-2. This is below our business plan forecast. We now flex the resource here to support other asset management activities to increase efficiency and maximise output.

Under our Totex operating model **Operations Management**, **Customer Management**, **Emergency** and **Repair** costs can all be affected by the relative level of workload across Opex, Capex and Repex. In Opex the main workload drivers are the volume of Publicly Reported Escapes (PREs) and Repairs we see in the year.

Workload	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Forecast PREs	90,529	89,869	89,234	88,626	88,041	87,480	86,942
Forecast Repairs	20,199	19,551	18,838	18,153	17,497	16,866	16,260
Actual PREs	74,948	70,115	67,770	-	-	-	-
Actual Repairs	17,317	17,794	19,489	-	-	-	-

PRE workload continues to trend down and is significantly below our business plan forecast. Volumes fell significantly during the Covid-19 pandemic and have not returned to previous levels. We have seen an increase in Repairs this year, mainly on services, and the volumes are above our business plan forecast. We expect repairs to trend down over time as a result of the Repex programme, but not necessarily every year as other factors such as weather will influence the overall workload.

We spent £28.6m on **Emergency** and **Repair** in 2020/21, but this included £3.1m of stranded direct labour resource and £0.8m of increased contractor resource associated with the Covid-19 pandemic. During the pandemic all non-priority customer invasive planned works were stopped to minimise interaction with members of the public and protect both customers and employees. We also saw reduced customer driven connections and service alteration work throughout the year. This resulted in a significant amount of resource in the network being at work but with no specific work to complete, stranding costs in Opex. We also employed additional contractor engineers to provide extra resilience within our emergency workforce to manage any Covid-19 related absences.

Adjusting for this we would have spent c£24.7m in 2020/21. This year we spent c£23.3m, £1.4m lower than this adjusted total. We have achieved this through careful management of overtime and increased focus on productivity as a result of more resource being on our new modern terms and conditions.

Our forecasts for Emergency and Repair remains in line with our Business Plan and are based on a more prudent 'normal' winter workload than we have seen in recent years. We would expect to outturn lower than this when weather is milder, but we cannot always assume this will be the case.

We spent £2.6m less on **Operations Management** this year, the main driver being £1.6m reduced Pensions Deficit payments. We made a one-off increased payment in 2020/21 as a result of the latest triennial valuation, discussed with Ofgem as part of the RIIO-2 business plan submission. The balance is driven by efficiencies, staff turnover and the relative levels of workload across Totex when compared to our business plan, in particular between Opex and Repex. We expect to spend in line with our plan for the remainder of RIIO-2, assuming a more normal mix of work.

We spent £0.1m less on **Customer Management** this year, largely due to reduced calls to the emergency number than expected following the Covid-19 pandemic. We expect to spend in line with our plan for the remainder of RIIO-2, assuming a more 'normal' workload, in particular over winter.

We spent £1.6m more on **Maintenance** this year. In our business plan we outlined our strategy to increase maintenance in several areas, in particular on District Governors to extend their operational life and reduce Capex, carry out on-line inspections using new

technology on our 4" high pressure pipelines, and to install more Pressure Control systems which require increased maintenance. Accelerating this workload post the Covid-19 pandemic has proved more difficult than expected with long lead times for some equipment and scarcity of resource. We expect to accelerate this work over the next two years and fully catch up by the end of RIIO-2, spending just under our business plan target over the price control.

We spent c£0.7m less on **Other Direct Activities** this year, but last year's costs included £1.2m of costs related to the Covid-19 pandemic, primarily for Personal Protective Equipment (PPE). We expect to spend in line with our plan for the remainder of RIIO-2. Costs can vary year on year, largely driven by the number of district incidents we encounter and our success at recovering costs from 3rd parties if they caused the incident. Our plan was based on the long-term average.

Business Support and Training and Apprentices

We spent £0.3m less on **IT and Telecoms** this year. We continue to see benefits from our insourcing strategy as we exit older contracts and move roles in house, which has been offset by increases in resource focusing on Cyber Security. We expect to increase resource in several areas to support our overall IT strategy in the next year, and expect costs overall to stay around £6.6m for the remainder of RIIO-2.

Our **Property** costs have increased by £0.3m this year due to increased rents and utility bills. We also received rebates of c£0.1m. Overall these costs haven't accelerated as fast as we anticipated in our business plan, but we expect them to continue to increase to the levels we forecast for the remainder of RIIO-2.

Our **Human Resources** costs have increased by £0.1m this year and we expect them to increase again to be in line with our business plan. We are seeing increased costs for recruitment as staff turnover has increased, and are investing more in our wellbeing, hybrid working and talent development strategies, as well as expanding on our existing diversity and inclusion plans.

We spent £1.2m less on **Audit, Finance and Regulation** this year, mainly from the cessation of our RIIO-2 Business Plan team and associated contractor. The balance is efficiency driven as we reduced headcount in some areas, and through natural variations in Professional and Consultancy fees which can move significantly each year. We expect

costs to increase year on year from now as we begin to ramp up towards the development of our RIIO-3 business plan.

We spent £0.2m less this year on **Insurance** and claims, with both years below the long-term average due to lower claims. However, claims have historically varied materially from year to year and are very difficult to predict. Our forecast remains at the long-term average.

Our **CEO and Group** costs increased by £0.5m this year, driven by our Hardship fund and the Vulnerability and Carbon Monoxide Allowance (VCMA). We were behind our plan this year but expect to catch up next year, with costs then remaining broadly flat for the remainder of RIIO-2. **Procurement** costs are in line with our plan, and we expect them to remain so.

5.2.2 Non-Controllable Opex

Non-Controllable Opex (2018/19 prices)	21/22 Actuals	22/23 Forecast	23/24 Forecast	24/25 Forecast	25/26 Forecast	TOTAL Forecast
Shrinkage	7.9	23.9	17.7	10.8	7.7	68.1
Ofgem Licence	2.3	2.3	2.3	2.3	2.3	11.6
Network Rates	42.1	39.7	39.7	39.7	39.7	200.8
Pension Deficit	4.9	4.3	4.1	4.1	4.0	21.4
NTS Exit Costs	39.3	35.0	36.6	36.9	35.9	183.7
Xoserve	3.3	3.4	2.3	2.2	2.1	13.4
Supplier of Last Resort	0.7	83.4	20.2	0	0	104.3
Retentions	0	0	0	0	0	0
Total	100.6	191.9	123.0	96.0	91.69	603.2

By definition Non-Controllable costs are outside of the control of the GDN's. Costs are significantly higher than the level we forecast in our Business Plan. The main drivers are:

- Shrinkage gas costs are forecast to be 180% higher over the price control as a result of the increased cost of gas, driven by the Ukraine war and other economic factors.
- Supplier of Last Resort payments peak at £83.4m in 2022/23 and total over £100m over the price control. We did not include any costs for this in our Business Plan.
- The Ofgem Licence has increased by nearly a third.

5.3 Capex

5.3.1 Capex against the Allowance

Capex (2018/19 prices)	21/22	22/23	23/24	24/25	25/26	TOTAL
LTS, storage and entry	9.3	13.0	16.0	18.1	15.4	71.8
Connections	7.5	5.3	5.3	5.3	4.0	27.3
Mains Reinforcement	4.7	4.1	3.4	3.4	3.5	19.2
Replacement governors	0.3	0.5	1.4	2.4	2.5	7.1
Other Capex	18.5	20.7	27.7	27.6	27.8	122.4
Total	40.3	43.6	53.8	56.8	53.2	247.7
Final Allowance	52.1	58.7	55.8	52.0	48.2	266.8
Variance	(11.8)	(15.1)	(2.1)	4.8	5.0	(19.2)
Cumulative Variance	(11.8)	(26.8)	(28.9)	(24.1)	(19.2)	

Our Capex costs were £40.3m this year, £11.8m lower than the allowance. We expect costs and workload to increase and be more in line with our business plan over the rest of RIIO-2. We expect to outperform the 5-year Final Allowance (workload adjusted and including forecast RPEs) by c£19.1m.

LTS, Storage and entry costs were £9.3m, c£2m lower than our Business Plan Forecast. The main driver for this has been the delays in starting work on some of the major projects associated with the Network Rail-driven Transpennine Electrification project. This is the largest area of expenditure on our LTS assets in RIIO-2 and is expected to involve work at 4 separate locations. NGN proposed this c£20m project should be a PCD as we are not driving the work, location or timing, and so the final costs are uncertain. Network Rail continue to work on designs for the projects and as a result suspended but did not cancel their notification for some areas of the project. We expect that formal notification to continue the projects will be made before September 2022, with delivery required by early 2025 and December 2024 respectively. Further details are provided in section 6.3.3.

We have also experienced some delays with long lead items and a shortage of expert contractor resource, driven by the Covid-19 pandemic and general economic conditions. Despite this we expect costs to increase for LTS, Storage and Entry in line with our Business Plan, and to peak in 2024/25.

Net Connections costs were £7.5m this year, c£0.5m lower than our Business Plan forecast. The main driver for the decrease was reduced workload in all areas.

Connections (2018/19 prices)	21/22	22/23	23/24	24/25	25/26	TOTAL
Allowed volume						
Domestic Services	5,462	5,802	6,137	6,468	2,174	26,043
Domestic Mains	27.0	30.3	33.5	36.8	3.2	130.8
Fuel Poor Services	1,000	1,000	1,000	1,000	1,000	5,000
Non-Domestic Services	512	517	522	526	530	2,608
Actual and Forecast volume						
Domestic Services	3,931	3,347	3,404	3,417	1,528	15,626
Domestic Mains	17.1	15.8	16.1	16.6	1.9	67.5
Fuel Poor Services	854	250	250	250	250	1,854
Non-Domestic Services	405	300	300	300	300	1,605
Actual and Forecast cost						
Net Cost	7.5	5.3	5.3	5.3	4.0	27.3
Allowance Variance						
Domestic Services	(0.3)	(1.5)	(1.5)	(1.5)	(1.5)	(6.1)
Domestic Mains	(0.8)	(1.2)	(1.2)	(1.3)	(1.1)	(5.5)
Fuel Poor Services	(0.7)	(0.8)	(0.9)	(1.0)	(0.6)	(4.0)
Total Allowance Variance	(1.8)	(3.4)	(3.6)	(3.7)	(3.1)	(15.6)

Connections workload

Domestic and Non-Domestic workload was c27% lower than our allowed workload. All workloads reduced during the Covid-19 pandemic and have not returned to the levels seen earlier in RIIO-2 which drove our business plan forecasts and the allowed workload.

Actual workload in 2022/23 has reduced further, likely driven by the cost-of-living crisis, high energy prices, and general economic conditions. Given these conditions are expected to continue for some time our forecast is based on the workload we are seeing now, which is c42% lower than the allowed workload. We expect to see new to new domestic connections stop in 2025/26 as a result of government policy preventing the installation of new gas boilers in new properties.

Fuel poor workload was also lower than planned, 854 compared to our annual target of 1,000. Ofgem's definition of fuel poverty and the removal of area-based qualifications

makes it much harder to qualify for a fuel poor connection now. We expect workload to fall further to c250 connections per annum from 2022/23.

Connections allowance and costs

Both Domestic and Fuel Poor connections are subject to a volume driver. As we are seeing less workload our allowances will fall by c£15.6m over RIIO-2. The reduction is £1.8m in 2021/22, whereas our actual net costs fell by £0.5m, which implies a c£1.3m relative inefficiency.

As discussed with Ofgem, c£1.5m (11%) of our gross connections are fixed in the medium to long term. We have seen about 30% lower workload in 2021/22, which implies c£0.5m of this inefficiency will be driven by stranded fixed costs, leaving £0.8m.

The balance is driven by several factors. Net Connections can be impacted by the amount of revenue recovered each year, not just costs. The relative recovery rate varies year on year based on workload mix and timing. Recovery rates this year were lower than last year, which we estimate could account for c50% of the £0.8m remaining. We are also seeing cost pressures for materials, fuel, and costs of reinstatement.

Mains reinforcement costs were £4.7m this year, under the £5.2m forecast in our Business Plan. We delivered 10.5km of mains at a unit cost of c£460 per meter, a reduction from £520 per meter in 2020/21. Both of these unit rates are historically high, but they are driven by a large project in Pocklington which has seen significant preparatory work but no recorded workload as the pipe is yet to be commissioned. We expect unit rates to return to more normal levels in the future.

In our business plan we did highlight the risk volumes could increase significantly due to improving economic conditions and increasing demand for electricity peaking plant. Much of this workload is third party driven. Clearly the economic situation has changed, and together with the cost-of-living crisis means we now expect to see workload and costs reduce over RIIO-2 to c£19m, c£5m below our business plan forecast.

Replacement governor costs were £0.3m this year, c£1.3m below our business plan forecast, which is also reflected in the workload delivered. We expect to recover from this slow start to RIIO-2 after successfully increasing the resource to deliver the programme and establishing a new commercial framework to deliver value for money. We expect

workload and costs to increase year on year to deliver the forecast workload, whilst spending c10% less than our business plan forecast.

Other Capex costs were £18.5m this year, c£7m below our business plan forecast. The main drivers for this underspend were:

- c£2.7m lower expenditure on **Vehicles** than planned. This is down to timing and reflects the world-wide semi-conductor shortages which have increased lead times for all types of vehicles. We expect to recover this position over RIIO-2 and that unit costs will increase due to the scarcity of vehicles.
- c£1.5m lower expenditure on **Property and Workspace**. The Covid-19 pandemic has led to a review of our overall property strategy to take into account hybrid working and changes in the office environment, which has delayed the planned expenditure in 2021/22. We currently forecast to spend broadly in line with our business plan but this may change or be focused in other areas than originally expected.
- c£2.2m lower expenditure on **Electrical and Mechanical instrumentation**. This mainly relates to Pressure Management equipment and is a timing issue. We are currently assessing new innovative equipment to support this programme of work which has delayed the planned investment until later in RIIO-2.

We expect costs to increase in future years to be more in line with our business plan as we recover the positions outlined above. If the expected cost pressures on vehicles in particular, and on areas such as electrical equipment, plant, tools and equipment materialise we expect to spend more than our business plan forecast.

5.4 Repex

5.4.1 Costs

Repex Costs (2018/19 prices)	21/22	22/23	23/24	24/25	25/26	TOTAL
Tier 1 and <2" Steel	58.0	57.9	57.9	57.9	57.9	289.4
Tier 2a	1.6	1.1	1.0	1.0	1.0	5.7
Other	15.0	14.6	14.6	14.6	14.6	73.2
Diversions	7.2	2.2	2.2	2.2	2.1	15.9
Total Mains laid	81.8	75.7	75.6	75.6	75.6	384.2
Tier 1 and <2" Steel	10.9	10.0	10.0	10.0	10.0	51.0
Tier 2a	0.0	0.0	0.0	0.0	0.0	0.1
Other	0.7	0.9	0.9	0.9	0.9	4.2
Diversions	0.1	0.1	0.1	0.1	0.1	0.4
Other Services	6.1	6.9	6.9	6.9	6.9	33.7
Total Services	17.8	17.9	17.9	17.9	17.9	89.4
Stubs	1.2	3.5	2.5	2.5	2.0	11.7
Risers	0.0	0.3	0.3	0.3	0.3	1.4
Total	100.7	97.5	96.4	96.3	95.8	486.6
Allowance	105.7	104.8	98.7	97.9	97.9	504.9
Variance	(5.0)	(7.3)	(2.3)	(1.6)	(2.1)	(18.3)
Cumulative Variance	(5.0)	(12.3)	(14.6)	(16.2)	(18.3)	

Our Repex costs were £100.7m this year, £5.0m lower than the allowance. The main driver for this was lower than expected costs for Tier 1 Stubs, which are subject to a re-opener mechanism. Ofgem provided allowances for the first two years of RIIO-1 for Tier 1 Stubs as the HSE policy was under review at the time, and so the volume and timing of work was uncertain.

It is now clear under HSE policy that many Tier 1 stubs still need replacing, and so our cost forecast takes this into account. This is the main driver for the allowance outperformance reducing in later years, as we have included costs with no associated allowance. We expect to re-open Tier 1 Stubs to review progress to date and our plans for the rest of RIIO-2 to ensure we can deliver the required work by the end of the Repex programme.

We expect repex unit rates to remain broadly flat in RIIO-2. The DSP delivery model we introduced in RIIO-1 is now fully embedded and, as a consequence, provides more limited opportunities for efficiencies moving forward. We are still targeting to deliver efficiencies,

but we expect these to be offset by cost pressures as the work becomes more complex towards the end of the Repex programme.

5.4.2 Mains Workload

Mains Workload (km)	21/22	22/23	23/24	24/25	25/26	TOTAL	ALLOWED
Tier 1	437.4	437.4	437.4	437.4	437.4	2186.8	2144.3
Tier 2a	3.2	2.2	2.0	2.0	2.0	11.5	11.5
Tier 2b	19.1	20.7	20.7	20.7	20.7	102.0	102.0
Tier 3	5.3	4.4	4.4	4.4	4.4	22.7	22.7
Iron Mains	464.9	464.7	464.5	464.5	464.5	2323.1	2280.6
Steel	75.1	72.6	72.6	72.6	72.6	365.4	361.1
Other	14.0	8.4	8.4	8.4	8.4	47.5	47.5
Diversions	11.1	11.4	11.4	11.4	11.4	56.6	56.6
Total	565.2	557.0	556.8	556.8	556.8	2792.7	2745.9

This year we have delivered a total of 565.2km of mains abandonment.

The **Tier 1 Mains** target is 2,144.3km over RIIO-2, or 428.9km per annum. Over RIIO-2 we plan on delivering 2,186.8km, or 437.4km per annum. This is an increase of 8.5km each year, 42.5km over the 5 years. This will allow us to recover the Covid-19 related shortfall of workload seen in the final year of RIIO-1 by the end of the Repex programme in 2032. This increased workload will be funded under the Tier 1 Mains volume driver.

Tier 2a Mains are also subject to a volume driver as the workload is very difficult to predict. We now expect to deliver 11.5km over RIIO-2, an increase of 1.5km, with most of this increase delivered in the first two years of the price control.

We are slightly behind the planned run rate for **Tier 2b Mains**, and slightly ahead of the run rate for **Tier 3 Mains**. We expect to deliver the allowed workload for both by the end of RIIO-2.

We expect to deliver slightly more **Steel mains** workload over the price control. This is predominantly in the <2" steel category, which is replaced mainly when we find it whilst replacing Tier 1 iron mains. As Tier 1 mains volumes increase as described above, we expect this workload to increase as well.

Other Mains and Diversions work is difficult to predict, as the former includes poor performing PE and Asbestos which we replace when it's found, and the latter is third party driven. We expect to deliver the allowed workload over RIIO-2.

5.4.3 21/22 year-on-year performance

Year on Year Performance (2018/19 prices)		21/22		19/20	20/21
	Net Cost	Workload	Unit Cost	Unit Cost	Unit Cost
Tier 1 and <2" Steel	58.0	474.5	122	107	142
Tier 2a	1.6	3.2	503	356	538
Other	15.0	58.0	258	350	432
Diversions	7.2	10.32	700	283	79
Total Mains laid	81.8	546.0	150	135	191
Tier 1 and <2" Steel	10.9	34,868	312	306	299
Tier 2a	0.0	79	312	331	266
Other	0.7	2,243	311	307	291
Diversions	0.1	245	312	346	340
Other Services	6.1	5,579	1091	1457	1252
Total Services	17.8	43,014	413	462	509
All-in Mains cost	99.5		182	171	220

In terms of year-on-year performance unit costs have decreased from the Covid-19 driven peak of 2020/21, with the all-in mains cost reducing from £220 per meter to £182 per meter. We have seen an increase since 2019/20, a more comparable year, from £171 to £182 per meter.

This is mainly driven by Tier 1 and <2" steel mains and the associated services, which on a combined basis have increased by c12% from c£129 per meter to £145 per meter. There are several factors behind this increase in costs:

- We have seen a 7% increase in the proportion of mains that needs to be open cut rather than inserted since we submitted our business plan in 2018/19. Services that need to be open cut have seen a similar increase.
- As outlined in our business plan, the proportion of ductile iron in the workload has increased by c27% across all tiers. This type of main is more difficult and time consuming to work on.

- We are also seeing the average project length decrease over time as we inevitably begin to pick up smaller pipe lengths to complete particular geographic locations.

We expect these cost pressures and others to continue to increase from now until the end of the Repex programme. We are looking to develop a fuller picture on this to better understand how costs and workload can be best managed to deliver the most efficient mix of work over time.

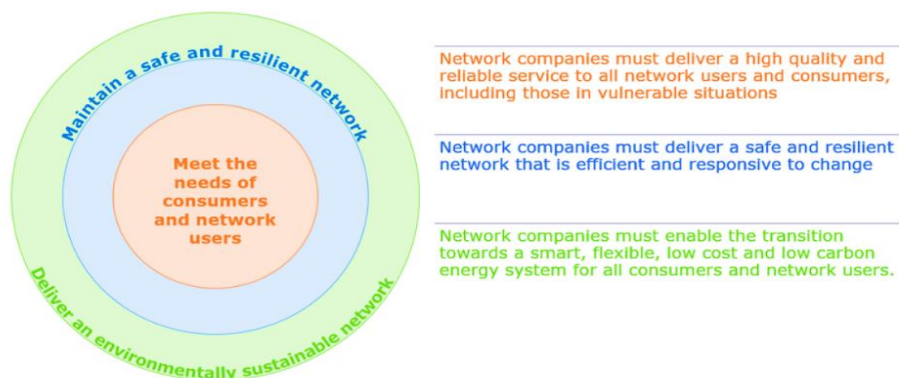
Outputs and Incentives

6 Outputs and Incentives

6.1 Introduction

The adoption of an output and incentive-based framework is a key element of the RIIO regulatory contract. By defining the outputs companies need to deliver and any incentives or penalties they will receive for over or under-performance, as well as setting cost allowances, companies are incentivised to innovate and deliver the services that customers require at the least cost. An outputs-based framework also provides greater transparency for customers and the networks as to what services and standards the networks need to deliver.

Outputs for RIIO-2 are grouped into three consumer-facing output categories, as set out below:



There are three potential types of output, depending on what the ultimate aim of the output is. Some outputs fit into more than one type.

Price Control Deliverables (PCDs) specify the deliverables for the funding allocated, and the mechanisms to refund consumers if an output is not delivered (or not delivered to a specified standard). Their purpose is to hold the networks to account for delivering work that has been funded through the expenditure allowances, and that they are only paid for what they deliver.

Licence Obligations (LOs) set minimum standards that network companies must achieve. Failure to deliver to these standards means the network is in breach of the licence and can receive a material fine and further sanctions.

Output Delivery Incentives (ODIs) drive service improvement through Reputational and Financial incentives. Network performance will either be rewarded or penalised financially or by reputation when compared against their own targets and those of the other companies.

6.2 Meeting the needs of consumers and network users

6.2.1 Consumer Vulnerability and Carbon Monoxide

Ofgem have introduced three outputs related to consumer vulnerability and carbon monoxide.

- The **Consumer vulnerability minimum standards** (LO) which aims to retain and improve in some cases on the existing standards in a new Licence Obligation.
- The **Consumer Vulnerability reputational incentive** (ODI-R) aims to ensure there is focus on three key themes and six key metrics related to vulnerability and carbon monoxide (CO) awareness. This will ensure comparison and knowledge sharing between the gas networks.
- The **Vulnerability and Carbon Monoxide (CO) allowance** is to allow the gas networks to provide bespoke services to support consumers in vulnerable situations and raise awareness of the dangers of CO. It takes the form of a Use-it-or-Lose-it Allowance. NGN has received an allowance of £5.16m over the price control (2018/19 prices)

6.2.2 Consumer vulnerability reputational incentive

In 2021/22 we have focussed on engaging both colleagues and community partners in understanding the importance of the areas targeted under this incentive, and to make sure we have effective delivery and recording mechanisms in place. The table below outlines the headline results for the 6 key Ofgem metrics, with some additional reporting on the number of customers referred to the Priority Services Register (PSR), and the % increase in Carbon Monoxide awareness using the commonly agreed survey.

Key Performance Indicator	21/22
Customers reached through Carbon Monoxide (CO) awareness initiatives	6,009,334
Number of CO awareness visits / surveys with customers	17,995
Average score before awareness visit	5.88/10
Average score after visit	7.55/10
Average increase in awareness from visit	28.04%
Number of customers referred onto the Priority Services Register (PSR)	4,908
Average customer satisfaction score for PSR customers directly impacted by NGN	9.39/10
Number of Fuel Poor Network Extension Scheme Connections	854

Here are some specific actions that we have taken to help deliver these results.

Using research to inform our approach

Each year we conduct PSR/CO awareness research with 1000+ domestic and business customers. This data was shared with stakeholders and overlaid with VCMA funded projects and our social indicator mapping. We have used these findings to inform where to target our awareness programmes, including our annual multi-media PSR and CO awareness campaign.

Our VCMA Engaging with Vulnerable Customers PR project was tailored to target those groups that our research had found to have the lowest levels of understanding. We discovered that Leeds and Wear and the surrounding areas had the lowest awareness, and so this is where we targeted elements of the campaign. Social media adverts for the CO Heroes campaign were aimed at the vulnerable groups, pregnant and English not the first language, in Leeds, Sunderland and surrounding areas including Bradford and Durham. Harvey and Hugo also set up adverts to increase awareness to the general public in these areas, as this was shown to be lower than in other regions. This was also reflected in the CO Heroes Toolkit, which was created through the project and distributed to various groups and community settings, (such as GP surgeries and BAME groups) to ensure the project reached those with the lowest knowledge.

Providing additional support through our operational activities

In 2021/22 the average customer satisfaction score for PSR customers directly impacted by NGN activities was 9.39/10, compared to an overall customer satisfaction score of 9.2. This indicates that when a customer identifies that they need additional help and support, we are going above and beyond to provide this. Our approach is supported by

comprehensive training provided by our in-house Vulnerability trainer. The foundation training is in Making Every Contact Count, which trains all NGN colleagues and contractors in identifying signs of vulnerability, referring customers onto the Priority Services Register where appropriate, and referring customers for further support through our extensive network of community partners. These services include debt advice, benefits maximisation, mental health support, child safeguarding, and emergency fuel vouchers amongst many others.

We have also seen increases in the following operational activities:

- Carbon Monoxide Awareness visits/surveys – 17,995, compared to 6,314 in 2020/21 (22,000 in RIIO-1 overall).
- The number of customers referred onto the Priority Services Register – 4,908, compared to 1,704 in 2020/21.

6.2.3 Vulnerability and carbon monoxide allowance

At NGN we have a proven track record of investing wisely in sustainable projects that reach our customers in most need. In 2015 NGN created a Community Promises Fund, which then evolved into a joint Community Partnering Fund with Northern Powergrid in 2018. Over subsequent years this has enabled us to establish over 70 community partnerships with grass roots organisations across our region. These now support how the VCMA is spent. Our approach to investing the VCMA is based on three key areas:

- Improving and applying knowledge of vulnerable customers.
- Our operational capability.
- A continual review of our Customers in Vulnerable Situations Strategy.

This year we have focussed on getting these foundations right whilst continuing to engage with our stakeholders on their priorities, alongside a challenge from our Customer Engagement Group about having the right level of internal and external governance in place.

The key to our approach has been to build on support and partnerships that we developed during RIIO-1. Many of the projects that we have funded this year demonstrate that evolution.

Case Study

Over 26,000 households in North Yorkshire are in fuel poverty, where people are struggling to keep warm at an affordable cost. A significant amount of these include someone who has a long-term health condition or disability, many of which can be made worse by living in a cold home. Cold homes, and associated issues around dampness and condensation, inadequately maintained heating systems, and challenges paying energy bills, can also cause new health problems.

Yorkshire Energy Doctor is one of our nine NGN strategic partners. NGN has been working with YED since 2016, as they work to specifically address the needs of our vulnerable customers and communities specifically in North Yorkshire. By working with the NHS/health professionals, this project tackles these issues to avoid further negative health impacts amongst vulnerable groups. The hardest thing about tackling fuel poverty is identifying those households most at risk from cold homes and encouraging them to access this support. Health professionals are well-placed to do this. They are trusted by their patients, often conduct home visits where potential issues around cold homes and vulnerability can be more easily identified, and can identify first-hand any health issues that could be being caused, or exacerbated, by cold homes. The NHS may be the only support service that some vulnerable households see.

Feedback from our social indicator mapping indicated that there are 12,835 excess winter deaths in the NGN area, with the expected highest rates in North Yorkshire. Stakeholders previously asked us to prioritise working with vulnerable customers in fuel poverty and customers with physical and mental health challenges. People living in fuel poverty often have to choose between heating or eating.

6.2.4 Fuel Poor Network Extension Scheme (ODI-R) (Capped Volume Driver)

Outputs	21/22	22/23	23/24	24/25	25/26	TOTAL	Target	Variance
Fuel Poor	854	250	250	250	250	1,854	5,000	(3,146)

The purpose of the Fuel Poor Network Extension Scheme (FPNES) is to help tackle fuel poverty by supporting off-grid, fuel poor households to connect to the gas network.

Our target is to connect a minimum of 5,000 fuel poor households in RIIO-2, with a reputational incentive to ensure we achieve this. It is also subject to a volume driver to

ensure we only get paid for the number of connections we deliver, up to a maximum of 10,000 connections.

In 2021/22 we have delivered 854 FPNES connections. It has been a challenging year, with the removal of funding for in-house measures via ECO 4. We have continued to engage with our stakeholders about what more we could be doing to promote the FPNES, maximise opportunities from the current funding landscape, and support customers out of fuel poverty. Despite this we expect volumes to decrease further as access to funding becomes increasingly scarce and difficult to access.

6.2.5 Customer Satisfaction Surveys (ODI-F)

Outputs	21/22	22/23	23/24	24/25	25/26	Average
Unplanned Work	9.54	9.58	9.58	9.58	9.58	9.57
Planned Work	9.09	9.13	9.13	9.13	9.13	9.12
Connections	8.96	9.01	9.06	9.11	9.16	9.06
TOTAL	9.20	9.24	9.26	9.27	9.29	9.25
Incentive (£m 2018/19 prices)	1.4	1.6	1.7	1.7	1.8	1.7

The purpose of the Customer Satisfaction Survey (CSS) is to ensure GDNs maintain good customer service and reward GDNs that deliver exceptional performance. The CSS itself involves interviewing customers based on three types of interaction that they have had with the network – connections, unplanned interruptions, and planned interruptions.

Ofgem has set separate targets and rewards/penalties for each type of interaction, with each category weighted equally. Each category also has a dead band within which no reward/penalty is applied. The overall reward/penalty is capped at 0.5% of Base Revenue. This is summarised in the table below.

Survey	Weight	Max Penalty Score	Penalty Score	Reward Score	Max Reward Score
Connections	33.33%	7.43	8.11	8.65	9.33
Planned Work	33.33%	7.90	8.34	8.69	9.13
Unplanned Work	33.33%	8.85	9.00	9.43	9.58

This year we achieved an overall score of 9.2. This exceeded our internal forecast. During the trials for the revised RIIO-2 Customer Satisfaction methodology, scores on average dropped by 0.1. This drove a renewed focus on our Customer Experience Strategy (CES), originally launched in 2013 to support our activities during RIIO-1. Triangulating data from our regulated surveys, complaints and enquiries, and the Institute for Customer Service Accreditation, we reengineered our CES and relaunched it this year.

We also have customer improvement groups across each of our operational patches that feed into a network-wide customer improvement programme. They meet monthly to discuss service improvements across all performance areas. At an operational level we hold twice weekly customer service and complaints call. We use this time to look at high-scoring jobs, as well as those scores that are 5 and below. We identify key learning points and discuss if they could be adopted across the whole network. Any specific improvement areas that need further work are then taken to the network improvement group for wider discussion.

6.2.6 Complaints metric (ODI-F)

The purpose of the Complaints Metric is to ensure that GDNs maintain good performance in their handling of complaints. The metric is a composite score calculated as the sum of each GDN's performance against four weighted indicators outlined in the table below. The lower the score, the better the GDN is at resolving complaints.

Indicator	Weighting
Percentage of complaints unresolved after one working day (1WD) of receipt	10%
Percentage of complaints unresolved after 31 working days (31WD) of receipt	30%
Percentage of repeat complaints	50%
Percentage of Energy Ombudsman findings against the GDN	10%

The complaints metric has stayed the same as RIIO-1, but the threshold for penalty has reduced from 11.57 in RIIO-1 to 5 in RIIO-2. This year we achieved a score of 2.8.

Outputs	21/22	22/23	23/24	24/25	25/26	Average
Complaints Metric	2.8	-	-	-	-	-
Target	5.0	5.0	5.0	5.0	5.0	5.0
Penalty (£m 2018/19 prices)	-	-	-	-	-	-

This year we targeted both a reduction in complaints as well as a strong performance against the complaint's metric. We have seen fewer complaints, which we believe has impacted our D+1 (fully closing a complaint in 1 working day) performance. This led to a lower metric score this year when compared to 2020/21. No other measures saw a reduction. We anticipate that this reduction will plateau during RIIO-2, and we will be closely monitoring this against our customer satisfaction performance.

Our focus on driving performance around preventing complaints, and improving the quality and timeliness of closure when we do receive a complaint has been achieved by:

- Twice weekly customer satisfaction and complaints calls. These are attended by 150+ colleagues from across our direct workforce and supply chain, and across all job roles and seniority. They are chaired by a different business lead each week and focus on taking learning from across our operational patches, reporting on best practice, and highlighting exceptional individual performance. We carry out root cause analysis on all complaints that fail D+1, so we can understand if anything could be done differently.
- Daily management information is issued across the business to highlight performance against the 4 key metrics.

6.2.7 Guaranteed Standards of Performance (GSOPs)

GSOPs	21/22	22/23	23/24	24/25	25/26
Paid Out	£0.68m	-	-	-	-

GSOPs set common minimum performance standards for Gas Distribution Networks across the service areas of interruptions to supply, gas connections and customer service. If the GSOPs are not met, NGN must pay compensation to customers. There are 14 GSOPs that NGN must monitor and report performance against in RIIO-2, consistent with RIIO-1.

The GSOPs regime has changed materially from RIIO-1 to RIIO-2 with many of the standards seeing reduced timescales, increased payment values and proactive rather than reactive payments. We supported this approach in our business plan. The change has impacted processes within NGN and Xoserve and the response has been positive with the intended improved outcomes for customers.

6.2.8 Emergency response time (LO)

Outputs	21/22	22/23	23/24	24/25	25/26
One Hour Response	99.75%	-	-	-	-
Two Hour Response	99.95%	-	-	-	-
Target	97%	97%	97%	97%	97%

The purpose of the emergency response time licence obligation is to ensure GDNs respond to 97% of reported gas escapes within one hour when they are uncontrolled, and within two hours when they are controlled. Performance against both these targets can be adversely affected by large incidents or very severe winter weather conditions.

This year we achieved 99.75% and 99.95% for our one-hour and two-hour response respectively. Achieving this standard is a core target for our network and receives day to day focus from our operational teams, in particular in the key winter periods.

6.2.9 Unplanned interruptions (ODI-F)

Outputs	21/22	22/23	23/24	24/25	25/26
Actual	5 hours	-	-	-	-
Minimum Performance Level	10 hours	10 hours	10 hours	10 hours	10 hours
Excessive Deterioration Level	17.5 hours	17.5 hours	17.5 hours	17.5 hours	17.5 hours

The purpose of the unplanned interruptions financial output delivery incentive is to ensure that GDNs manage the duration of these interruptions appropriately and performance does not deteriorate. An unplanned interruption is one where no prior notification has been given to the customer. These are typically caused by problems with the network assets (upstream of the ECV), damage to assets by third parties, and water ingress.

The incentive is penalty only, with a collar of 0.5% of Base Revenue. Each GDN has an individual Minimum Performance Level (MPL), representing the point at which a penalty will be incurred, and an Excessive Deterioration Level (EDL), where the maximum penalty will be incurred. The penalty will increase linearly between these two levels.

This year our average duration was 5 hours for 10,778 interruptions, which compares favourably to the RIIO-1 average of 6.6 for 12,488 interruptions. The duration of interruptions is very dependent on factors such as location, ground conditions, and extreme weather conditions.

6.2.10 Data Best Practice and our Digitalisation Strategy and Action Plan (LO)

The purpose of the **Data Best Practice** licence obligation is to ensure the delivery of a digitalised energy system that will maximise the value of data for consumers. Ofgem own and publish a Data Best Practice Guidance document which defines the data that we must comply with, and then details a principles-based compliance approach. This document was published on November 15th 2021 and has been adopted by NGN. As active members of the Data and Digitalisation Steering Group (DDSG) representing energy distribution and transmission companies, NGN have engaged with Ofgem, BEIS and other key stakeholders to help shape the guidance and to promote its consistent application. NGN chairs a sub-group of the DDSG on Data Interoperability.

The purpose of the **Digitalisation Strategy and Action Plan** (DSAP) licence obligation is to ensure GDNs work to make better use of Energy System Data and digital technologies to generate value for customers and stakeholders. This could include delivering a more efficiently planned, maintained and operated energy system, with users having greater information and insight.

Under the licence obligation GDNs are required to publish and seek feedback on:

- An updated Digitalisation Strategy at least once every two years.
- An updated Digitalisation Action Plan at least once every six months.

NGN's latest Action Plan can be found using the link below:

<https://www.northerngasnetworks.co.uk/previous-plan/the-future/digitalisation-strategy/>

6.3 Maintain a safe and resilient network

6.3.1 Repex - tier 1 Mains and Services (PCD)

Outputs	21/22	22/23	23/24	24/25	25/26	Total	Target
Mains	437.4	437.4	437.4	437.4	437.4	2,186.8	2144.3
Services	30,220	30,043	30,043	30,043	30,043	150,392	147,469

The purpose of the Tier 1 mains and Tier 1 services PCDs is to fund the workload delivered under the Tier 1 replacement programme. Both PCDs contain an Allowance Adjustment Mechanism that ensures consumers only fund the volume and mix of work that is actually delivered, subject to an upward cap to limit the amount of any over delivery.

Over RIIO-2 we plan on delivering 437.4km of Tier 1 mains per year in the same workload mix contained within our Business Plan. This is an increase of 8.5km each year, 42.5km over the 5 years, and will allow us to recover the Covid-19 related shortfall of workload seen in the final year of RIIO-1 by the end of the Repex programme in 2032. This is below the 3% cap for mains workload and generates an increased allowance of £4.4m over RIIO-2.

This increase in mains also drives an increase in services, where we expect to deliver 2,923 extra over the 5 years, 585 per year. This is below the 10% cap for services and generates an increased allowance of £0.8m over RIIO-2.

6.3.2 Gas holder demolitions (PCD)

Outputs	21/22	22/23	23/24	24/25	25/26	Total
Actual	5	-	-	-	-	5
Target	5	5	5	5	3	23
Cumulative Out / (Under)	0	-	-	-	-	-

The purpose of the Gas Holder Demolition PCD is to fund the removal and decommissioning of gas holders. These assets are no longer required to operate the network and present a safety risk and require maintaining whilst still in situ. If we do not complete all targeted 23 holders in RIIO-2 then our allowance reduces by a set unit cost.

This year we successfully demolished 5 holders, in line with our business plan target. We remain on track to complete the programme in RIIO-2.

6.3.3 Capital Projects Price Control Deliverable (PCD)

The purpose of the Capital Projects PCD is to hold the networks to account for the delivery of specifically funded capital investments. NGN has two such projects, discussed below.

TransPennine Rail Electrification – this is the largest area of expenditure on our LTS assets in RIIO-2 and is expected to involve work at 4 separate locations. NGN proposed this c£20m project should be a PCD as we are not driving the work, location or timing, and so the final costs are uncertain.

Our RIIO-2 Business Plan assumed that the 17 bar 450mm Dewsbury pipeline would need a 'local diversion', and that both the 38 bar 600mm Dewsbury pipeline and the 17 bar 250mm Thornhill Spur pipelines could be left in-situ, requiring additional protective measures.

Network Rail have now further developed their concept designs and it is now clear that a large rail bridge together with a piled retaining embankment would need to be constructed over the area of the existing Thornhill Spur pipeline. Further studies and surveys showed that finding a safe and cost-effective diversion was not possible without significant additional land purchase that may affect the feasibility of the whole new rail scheme. In view of this, Network Rail have now commenced a redesign of the proposed new rail bridge and embankment to remove the need for piling close to Thornhill Spur. NGN are still under notice to remove this pipeline, although the required date has been extended to February 2024. Due to this protracted study programme and possible level of protection required to the existing pipeline, NGN currently estimates that c£0.5m will be expended against this PCD to close-out the required scope at Thornhill Spur.

Our RIIO-2 Business Plan assumed that of the two Dewsbury HP pipelines, only the smaller 17 bar one would need a local diversion at a cost of c£5m. There has been no change to this scope or estimate, and NGN which shortly be undertaking tendering for detail design following completion of the Options Study. Network Rail have served notice on NGN to divert this pipeline by August 2024.

In addition, the detail design for the works in this area now includes a considerable land purchase and a deeper cutting for the new rail lines in proximity to a larger 38 bar pipeline, and this pipeline is now also under notice for NGN to remove it by August 2024. The details of Network Rail's work in this area is still to be finalised, and when issued, this

will allow NGN to update its cost estimate for the required diversion, since this was presented as a 'no cost option' in the RIIO-2 Business Plan.

Two further diversions of high-pressure overcrossing are needed to facilitate the TransPennine electrifications work east of Leeds. Ridge Road was designed and the procurement of materials undertaken during RIIO-1, whilst conceptual solutions were produced for Austhorpe Lane. Network Rail then suspended but did not cancel their notification for both projects. We expect that formal notification to continue the projects will be made before September 2022, with delivery required by early 2025 and December 2024 respectively. Costs have not currently been updated but are likely to be in line with the original forecast of c£15m.

Overcrossings – we build these assets when our below-ground pipes cross natural or man-made obstacles such as rivers, canals, road and railways. We have a total population of 352. If an overcrossing fails, we risk an explosion, loss of supply, and methane leakage. There is also a security risk should a member of the public access the site and fall from the pipework – such an incident happened in RIIO-1.

Under this PCD we have a target to deliver 45 condition upgrades and 63 security upgrades for £8.3m over RIIO-2. This year we have delivered 2 condition upgrades for c£0.12m, an average of c£60k, and 2 security upgrades. The condition upgrade unit costs are relatively low compared to the allowed unit cost of c£80k. Note unit costs can vary significantly for this type of work, and these overcrossings were relatively simple stream / ditch projects.

We expect to increase workload next year, which will then peak in year 3 of the price control. At this point we expect to be ahead of the expected run rate to deliver the full programme of works over the 5 years, with workload reducing in the final 2 years.

6.3.4 Cyber resilience IT and OT (PCD and Use it or Lose it Allowance)

The purpose of the Cyber Resilience Information Technology (IT) and Operational Technology (OT) PCD and Use it or Lose it (UIOLI) allowance is to support NGN in managing risks associated with the security of its information and operational technology. The funding seeks to:

- Reduce the likelihood of security incidents occurring.
- Minimise the impact of security incidents that have occurred.

- Improve the continuity of gas distribution services whilst operating in cyber-affected states.
- Support wider business objectives such as digitalisation and net zero initiatives.

This work is business critical and sensitive in nature and so is not considered in detail here. We received funding for use across the first three years of RIIO-2. Funding was not provided for the later years due to the increasingly uncertain nature of the risks and hence the funding required.

6.3.5 Job completion lead-time including re-instatement (ODI-R)

Outputs	21/22	22/23	23/24	24/25	25/26
Total completed Jobs	1174	-	-	-	-
% Completed within target	57.6%	-	-	-	-

This output requires NGN to complete works for a connection or service alteration at sites where flow rates are below 275kWh per hour within 20 working days of payment. The RIIO-2 target for NGN is to ensure this is achieved 45% of the time by the end of the price control. NGN's performance in 2018/19 was c31%.

This year we beat the target, achieving 57.6% of works within 20 days. The target was formally embedded within our workforce planning activities and our Totex operating model ensured resource was available to significantly improve performance.

6.4 Deliver an environmentally sustainable network

6.4.1 Shrinkage and environmental emissions (ODI-F and ODI-R)

The purpose of the shrinkage and environmental emissions ODIs is to incentivise the gas networks to reduce shrinkage and leakage gas volumes.

Shrinkage gas includes gas illegally taken by third parties, own use gas the networks use primarily for pre-heating gas at locations where the gas moves from one pressure tier to the next, and leakage gas. The reputational ODI covers all of shrinkage gas.

During 2021/22 we successfully reduced our overall Shrinkage Gas volumes by 4.9GWh to 314.1GWh. This is behind our original business plan target. This underperformance is as a result of some delays in implementing a new System Pressure Management technology that has been developed within NGN.

We will start to implement this new system in 2022/23, which we expect will allow us to push average system pressures below the levels in our original business plan. In doing so this will achieve the aggregate levels of shrinkage reduction over the five year price control.

This outcome can be seen in our assessment of our current and forecast performance against the financial ODI that covers leakage associated with average system pressure and gas conditioning levels.

Environmental Incentive £m, 18/19 prices	21/22	22/23	23/24	24/25	25/26	Total
Environmental Emissions	(0.3)	(0.0)	0.2	0.1	0.1	0.1

6.4.2 Commercial Fleet EV Price Control Deliverable (PCD)

The purpose of the Commercial Fleet Electric Vehicle (EV) PCD is to support the networks in converting their vehicle fleets to EVs or other zero emission equivalents. The base total allowance includes funding for updating the network vehicle fleets. The funding in this PCD relates to the incremental cost of purchasing an electric vehicle in place of an equivalent internal combustion vehicle. Whilst the unit costs are for vehicles and infrastructure based electric vehicle data, the PCD allows equivalent zero-emission vehicle types, such as hydrogen, to be substituted for an EV where this is efficient. The PCD is also subject to a volume driver which adjusts the five-year allowance to reflect the actual volume and mix of EVs delivered over the price control.

NGN's PCD includes replacing 146 small and medium vans with EVs and installing 182 electric vehicle charging points. Our plan was to begin installing the EV charging points in the first year of RIIO-2 and to purchase 2 EVs to fully trial and understand the impact on operations of adopting EVs.

However, the Covid-19 pandemic delayed the preparatory work needed to deliver this. We have now completed all the required surveys to ensure our offices and depots have the necessary electrical capacity to support the EV charging points. We will shortly complete a competitive tender exercise to appoint a contractor to deliver the work, with the majority expected to be completed in the second year of RIIO-2.

We will also carry out a competitive tender event in the second year of RIIO-2 for the purchase of our first EVs, though delivery dates will be subject to the world-wide supply chain issues currently being experienced.

6.4.3 Environmental action plan and annual environmental report (ODI-R)

The purpose of the Environmental Action Plan (EAP) and Annual Environmental Report (AER) is to ensure that GDNs take responsibility for the environmental impacts arising from their networks and are transparent in what they are doing to mitigate these. It aims to support the delivery of environmental outcomes and encourage greater environmental ambition.

The EAP included workload targets for three key **Land Remediation** activities:

- On-going periodic condition reviews for all 148 sites within the portfolio to ensure conditions remain stable and existing environmental risk assessments remain valid.
- Environmental monitoring works at up to 9 sites and intrusive survey works at up to 7 sites to confirm site conditions and refine the existing environmental risk assessment.

This year we completed the above activities across 56 sites, in line with the EAP target. This included desk top assessments at 5 of the sites, intrusive land contamination survey work at 6 of the sites, and environmental sampling at 10 of the sites to update the environmental risk and potential liability. Some sites saw more than one activity. Site inspections were completed at a further 40 former sites to ensure their conditions remain stable and the existing risk assessments remain valid.

- Remediation works at up to 8 sites where we have identified potentially non-compliant conditions, or where remediation would deliver environmental betterment to reduce the long-term contamination risks associated with the sites.

The EAP included 2 new remediation projects in 2021/22, however these have not commenced due to potential third-party interest in the planned sites. We continued projects at three sites, most notably at a site in Keswick, Cumbria. This project successfully recovered c7,500 litres of coal tar and contaminated waters from the tank on site, reducing the thickness of coal tar present in the tank to below measurable thicknesses, whilst also reducing dissolved contaminant concentrations in the remaining tank waters by c90%. The project won the Best Remediation of a Smaller Site at the 2021 Brownfield Awards.

Full details of our performance against our **Environmental Action Plan** initiatives will be provided in our **Annual Environmental Report** which will be published by the 1st of October 2022. A summary of the key actions we have taken during 2021/22 is provided below:

- Company cars – now includes 80% hybrid, plug-in hybrid or battery electric vehicles.
- In partnership with the White Rose Forest and Community Forest Trust we directly funded the planting of over 7,500 trees and enabled the planting of a further 550 trees to directly tackle poor urban air quality in our region.
- Homes for Nature – 66 sites now have improved conditions to encourage biodiversity.

- Natural Capital Assessments – we have developed a bespoke tool to assess and value material ecosystem services to derive natural capital values for our landholding. We have carried out detailed assessments for 32 of our infrastructure sites.
- Office and depot waste – our paper consumption reduced from 3m sheets in 2018 to c0.5m sheets, meaning we are ahead of our target for a 50% reduction by 2025/26.
- Excavation spoil disposal (0.0%) and virgin aggregate consumption (8.0%) are both on track to achieve the end of RIIO-2 targets.

Section 6.4.2 above provides details of our actions taken during 2021/22 to achieve our Commercial Fleet EV Price Control Deliverable.

6.4.4 Business Carbon Footprint (ODI-R)

The purpose of the business carbon footprint (BCF) reputational incentive is to ensure that GDNs take responsibility for their BCF and are transparent in what they are doing to reduce this. Our Environmental Action Plan (EAP) included targets for the reduction in BCF over RIIO-2.

Business Carbon Footprint		21/22	22/23	23/24	24/25	25/26
Non-Shrinkage BCF for Scope 1 and 2 [^] – tCO ₂ e	Actual	4785				
	Target	4,885	4,482	3,978	3,655	3,580
Non-Shrinkage BCF for key Scope 3 – tCO ₂ e	Actual	15,200				
	Target*	15,298	15,030	14,724	14,457	14,191
Scope 1, 2 [^] and key 3 BCF – tCO ₂ e	Actual	19,985				
	Target*	20,183	19,512	18,702	18,112	17,771
Total Scope 1, 2 [^] and 3 BCF – tCO ₂ e	Actual	27,191				
Scope 1 - Shrinkage tCO ₂ e	Actual	363,345				

* Business plan targets amended in May 2022 in agreement with Ofgem to bring Scope 3 emissions reporting in line with best practice methods.

[^] Market-based Scope 2 emissions methodology

The impacts of the Covid-19 pandemic temporarily influenced our Scope 1 and 2 BCF during 20/21 as our business travel habits changed and energy consumption fell. Our 21/22 Scope 1 and 2 BCF (market-based, excluding shrinkage) is 26% below our pre-COVID value from 19/20, and 14% below 20/21 (both location-based), in addition to being 100tCO₂e (2%) below the 21/22 annual target contained in the EAP. The main drivers for this are:

- Vehicles – reduced fuel consumption in our commercial vehicle fleet (-1% vs 20/21) and decarbonising our company car fleet composition (see above).
- Electric – use of 100% zero-carbon electricity at all of our premises and infrastructure sites for the first time.

We have made changes to how we measure and report our Scope 3 BCF (excluding shrinkage) to bring this in line with best practice, meaning performance comparison with previously reported years is not possible. Emissions for identified key Scope 3 emissions sources were 98tCO₂e (0.6%) below our revised annual target contained in the EAP. The main drivers for this are:

- PE pipe – reduced material purchasing (-28% vs 20/21) as we utilised our stockpiles built up as part of our Brexit and Covid-19 contingency planning.
- Electricity losses – use of 100% zero-carbon electricity at all of our premises and infrastructure sites.
- Air and rail travel – no business air travel for the second consecutive year and much-reduced business rail travel compared to pre-Covid-19 as we continued to use technology to engage with stakeholders virtually.

During 2021/22 we completed a materiality assessment and screening exercise for our Scope 3 business carbon emissions. Full details of this will be reported in our 2021/22 Annual Environmental Report.

7 Re-openers

7.1 Introduction

It is not always possible to anticipate all future events as some are outside of a company's control. This limits the ability of companies to accurately forecast costs, workload as well as any associated outputs.

In these circumstances Ofgem can include re-openers to manage this uncertainty. Depending on their design they allow Ofgem to adjust a company's allowances (in some cases up and in some cases down), outputs and delivery dates in response to changing circumstances during the price control period.

7.2 HSE Fatigue

The purpose of this re-opener is to account for changes in Health and Safety Executive (HSE) policies that result in material changes to Totex costs during RIIO-2. Funding can move up or down in response to HSE policy changes that impact safety requirements.

The HSE has engaged with the GDNs to assess our fatigue management approaches to ensure they are appropriate and benchmarked against the good practice as outlined in Managing Shift Work: Health and Safety Guidance (HSG 256). This includes a systematic approach for assessing and managing the risks of work-related fatigue, covering the planning and monitoring of working hours, and an audit of working time arrangements.

A joint GDN-HSE group has been set up to manage this engagement. A sub-group of GTOSG (Gas Transporters Operational Safety Group) has been formed to work on Fatigue, with representatives from each GDN, a HSE human factors specialist and a HSE pipeline inspector. This group has scoped out a research project on fatigue which was focused on the working practices of the GDNs, including the use of flexible work patterns, and standby/call out approach to cover out-of-hours emergency workload.

The exact impact is unknown at this point, but estimates have suggested we could see a material increase in resource needed to cover our 24-hour 365 days a year operation. This could lead to a cost increase of £10m p.a. We are working to establish the most efficient response to this challenge to mitigate cost increases whilst remaining compliant with the best practice.

7.3 Streetworks

The purpose of this re-opener is to allow GDNs to recover the efficient costs of complying with new permit and lane rental schemes or new requirements introduced by public bodies after the RIIO-2 price control was set. These public bodies include agencies such as the Environment Agency, not just the Highways Authorities. Therefore, the scope of this re-opener includes the situation where the GDNs incur increased costs for disposing of excavated material from streetworks if the Environment Agency withdraws Regulatory Position Statement 211.

When we submitted our business plan 7 out of 27 authorities in our network had introduced permit schemes, at a cost of c£2m per year. A further 17 authorities have now introduced schemes, which has increased our costs in three areas. We manage the process, pay the permit fees, and the permits themselves impose conditions on how we operate in the street, which impacts productivity. We estimate this will cost an extra £2.7m per annum based on current actual costs and run rate. This equates to £13.4m over RIIO-2. Importantly we did not include a forecast for this increase in our Business Plan submission and have looked to mitigate the impact where possible. We expect to re-open in January 2024.

The Environment Agency have stated their intention to withdraw Regulatory Position Statement 211, which gave utilities exemptions from legislation governing the safe disposal of hazardous waste when the road is dug up. Street Works UK is leading an industry working group to develop an alternative way of working to ensure that utility excavation spoil waste can be practicably managed in accordance with waste legislation. This year we participated in the second phase of field work to characterise excavation spoil waste and develop and test new methods of risk assessment. This ongoing work aims to develop a new spoil waste management protocol in agreement with the Environment Agency by mid-2023 with a subsequent period of training and preparation prior to full industry implementation. Depending on progress and the likely outcome this may be included in our re-opener in January 2024.

7.4 Cyber Security

The purpose of the Cyber Resilience Operational and Information Technology reopeners is to support NGN in managing risks associated with the security of its operational technology network and information systems which can change materially over time.

This work is business-critical and sensitive in nature and so is not considered in detail here. We received funding for use across the first three years of RIIO-2. Funding was not provided for the later years due to the increasingly uncertain nature of the risks. Two re-opener windows exist in RIIO-2 which allow us to request further funding to manage these future risks – these are in April 2021 and January 2023. Ofgem also require confidential ongoing biannual reports on progress. We re-opened in January 2021 which increased our funding over the 5 years of the price control. We expect to re-open again in January 2023 to both reprofile some of the existing expenditure and to request further funding in response to changing requirements and the enhanced Cyber Assessment Framework (CAF).

7.5 Non-operational IT and Telecoms Capex re-opener

The purpose the Non-operational IT and Telecoms Capex re-opener is to allow the GDN's to recover efficient costs directly incurred to deliver efficient IT enhancements to deliver their agreed IT strategy. Given the fast paced and constantly changing technology landscape Ofgem placed a high hurdle for allowing ex ante IT and Telecoms allowances, which meant some projects were disallowed. This re-opener allows the GDN's to in effect resubmit or amend those projects for consideration when they are more certain. There are two re-opener windows. We did not re-open in April 2021 but expect to re-open in January 2023 to request funding for some of the projects which were disallowed and in response to changing market conditions for IT equipment and infrastructure.

7.6 Tier 1 Stubs

The purpose of this re-opener is to allow GDNs to recover efficient costs for decommissioning Tier 1 iron stubs. A Tier 1 stub is a short length of Tier 1 iron main attached to a larger diameter parent main which would previously have been decommissioned at the same time as the parent main. Under the Three Tier Repex approach introduced in RIIO-1 not all large diameter parent mains will be decommissioned, as they may not pass a Cost-Benefit assessment.

Ofgem provided allowances for the first two years of RIIO-1 as the HSE policy was under review at the time, and so the volume and timing of work was uncertain. It is now clear under HSE policy that many Tier 1 stubs still need replacing.

There is only one re-opener window in January 2023. The reopener covers historic and future costs, and we expect to re-open to review progress to date and our plans for the rest of RIIO-2 to ensure we can deliver the required work by the end of the Repex programme. More details will be provided to Ofgem when we have a better understanding of the whole programme cost which is still under development as the work only commenced in 2021.

8 Innovation and Futures

8.1 Introduction

One of NGN's key objectives within RIIO-2 is to prepare the network to deliver Net Zero at the lowest cost to the consumer, whilst maintaining world-class levels of system reliability and ensuring that we support the needs of consumers in vulnerable situations. We are aware that investment in our network is likely to need to increase to meet Net Zero targets as we progress through this decade.

To achieve this key objective, there are three allowances, the Strategic Innovation Fund (SIF), Network Innovation Allowance (NIA) and Net Zero Use It or Lose it Allowance, which can facilitate the transition to a Net Zero future.

NGN is committed to a whole systems approach to deliver sustainable energy solutions that will benefit our customers and contribute to meeting the UK's net zero emissions targets. A whole systems approach is one that facilitates strong collaboration and integration across utilities, operations, markets and supporting processes and is tested against a range of future scenarios.

8.2 The Strategic Innovation Fund

The Strategic Innovation Fund (SIF) is a funding mechanism which aims to find and fund ambitious, innovative projects with the potential to accelerate the transition to net zero. These projects should help shape the future of energy networks and succeed commercially where possible. Ofgem have allocated £450 million to this fund over the period 2021 to 2026, with the option to extend and increase as necessary. The SIF is delivered in partnership with Innovate UK, part of UK Research and Innovation (UKRI).

Four key Innovation Challenge areas have been identified. These are:

- Whole system integration.
- Data and digitalisation.
- Heat.
- Zero emission transport.

The SIF will be funded in three Project Phases (Discovery Phase, Alpha Phase and Beta Phase), with successful application and assessment against Eligibility Criteria as a condition of receiving SIF Funding for the relevant Project Phase.

In November 2021 we submitted several projects under the discovery phase and were notified by Ofgem in February 2022 that we had been awarded £0.5m of funding to progress 5 projects through the Discovery phase. The Discovery Phase (feasibility studies) defines the problem and the value of solving the problem. It also facilitates a common understanding of what energy consumers and network users need from the innovation and identifies any constraints that may impact on the solution of the problem and options for the management of those constraints.

In 2022/23 NGN will be working to progress these projects through the discovery phase and consider progression to the alpha phase, which will focus on preparing and testing the different solutions to the problems that are identified during the discovery phase, ahead of any future large-scale demonstration of the project. It will also test the riskiest assumptions. The five projects are outlined below.

8.2.1 The Multimodal Hydrogen Transport Refuelling Network Study

Partners: Eversholts, Durham University, Herriot Watt University and Transport for the North

Funding: £89,500.

This project will evaluate the potential for using hydrogen in heavy-duty transport across the North of England. It will create a joined-up, regional strategy to cost-effectively kick-start the hydrogen economy in the North and will directly support the growth of zero-emission transport, and the decarbonisation of the electricity grid.

8.2.2 Rail decarbonisation planning

Partners: Eversholts, EA Technology, Northern Powergrid and Northern Rail

Funding: £113,500

This project will develop an overarching implementation strategy and methodology to enable the ongoing deployment of the most effective, efficient, and appropriate technology solutions to decarbonise rail transport.

8.2.3 Critical factors for adopting smart homes for energy efficiency and implications for consumers and providers

Partners: National Energy Action, Newcastle University and Northern Powergrid

Funding: £55,400

In parallel to a Network Innovation allowance (NIA) project looking at energy efficiency through our Customer Energy Village at our dedicated research site in Gateshead, this project will provide a state-of-the art review of the factors related to the use of data and digital technologies, to help reduce customer bills and enable a fair net zero transition.

8.2.4 Thermal imagery analysis

Partners: National Grid and Synovate limited

Funding: £78,200

This project aims to develop a proactive strategic assessment and forecasting tool to support the replacement of old metallic mains with new PE pipes. It will capture asset data with new sensing solutions to develop models to support a safe, cost-effective and environmentally aware hydrogen conversion through better asset information, planning and reduced uncertainty.

8.2.5 Excess gas turbine energy generation

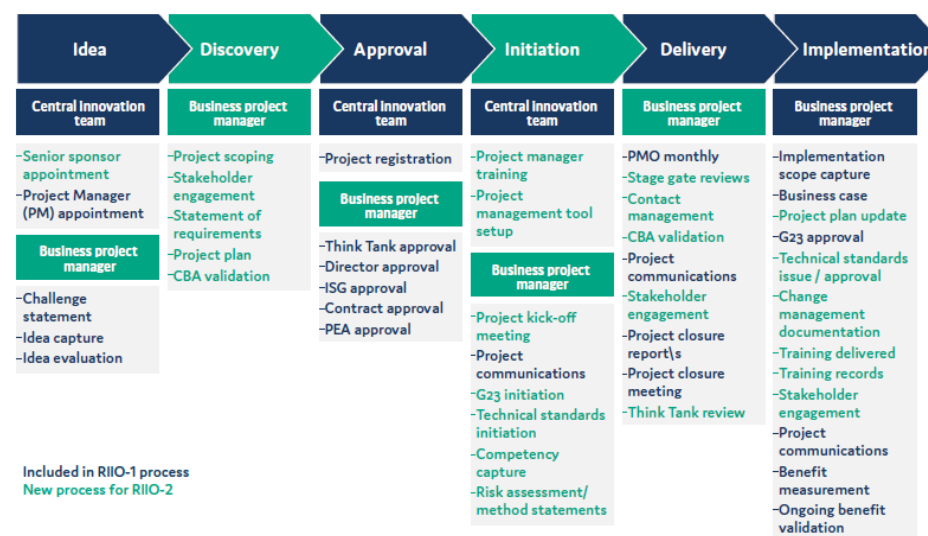
Partners: Revolution Turbine Technologies Ltd, Digital Catapult, Stockton & District Advice & Information Service, and Northern Powergrid

Funding: £134,200

This project explores the potential for a new product and service to generate net zero electricity using excess gas pressure. This technology has been proven in the oil and gas sector offshore but is new to the UK energy market. The project takes a whole system view across energy generation and demand, determining new financial viability for infrastructure expansion and modernisation.

8.3 Network Innovation Allowance

Within RIIO-2 the purpose of the Network Innovation Allowance (NIA) is to fund innovation relating to support for consumers in vulnerable situations and/or the energy system transition. NGN uses a six-step process to decide on which projects to fund through the NIA Allowance. This process helps identify barriers to realising a successful outcome and ensures that they are removed. It also allows us to better understand the project data and stakeholder requirements upfront.



The process is managed by the independently chaired Innovation Think Tank which is our monthly forum for colleagues from across the network to present potential innovation projects. The purpose of the Think Tank is to develop and foster a culture of 'value-based' innovation across the network, also acting as an engagement vehicle to keep colleagues connected to innovation and allows the collective wisdom of the wider business to feed into the thinking. This is achieved by bringing together key business disciplines under a single authority to challenge and approve innovation project proposals.

Key highlights from some of the projects we have progressed in 2021/22 are outlined below. Further details of these and our other projects can be found online in NGN's RIIO-2 Year 1 Innovation report.

8.3.1 Leak Vision

Leakvision has been developed in collaboration with Synovate. It maps pipeline leakage internally and pinpoints gas leaks, avoiding missed digs and repeat visits. The technology is mounted to a robot base/push rod camera system, the system can inspect in-pipe features to indicate the presence of leaks from joints, connections and defects. The technology will allow NGN to reduce the cost of excavations and reduce emissions from faster and more efficient repairs.

8.3.2 Vulnerability Mapping Tool

Working with its project partner Egnida NGN are developing a collaborative platform which will combine data from across the business with open-source and paid-for external data sources to create an interactive visual map. This map will allow staff to see where their decisions will have the largest impact on customers and where the most vulnerable customers are. This will assist communication, engagement with external stakeholders, and planning activities which need to take into account the impact on vulnerable and priority customers.

8.3.3 H21

In 2021/22 NGN has continued its research into the feasibility of repurposing the existing gas network to distribute Hydrogen. The H21 project continues to provide evidence that is critical to facilitating this and critical to the live village trial that NGN is preparing for.

In 2021/22 we commenced testing network operational gas procedures under 100% hydrogen conditions on an existing buried network of gas mains, a world first, to further understand how gas operations would be undertaken on a 100% hydrogen network in the future. This project will provide vital evidence about the suitability of the existing gas distribution network and applicable procedures to distribute 100% hydrogen.

NGN also commenced a study into the wider impact of hydrogen. This project utilises the existing distribution gas network to transport hydrogen and will monitor the effects of the changes in characteristics of hydrogen as opposed to natural gas. These characteristics need to be reviewed and the effect on the network assessed. This is of particular importance for the proposed Hydrogen Village trial at Redcar and future conversion projects. Further information on NGN hydrogen projects can be found on its dedicated H21 website <https://h21.green/>.

8.4 Futures

In its RIIO-2 Final Determination, Ofgem established a Net Zero and Re-opener Development Fund Use it or Lose it allowance ("NZARD UIOLI"). The purpose of the NZARD UIOLI is to enable Network Licensees to fund small Net Zero facilitation projects, and also to allow for early development work on projects that network companies intend to bring forward at a later stage through other RIIO-2 Net Zero-related mechanisms. NGN were awarded £4.59m under the NZARD UIOLI.

8.4.1 Overview of NGN Futures projects

In 2021/22 NGN has allocated its UIOLI across a number of projects which predominately focussed on understanding the role that gas would play in helping to achieve the UK Net Zero emissions targets. We have also focused on developing a strategy and roadmap for energy futures that considers the impact of changes across the whole energy system. This will help to ensure that we deploy the UIOLI in its most effective manner. The figure below outlines our approach to our Net Zero Strategy development.



In our strategy analysis we identified a range of actions that NGN could implement to prepare the business for potential future scenarios, which differ by importance, urgency, cost and progress to date as shown by the figure below. Any steps taken will prioritise the 'low regrets' actions which are relevant in multiple future scenarios. Each of the five projects progressed is described below.

Assessment criteria	Categorisation of activities	Cost	Timing and prioritisation
Following focus sessions, each activity was assessed on the basis of a range of key factors:	Each activity was categorised based on its importance, urgency and the current degree of organisational readiness:	Indicative cost levels based on the nature of each activity were defined as below:	Suitable time periods for prioritisation of each activity were allocated as defined below:
Importance 	Continue as planned – the aims and steps to mitigate key gaps are known. Implementation of known steps is needed.	£ Low cost – planning activities that can be delivered primarily through internal resources including desktop assessments.	Short-term – priority in the next year.
Urgency 	Develop a plan – the aims are known but the steps to mitigate key gaps are not fully established. Development of a robust plan is needed.	££ Medium cost – preparatory, enabling activities that may require working with external partners and involve some limited capital expenditure.	Medium-term – priority in advance of the 2026 policy decision on the role of hydrogen in residential heating.
Progress to date and scale of existing gaps 	Plug the gap – neither the aims nor the steps to mitigate key gaps are fully established. Clarification of the aims and development of a plan are needed.	£££ High cost – delivery activities which involve the deployment of people, systems, resources and projects and can be capital intensive.	Long-term – priority post the 2026 policy decision on the role of hydrogen in residential heating.
Cost 			
Degree of planning 	Implement when triggered – the aims and / or the steps to mitigate key gaps may be known, but implementation is not yet needed.		

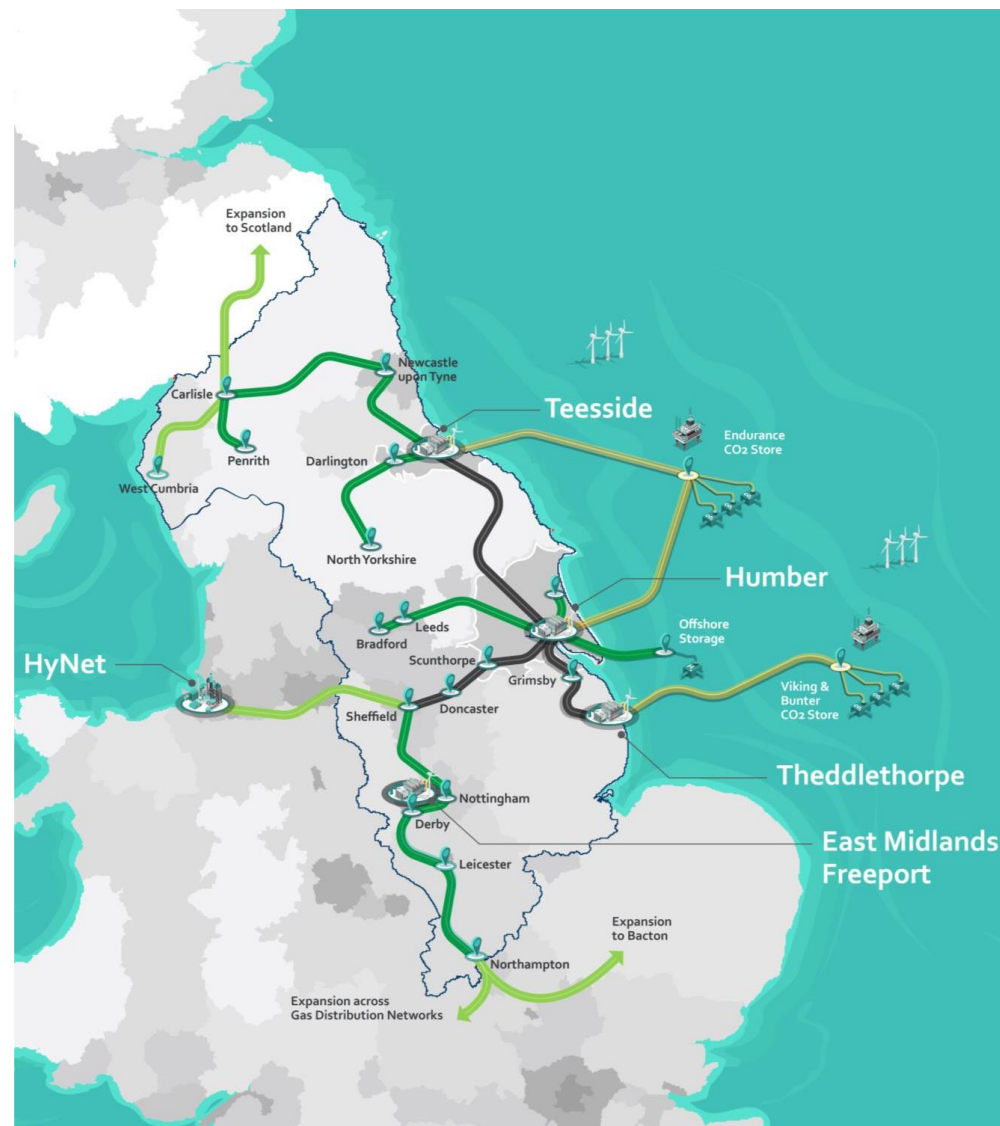
8.4.2 East Coast Hydrogen

East Coast Hydrogen, phase 1 is a collaboration between Northern Gas Networks, Cadent and National Grid Gas Transmission. It is a 15-year programme that will be carried out in multiple discrete phases.

The East Coast Hydrogen Feasibility Report is the first step in the decarbonisation of industrial, commercial and domestic demand across the East Coast Hydrogen region and beyond. The project would see up to 39,000 businesses and over 4 million homes converted to hydrogen. The programme will benefit from the natural assets of the North of England, including existing and potential hydrogen storage facilities, and build on the hydrogen production in two of the UK's largest industrial clusters in the North East and North West, in turn ensuring significant private sector investment in the UK's industrial heartlands.

It will be the first major step in the conversion of our national gas networks to hydrogen and will act as a blueprint for subsequent conversions across the UK. The project also demonstrates the innovation, engineering capabilities and economic opportunity in the North, and creates tens of thousands of highly skilled Green jobs in the future hydrogen economy.

NGN plans to invest more of its UIOLI in 2022/23 to progress phase 2 of the East Coast Hydrogen project to generate evidence to support an application for additional funding to commence the project build through the Net Zero Pre-construction and Small Net Zero Projects Re-opener later in RIIO-2.

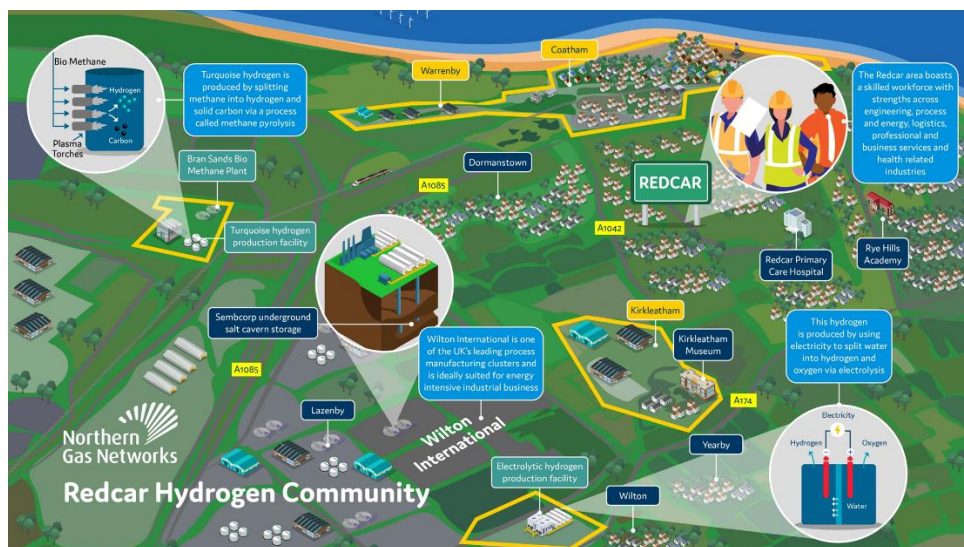


8.4.3 Residential Heat Study

The objective of this study was to analyse the upfront capital costs facing consumers when considering the installation of new low-carbon heating technology solutions for their homes today, including the cost of any associated home upgrades that will likely be required. The study tracks the upfront costs of these respective technologies over time to establish whether the cost reduction targets mooted by government and heat pump stakeholders are being delivered, and the implications this has on our ability to decarbonise the UK housing stock.

8.4.4 Redcar Hydrogen Community

In 2021/22, NGN worked with Ofgem and BEIS to prepare a feasibility study for the development of a hydrogen village on its network. The feasibility study was formally submitted to Ofgem and BEIS as a proposal to undertake a further detailed design for the village trial when Ofgem triggered the Net Zero Pre-Construction and Small projects Reopener in 2021. NGN's proposal involves switching the gas supply from natural gas to hydrogen for around 2,000 homes and businesses in parts of Redcar including the town centre, Warrenby, Coatham and an area of Kirkleatham from 2025 for around two years.



NGN selected the Redcar area for its project due to access to existing plans for hydrogen production in the area, and as Redcar contains a diverse range of housing stock and businesses. If ultimately approved, the delivery of the hydrogen village will be a significant project. It would involve the production and storage of hydrogen and repurposing our network to distribute Hydrogen. All gas appliances would need to be replaced with a hydrogen alternative or electric equivalent if customers did not want to participate.

8.4.5 HiiRoc Trial Unit

The HiiROC unit is seeking to demonstrate the efficient and clean production of hydrogen using natural gas and the process of methane pyrolysis. Unlike steam methane reformation which produces a significant amount of carbon dioxide, the HiiROC unit produces hydrogen and solid-state carbon, known as carbon-black, which is then collected and used in other applications. As there is no exhaust gas vented to the atmosphere the carbon footprint of the unit is greatly reduced. An additional benefit is the energy required to split the hydrocarbon molecules is significantly less than the energy requirements for hydrogen production through electrolysis.

8.4.6 Whole System Explainer

NGN worked with its project partners to develop an intuitive explainer for consumers and stakeholders regarding the role of gas, including hydrogen, in the whole energy system. The intention of this explainer was that it could be used in projects such as the Hydrogen Village Trial to demonstrate how the integration of hydrogen with electricity could lead to delivering overall better value for consumers and to help deliver against the UK's net zero emissions targets. The output of this project was a short video that has proved useful in supporting NGN's messaging regarding its efforts to deliver a lower carbon network.

8.4.7 Net Zero Pre-construction and Small Net Zero Projects Re-opener

The Net Zero Pre-construction Work and Small Net Zero Projects Re-opener (NZASP) was created to allow gas distribution and gas transmission companies to undertake early design, development, general pre-construction work, and net zero facilitation capital projects that will enable the achievement of Net Zero Carbon Targets. The reopener is Ofgem triggered and projects progressed under the UIOLI help to provide early development work on projects that network companies intend to bring forward at a later stage through other RIIO-2 Net Zero-related mechanisms.

In 2021 NGN progressed the East Coast Hydrogen and Redcar Hydrogen Community on the basis that Ofgem could trigger the reopener in RIIO-2 to fund further phases of the projects.

In 2021, Ofgem triggered the NZASP to fund phase 3 of the Hydrogen Village trials. The creation of a 'hydrogen village' was first mentioned in the Prime Minister's 10-point plan for a green industrial revolution in autumn 2020 and reiterated in last year's Heat and Buildings strategy. It will follow the creation of a hydrogen community of 300 homes using 100% hydrogen (SGN's H100 Fife project) and is expected to be followed by a hydrogen town of around 10,000 properties before the end of the decade, a project we are already starting to work on.

In December 2021, NGN submitted its Feasibility study for a Hydrogen Community in Redcar, as outlined above, to Ofgem to secure funding to commence the detailed design phase of the project.

Following a detailed assessment of its proposal by BEIS and Ofgem and further detailed consultation NGN was awarded £5.72m of funding from Ofgem and are contributing over £600K for the detailed design phase.

A proposal from Cadent to host a hydrogen village in a part of Ellesmere Port has also progressed. Both projects now enter the 'detailed design' phase, with a decision about which project will ultimately go live made in Spring 2023.