

Network Innovation Annual Summary 2020/21

we are
the **network**



About Us

We are Northern Gas Networks (NGN), the gas distributor for the North of England.

We keep 2.7 million homes and businesses cooking on gas, through our vast underground pipe network.

We are committed to providing a safe, reliable and great value service to our customers and stakeholders, while developing new forms of energy, such as hydrogen, to support a greener future.

Innovation underpins everything we do - whether we are replacing pipes, fixing leaks, developing low carbon energy solutions or supporting our most vulnerable customers.

By thinking differently, listening to our colleagues and stakeholders, working closely with our partners and considering our communities, we are pushing the boundaries of what a utility company is capable of.

About this document

NGN receives funding from our regulator, Ofgem, to develop innovative products and techniques that allow us to do our core work more effectively, and to create a pathway towards a greener future.

The funding is called the Network Innovation Allowance (NIA).

This document explores how we have used NIA funding in the 2020/21 business year to develop new products and services, invest in business-ready solutions and develop opportunities for collaborative, match-funded projects.

Eight years of industry-leading innovation



The way we approach innovation projects has continued to evolve and improve throughout this time.

For example, potential projects are now subject to more rigorous and sophisticated scrutiny before being green-lit, increasing their chances of success. We have developed more strategic relationships with our suppliers and partners, and now frequently leverage financial contributions from them, to reduce reliance on NIA funding. And we have created opportunities for all colleagues to share ideas, and to get involved in the project management and the delivery of innovation projects.

In the pages that follow, we take a look at our latest crop of NIA funded projects. As always, there is a tremendous variety of new projects to report on, such as improved ways to cut and seal pipes and new ways to capture data to a variety of new trials and studies around hydrogen conversion for homes and businesses.

We have come a long way, and I am delighted that NIA funding will be retained throughout the next regulatory period - allowing us to take many more exciting projects from the drawing board to the streets of the North of England.

Mark Horsley
Chief Executive Officer, Northern Gas Networks

This is our last annual innovation report of the current regulatory period, which began back in 2013. Over the past eight years, Network Innovation Allowance (NIA) funding has allowed us to deliver some truly revolutionary services and products, which continue to deliver valuable savings for customers, reduce disruption and support the transition to a net zero carbon future.

We have completed a total of 100 NIA funded projects over this period, many of which began life as concepts on paper, or extremely early prototypes. Without NIA funding, a lot of these projects would simply not have been developed.

We've also used NIA funding to support the UK's transition to a low carbon economy, by developing pioneering projects around hydrogen as a replacement fuel for natural gas. Through a series of projects under our H21 banner, we've proven that the UK's existing gas networks can be converted to transport hydrogen to homes and businesses - providing a clean and sustainable fuel for the future. We remain extremely active in this area, with a raft of new projects that are examining the fine detail of hydrogen conversion - covering everything from hydrogen storage and generation to the development of a domestic hydrogen detector/alarm.



1. Performance Update

2020/21 has been another boundary-pushing year for our innovation programme.

We completed 20 NIA funded projects and launched 23 new NIA projects, 3 of which were third party match funded.

We continued to work closely with the EIC, our supply chain and fellow utility companies, collaborating on a diverse portfolio of work, sharing knowledge and pooling resources.

We improved our approach to selecting innovation projects, by appointing an external Chair to our Innovation Think Tank – adding objectivity, fresh eyes and wider industry expertise.

And we finalised our business plan for the RIIO-2 regulatory period (2021-2026). To ensure great value for bill payers, innovation will play a crucial role in achieving these savings, while continuing to enhance levels of service.

Tracking our progress

To ensure that our innovation projects deliver value for money, we keep a close eye on their progress, during development and once implemented as business as usual.

We assess and forecast both the quantitative and qualitative benefits of proposed projects and subsequently track completed once implemented.

Measuring the true impact and value of an innovation project is complex and often involves more than simply recording cost savings.

In 2020/21, we built upon the work we started last year to develop a collaborative, industry-wide framework to report on the outputs and outcomes of innovation.

This project, delivered with the Energy Innovation Centre (EIC), other gas distribution networks, the Energy Networks Association (ENA) and Baringa Partners, is designed to bring consistency to the way we all measure and report the outcomes of innovation projects.

We have now agreed a comparative industry-wide framework, called the Innovation Measurement Framework (IMF) that will be used by NGN and all energy networks to report on a range of innovation outcomes, including collaboration and partnerships, the speed at which successful innovation is transitioned into BAU and the benefits innovation has delivered for network customers.

The IMF covers the following elements:

- The balanced scorecard: The measures to be reported against and where they sit within the innovation framework.
- The benefit tables: An Excel spreadsheet which includes the following:
 - Definitions and Guidance: The definition of each data point to be captured and guidance on how to complete the Idea, Project and BAU logs.
 - Idea log: a record of all innovation ideas received.
 - Project log: a record of all innovation projects.
 - BAU log: a record of innovation which has been transitioned into BAU.
- The external stakeholder survey: A survey to be conducted by the ENA on behalf of all energy networks.

The reported outcomes from the IMF will be published annually by NGN and all other energy networks and will provide stakeholders with an accurate and comparable representation of the benefits of investing in network innovation.

Reports will be published on the Smarter Networks Portal. By 31 October each year, the Energy Networks Association will publish a collective summary of NIA activities.

Our impact, in figures

In 2020/21, innovation allowed us to:

- Reduce the number of holes we needed to dig by 2,568
- Reduce the amount of spoil sent to landfill by 12,936 m³
- Complete 20 NIA funded projects
- Leverage £152,113 funding from our supply chain to support innovation projects.
- Maximised our £1.73m NIA investment in a year impacted by Covid-19.
- Cut vehicle journeys by 6,588 miles
- Collaborate with 30 partners

2. Developing our innovation culture

At NGN, we believe a culture of innovation should be part of everyone's life, both at work and at home – from engineers on the front line to office-based staff.

In 2020/21, we continued to create opportunities for all colleagues to become involved in innovation. The global Covid-19 pandemic presented challenges to every walk of life and we used our innovation process and the culture within NGN to share ideas to meet this challenge.

For example, we embraced the use of technology with an increase in video conferencing and webinars to ensure that stakeholders, supply chain partner and colleagues could all get involved in the scoping, creation delivery of innovation projects.

We also developed front-line projects to limit physical contact with customers during the height of the social distancing rules, such as trialling the use of Compressed Natural Gas (CNG) to keep customers on supply during gas outages, and avoid need for face-to-face contact, and replacing service pipes without the need for customer interaction.

Working with the EIC to expand our reach



To ensure that our innovation projects deliver value for money, we keep a close eye on their progress, during development and once implemented as business as usual.

We assess and forecast both the quantitative and qualitative benefits of proposed projects and subsequently track completed once implemented.

The EIC is an efficient single point of access for NGN to engage with and support a global community of innovators. By working through the EIC, NGN take a 'whole system' approach to innovation as together, we aim to promote, facilitate and accelerate collaboration across sectors.

Accessing the utility industry can often be complex for innovators and EIC efficiently facilitates engagement with third parties via proven processes that allow NGN and innovators to successfully innovate together. We have recently signed an Innovator & Industry Charter and together we are committed to work with other EIC Partners to address the main barriers to the innovation deployment and improve the overall experience for innovators.

Jane Blackwell,
Discovery Workstream Lead at the EIC

Managing innovation projects to increase their chances of success

All colleagues from NGN have the opportunity to take on an innovation project and manage it from start to finish.

To assist them, we have embedded the use of a Project Management Tool (PM Tool) that was introduced last year. The PM Tool ensures governance and control over all key elements of a project, including finances, risks, dependencies, and a broad range of internal and external stakeholder engagement. The use of the PM Tool, embedded as part of our six-step process, has increased likelihood of project success and has also enabled us to 'fail fast' where appropriate – ensuring we avoid spending unnecessary time and resource on a project that turns out not to be viable.

Our core innovation team supports colleagues across the wider business and participates in monthly review sessions to monitor progress, remove roadblocks and capture lessons learned. Each project is supported by a senior manager from within the business who can provide appropriate support.

We have also bolstered our core innovation team with the introduction of dedicated subject matter experts to help manage projects and lead on innovative approaches. The experts support NGN colleagues through the innovation process and create opportunities for personal and career development.

Adding external expertise to our Innovation Think Tank

Our Innovation Think Tank is the monthly forum for colleagues from across the network to present potential innovation projects. The Think Tank has a purpose 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.

Each project is subject to rigorous, but constructive, scrutiny and debate, and then all members vote, anonymously, on whether the project should be formally progressed. The effects of which will ensure innovation projects are sanctioned based on their relevance to NGN, RIIO outputs, the Gas Network Innovation Strategy (GNIS) and intended value to its customers.

Over the past 12 months, we have recruited an external Think Tank member – Professor Simon Pringle, who has 25 years’ experience in commercial strategy, innovation and sustainability.

Simon is also a member of our Independent Customer Engagement Group, which was originally set up to scrutinise

and inform our new business plan, and now provides an ongoing consultative role. It means he has extensive knowledge of our business as well as bringing a wealth of external experience.

Having originally acted as an observer during Think Tank forums, Simon now chairs each meeting. His involvement is helping to ensure that projects are examined in a broader and more objective way and tests alignment to our regulatory commitments and forward-looking strategy.

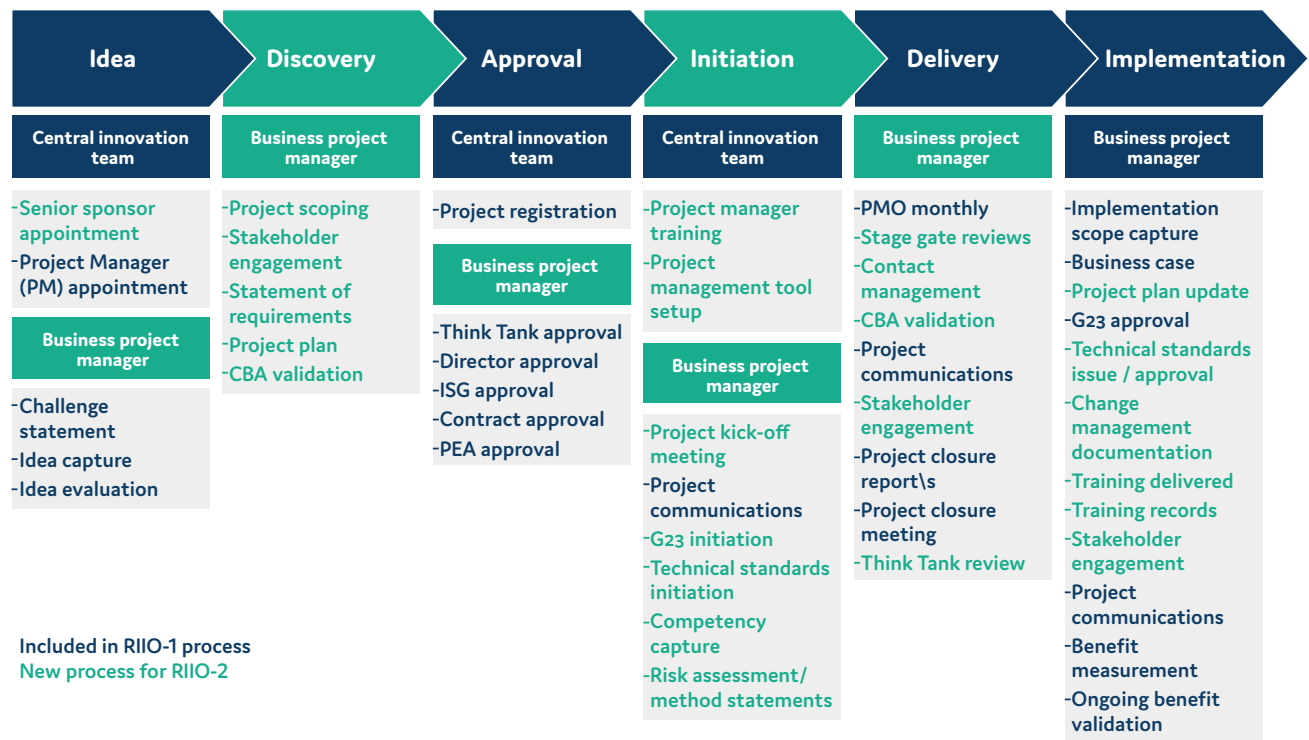


“NGN’s innovation portfolio is extremely diverse and exciting. Alongside working to improve operational efficiency, it has real potential to help address the challenges of decarbonisation and customer vulnerability. I hope my involvement in the Think Tank will allow me to bring some additional objectivity and perspective, to complement the wealth of specialist knowledge which already exists within NGN. I am sure that the work of the Think Tank will continue to nurture and develop the culture of innovation within the company.”

Professor Simon Pringle,
Think Tank Member

Embedding our six-step approach

We have fully implemented our six-step innovation process, core to which is a better definition of the problem statement as the outset. Our revised innovation process significantly helps identify barriers to realising a successful outcome earlier and ensuring that these are removed for the project. Aligned to this is the requirement to better understand the project data and stakeholder requirements up front. We are reducing the cycle time from ‘idea to life’, and through a more robust approach to managing outcomes, to ‘fail fast’ and stop projects where targeted benefits won’t be realised.



3. Collaboration

Developing a digital ‘roadmap’

The past year has seen us work with Digital Catapult – the UK’s leading digital technology innovation centre – to develop a digital ‘IoT’ roadmap for NGN.

The roadmap sets out our priorities in the digital space for the next regulatory period, such as greater use of Artificial Intelligence and remote sensors on the network to improve efficiency, reduce customer disruption and enable the smart networks of the future. The IoT Discovery Programme is enabling us to explore how advanced digital technologies can support the overhaul of existing processes within the network to drive efficiencies, save money and ultimately deliver better experiences for customers.

The alignment of innovation and digitalisation in RIIO-2 are key, as we coordinate our innovation plans to meet the requirements of the energy systems transition.

Leveraging joint funding

NIA funding continues to allow us to develop bold and imaginative projects, but we also recognise the need to leverage funding from other sources, such as our suppliers and third party funding mechanisms.

Monetary contributions from suppliers or ‘in kind’ contributions such as time, expertise and facilities, help to make projects more successful and even better value, at reduced risk, to our bill-paying customers. For our suppliers, the opportunity to develop and commercialise market ready products which can then be sold to other utilities and industries is an appealing proposition. For that reason, companies can often be willing to make a financial contribution when working with us.

Over the past 12 months, we have leveraged 152k of thirdparty funding to support our innovation and will continue to leverage innovation funding from third party throughout RIIO-2.

Recent joint funding successes include:
Development of a MP (Medium Pressure) leak encapsulation kit

Working with our supplier ALH Systems Limited, we have developed a ‘Starter Kit,, which allows our engineers to contain pipe leaks while carrying out repairs.

Traditionally, we have had to rely on third party contractors to install a steel shell encapsulation solution for completing repairs on medium pressure pipe joints. This is an expensive, disruptive, and time-consuming process.



“The IoT Discovery Programme is a three-month long scheme of work designed to support innovative businesses across a number of different sectors to explore advanced digital technologies. In addition, exploring how to deploy them sustainably within their organisations, through a series of workshops, seminars and group discussions. NGN was a key participant in this years programme, and we worked collaboratively with the team to identify and prioritise high-value use cases ranging from health and safety to energy systems transition. We look forward to working with NGN to further develop and roll-out these digital strategies and align to the RIIO-2 strategy.

John Pattinson
from Digital Catapult

The new kit transforms the way the operation is completed and allows NGN engineers to carry out the encapsulation process themselves, and includes shell, valve and other associated equipment. It is envisaged that each of our operational patches will have NGN engineers trained in the use of the new kits – saving time and money on each repair.

A pipe cutter for large diameter PE pipes

A new 12-month research, development and demonstration project is developing a new pipe cutter, suitable for large diameter PE pipes. In true collaboration, our project partner SVI are contributing 20% for the project cost.



The traditional method of cutting, using a handheld saw, is time consuming, laborious and can present a safety risk. The automatic cutter will allow engineers to be able to cut large pipes more efficiently both at the roadside and in the excavation. The team at Steve Vick International is creating three detailed design prototypes. After testing in the field, we hope to have the final product in use in the market by the first quarter of 2022. **Cutting edge innovation, you might say!**

“We’re excited about assisting Northern Gas Networks to bring this piece of kit to market. The new large PE pipe cutter will greatly reduce the amount of time it takes for field engineers to cut through pipes out in the field. We’re estimating the cutter will make a job that currently takes 30-40 minutes take just five minutes. It also looks much more professional to customers and the wider community.”

Rich Ditte, Business Development Manager
from Steve Vick

Industry-wide collaboration

Collaboration through recognised industry groups allows us to share knowledge, work together and avoid duplication of effort.

These groups include:

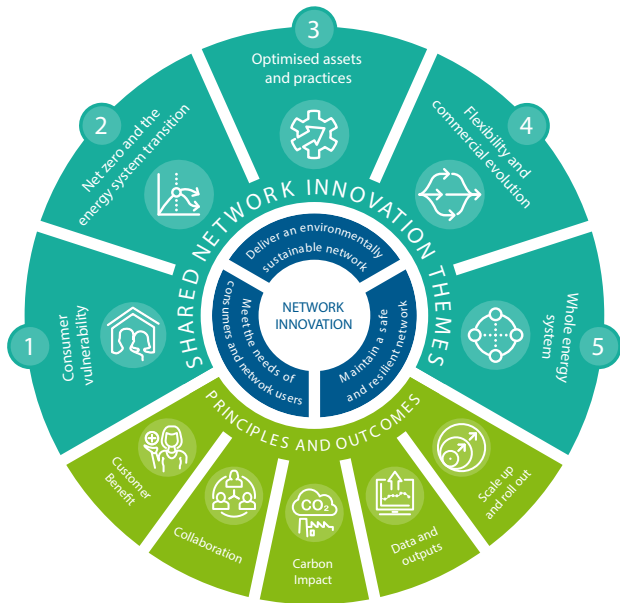
The Energy Networks Association (ENA): hosts a gas innovation governance group which allows us to share learnings and ideas with other gas networks. This year has also seen the introduction of consistent monthly cross sector innovation sessions as part of GIGG/EIM (Electricity Innovation managers) where innovation leads from all UK energy networks engage about network innovation.

Gas Innovation Governance Group (GIGG): a monthly gathering of UK gas networks, providing an opportunity to share knowledge and opportunities for collaboration.

Energy Innovation Centre: Over the past five years, we have developed a strong collaboration with the Energy Innovation Centre (EIC), a not-for-profit organisation which brings industry and innovators together. The organisation acts as a conduit to over 7,000 SMEs.

Programme Management Board (PMB): this group includes BEIS, Ofgem, HSE, NGGT and all the GDNs among its members and ensures coordination and knowledge sharing across UK hydrogen projects. In addition, the PMB monitors progress on the hydrogen work programmes delivered through the research and development sub-boards.

APPCOG: the Carbon Monoxide (CO) Parliamentary Group. Over recent years we have built strong relationships with fellow members of the group, working with the other GDNs, industry experts from in and out of the gas sector, parliamentarians and government ministers to help shape the future of CO safety, helping to protect everyone from the dangers of CO.



North East Task Force: we have been working closely with this group over recent months to help tackle the issues faced by 'off grid' communities to ensure that no customer is left behind as we move to net zero and future energy transitions. The group has been engaging with Baroness Finlay - Energy Minister, as we work with local governments, energy transporters and community support groups helping to create a landscape of fairness for everyone.

Cross Utility Innovation Group: a regular gathering of water, power and gas providers. Membership allows all members to widen their perspective beyond their own sector.

4. Project updates

Over the next 15 pages, we take a look at our most recent crop of NIA funded projects, with insights from NGN project managers and our partner organisations.

Case Study

H21 - Hydrogen ready service pipes

THE ROAD TO HYDROGEN

What would a future move to hydrogen fuelled homes and businesses mean for customers' service pipes?

Would these small pipes which connect homes and businesses to the gas network need replacing, or are they already suitable for transportation of hydrogen as part of the gas distribution network?

A new project is carrying out practical trials to examine this crucial aspect of hydrogen conversion.

FACT FILE

Project name: H21 - Hydrogen Ready Services

Project Reference: NIA_NGN_275

Collaboration: NGN, Cadent, DNV, SGN and WWU

Project Summary

We are working with DNV, who have created a custom-built investigation site that enables us to test existing service pipes with hydrogen, to assess any upgrading requirements.

Our teams will explore whether current services are sized correctly for conversion to hydrogen gas. By the end of the project around 400 tests will have been safely conducted on the test site.

The research builds on the original work from H21 Leeds City Gate project and provides valuable knowledge and learning to inform the next steps identified in the H21 road map.

Benefits

The project will examine the implications of hydrogen conversion for existing service pipes – answering another crucial question around hydrogen conversion and providing confidence for households, businesses and policy makers.

The research will be published in summer 2021 and will be available for all UK gas distribution networks. The project is part of a collection of studies looking at ways to enable a conversion of the UK gas grid to hydrogen.

Status: In development

"As a network, we're going to great lengths to research, explore and test to ensure that all the pipes, materials and services are hydrogen ready when it comes to making the move away from natural gases. We're still some way off from making the switch, however when that time comes, NGN customers can rest assured that everything will be in hand to help the UK safely achieve its vital goal of Net Zero by 2050."

Michael Smith,
Northern Gas Networks



Case Study

Hydrogen-ready components

THE ROAD TO HYDROGEN

The H21 hydrogen research project has already established that it is technically feasible to convert existing gas networks to hydrogen.

We are now exploring the fine detail of what this conversion would mean for networks and what adaptations would need to take place.

As part of this work, this year we launched the Hydrogen Ready Components project, an in-depth review of what hydrogen would mean for the various components found on our below 7 bar network.

FACT FILE
Project name: H21 - Hydrogen Ready Components
Project Reference: NIA_NGN_276
Collaboration: NGN and Cadent

Project Summary
Working in collaboration with Cadent, we are identifying all the components that could be affected by a transition to hydrogen including pipes, valves, filters and regulators. The Health and Safety Executive Science Division are then exploring how the materials will react to hydrogen.

The outcome of the project will be a searchable database tool, similar to a risk assessment, highlighting pieces of equipment and materials that may not react well with hydrogen and make recommendations for further testing.

Benefits
The project will give gas distribution networks a comprehensive understanding of how hydrogen will operate with their existing networks, and any components that will need to be replaced or modified. This knowledge will help to ensure network adaptations can take place in a timely manner, to support a smooth hydrogen transition.

Status: Ongoing

"The project is looking at all the different mechanical components that are used on the below 7 bar network and above ground installations. The research is also looking at fault data to understand what the impacts might be if we got a leak with hydrogen and if this would make a big difference to how we respond. All the findings from our research will be available in a database that will be ready for field engineers to use in early 2022. Other gas networks and even manufacturers will benefit from the Hydrogen Ready Components project."
Tom Greenwood,
Northern Gas Network

Case Study

H21 Occupied Trials Phase One

THE ROAD TO HYDROGEN

As the UK government's plans for Net Zero draws closer, we're exploring the practicalities of using hydrogen gas in customers' homes.

Occupied Trials is a detailed scoping project which started back in September 2020 to look at the requirements for trialling hydrogen gas in UK homes, and the health and safety requirements for such a trial.

"We're eager to show the Health and Safety Executive that we've covered all the safety and procedural aspects of a domestic trial involving 100% hydrogen. If all goes to plan we're looking to start the second part of the project, creating a time plan and compiling the costs in late summer 2021, which would bring us a step closer to being able to trial hydrogen in customers' homes."
Neil Travers,
Northern Gas Networks

FACT FILE
Project name: H21 Occupied Trials - Phase One
Project Reference: NIA_NGN_268
Collaboration: n/a

Project Summary
Phase one of the Occupied Trials project will build on the previous H21 research.

It involves looking at what needs to be in place to deliver public trials of 100% hydrogen in homes for cooking and heating. We are also looking at what we need to do as a business to transport hydrogen to trial homes, safely and efficiently.

Phase two will explore which contractors we would need, digging deep into the legal elements of storing hydrogen, plus looking at compliance and identifying any gaps around health and safety.

The findings will provide an evidence case to present to the Health and Safety Executive.

Benefits
The Occupied Trials project will see how hydrogen performs in real world domestic settings, ahead of a potential roll out of hydrogen in the years ahead.

Phase 1 of the project will provide a comprehensive assessment of the evidence required for a hydrogen safety case – giving customers, contractors and the HSE confidence that such a trial can be delivered safely.

Status: In progress

Case Study

Keeping supplies flowing using compressed natural gas

SUPPORTING VULNERABLE CUSTOMERS

Compressed Natural Gas (CNG) offers a temporary way to supply customers with gas, when there is an issue on the network.

Following on from the findings of the two previous SOFTPANG (Safe Operational Framework for the Temporary Provision of Alternative Natural Gas Systems) projects, which identified the feasibility of temporary gas solutions for vulnerable customers. SOFTPANG 3 does a deeper dive into the supply and distribution of CNG in cylinder and tanker form, to provide gas to properties where we would normally have to isolate the supply.

SOFTPANG 3 is focusing on ways to reduce the risk to customers and workforce where properties are identified as high risk as a result of the Covid-19 pandemic and cannot be accessed by engineers, in addition to other scenarios.

FACT FILE
Project name: Safe Operational Framework for the Temporary Provision of Alternative Natural Gas Systems 3 (SOFTPANG 3)
Project Reference: NIA_NGN_285
Collaboration: n/a

Project Summary
The project is being delivered in two parts. Stage one will see small compressed natural gas bottles, less than 20kg, used as a temporary alternative gas supply to individual homes. Stage two will see compressed natural gas tankers used as an alternative supply of gas to larger network assets/multiple supplies. For stage one we aim to be move to live field trials in summer 2021. Stage two requires longer to research and develop and we hope to commence trials in winter 2021.

"On successful completion of project in early 2022, it is expected SOFTPANG 3 will provide gas distributors with an opportunity to maintain supply during planned works without having to enter customers' premises. This will provide safety benefits to staff and customers during the pandemic and beyond, as well as reducing the disruption caused by interruptions to gas supply."
Michael Charlton,
Northern Gas Networks

Benefits
SOFTPANG 3 has the potential to reduce customer disruption during gas outages, by enabling networks to deploy an alternative supply of gas to customers.

Against the backdrop of the current pandemic, this solution can also avoid unnecessary contact with customers who may be isolating.

Status: Ongoing

"SOFTPANG 3 is focusing on NGN being able to allow constant access to gas and allow seamless change over from the network to a temporary supply whenever required. This project has potential to remove negative impacts associated with network activity, especially for vulnerable customers."
Tony Byrne,
Thornton Tomasetti



Case Study

Developing a domestic hydrogen detector



THE ROAD TO HYDROGEN

As hydrogen becomes an ever more viable future fuel for domestic heating and cooking, a new project is looking to develop a domestic hydrogen detector.

We teamed up with Energy Innovation Centre (EIC) to invite suppliers to submit their ideas for the hydrogen detector. When the device is eventually brought to market, it is hoped it will become as ubiquitous as a home smoke alarm or carbon monoxide alarm – supporting the take-up of hydrogen as a domestic energy source.

FACT FILE
Project name: H2GO - Domestic Hydrogen Detector
Project Reference: NIA_NGN_292
Collaboration: NGN and WWU

Project Summary
The project will provide is a critical piece of evidence to support the energy systems transition. We are working with DefProc Engineering who are developing the sensor technology, and with the Health and Safety Executive science division, who are testing the device at their Buxton laboratories. We aim to have a finished device ready for early 2022.

Benefits
Smoke and carbon monoxide alarms are important fixtures in most homes – providing an early warning in the event of fire or the presence of CO. Introducing a hydrogen detector would increase customer confidence in a move to widespread use of hydrogen for domestic heating and cooking.

Status: Early-stage development

"In addition to the keen interest being levelled on this principle by BEIS, there is a need to demonstrate to the public that the overall hydrogen conversion strategy is safe and that the risk has been reduced to as low a point as possible. Part of the development is checking the sensor sensitivity to other gases. The device will be a similar size to a regular smoke alarm, It will be battery powered, include a speaker, audio alarm and have an LED visual display. At the end of the project, we expect to have a device that manufacturers will be able bring to market - maybe one that could become a hydrogen, carbon monoxide and smoke alarm in one."
David Tomkin,
Northern Gas Networks

"The project is going well. This detector will help customers become comfortable with blended hydrogen and conversion to 100% hydrogen. The sensor will offer peace of mind that in the unlikely event of a problem, homeowners will get an immediate alert. The work we're doing will enable product manufacturers to start producing the sensors and in time bring them to market."
Patrick Fenner, DefProc

Case Study

Understanding gas use among commercial customers

THE ROAD TO HYDROGEN

Working in partnership with Cadent as part of the suite of NIA funded H21 projects, we are taking a detailed look at how our industrial and commercial customers use gas, in order to be able to better prepare for the conversion to hydrogen gas.

The aim is to create a high-level report that looks at the needs and behaviours of businesses and organisations both large and small when it comes to their gas usage. We're engaging with many different sectors, from the NHS to education to acquire this detailed understanding.

FACT FILE
Project name: : H21 - Understanding Industrial and Commercial Customers
Project Reference: NIA_NGN_269
Collaboration: NGN and Cadent

Project Summary
We are having direct conversations with customers who are happy and open to share details of their gas usage behaviour, as well as using social media to drive engagement with an anonymous survey. We're asking questions, sharing information and listening to customers and their thoughts and concerns around the move to hydrogen.

This research piece is seeing us collate and understand our internal data and asking questions about what our industrial and commercial customers need.

Benefits
This new report will allow us to better support our industrial and commercial customers in the transition to hydrogen, by better understanding their current gas usage and behaviour.

Status: Complete

"We're assessing and reviewing the needs of our industrial and commercial customers ahead of the UK government announcing a date for giving the go ahead to moving to greener gases. We're eager to listen and learn from them about what they need as we step ever further towards the conversion."
Russ Oxley, Northern Gas Networks

Case Study

H21 - A hydrogen supply and conversion strategy

THE ROAD TO HYDROGEN

Working with research and consultancy firm DNV, Wales and West Utilities and National Grid, we're conducting research into the most practical, cost effective and environmentally responsible way to mass produce and store hydrogen – to support a future hydrogen transition for homes and businesses.

The research draws on the original research by the H21 North of England Report and delves more deeply into some of the major practical issues associated with hydrogen conversion.

FACT FILE
Project name: H21 Initial Hydrogen Supply Strategy
Project Reference: NIA_NGN_270
Collaboration: NGN, NGGT, DNV and WWU

Project Summary
During Phase 1 of the conceptual project, we're running investigations and using our Teesside network as a test study area to answer some big questions such as: where will the hydrogen come from and where will it be stored? How do we convert the first house on the first street? Where is the workforce coming from?

We're starting to create a conversion plan of what will be needed three years in advance of any move from natural gas to hydrogen. Considerations include what equipment and supplies are needed, how we communicate with homeowners and businesses and how we manage engineer training.

The report contains modelling for hydrogen generation, storage and distribution to customers.

"The industry is waiting on a policy decision from the UK government about hydrogen conversion, and it is vital that the industry is ready to move quickly once we have this clarity. The Initial Hydrogen Strategy Report is a conversion roadmap using the North East as an exemplar area."
Mark Danter,
Northern Gas Networks

Benefits
The report will set out the practical steps to hydrogen conversion which will be shared with the wider gas industry. The plan will include stepping-stones for what the country needs for a safe and steady conversion. We look forward to releasing the Initial Hydrogen Strategy Report in summer 2021.

Status: In progress

"We're proud to be supporting Northern Gas Networks to produce this ground-breaking report. Once completed in late 2021, it will be a roadmap that will lay out plans for the hydrogen conversion of the NGN network and how this will affect end users. The findings will provide critical information applicable to the entire GB gas system."
Sarah Kimpton,
Vice President, DNV



Case Study

A more reliable gas forecast

CREATING A SMART GAS NETWORK

Following a successful development phase, in 2020, we launched Flexible Generation Forecasting - a software package that predicts gas demand at different times of the day, in different areas across the country.

The smart and intuitive piece of software enables gas distributors to model each part of the day when it comes to gas usage.

FACT FILE
Project name: Flexible Generation Forecasting
Project Reference: NIA_WWU_o68
Collaboration: WWU, ESO, SPEN, NGN, NGGT, Cadent and SGN

Project Summary
Historically, gas demand has been fairly predictable, but over the last few years, an increase in flexible generation sites to the gas distribution networks has impacted the accuracy of the forecasting.

Flexible power generation is a means of providing energy to the network during periods of high demand, to relieve stress on local and national power networks through additional power when it's needed.

The new forecasting Excel-based application, which was researched and produced in partnership with Delta EE and AFRY, allows the gas industry to better predict when the use of natural gas will be high.

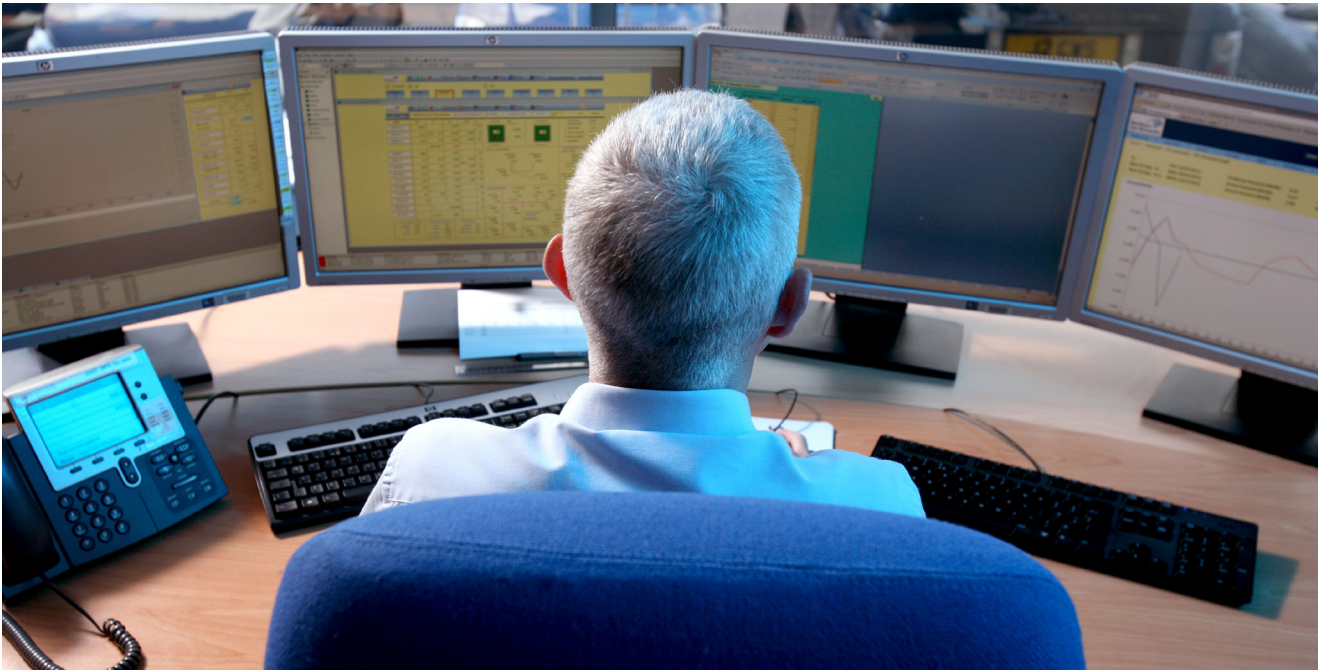
The project was deemed a success as the software is now being introduced and implemented by companies such as Cadent and SGN.

Benefits
Sharing data with other gas networks will improve forecasting. This in turn will drive the development of an efficient investment programme which meets the needs of current and future customers.

It also means that domestic, commercial and industrial customers will have the access to the gas supply they need at all times.

Status: Completed

"As a business we have spearheaded the development of this project which will benefit all other networks and the UK as a whole. We're delighted companies like Cadent and SGN are already using the application and we will look forward to embedding it into our systems in the near future."
Emma Buckton,
Northern Gas Networks



Case Study

Net zero: ensuring vulnerable customers are not left behind

SUPPORTING VULNERABLE CUSTOMERS

The move to a net zero economy and the emergence of new technology is exciting – but can present a risk of leaving financially vulnerable customers behind. Customers who are already in fuel poverty could be the last to take up new green technology and opportunities – unless we can intervene to prevent this.

We worked with Newcastle University, Northern Powergrid and Northumbrian Water to collate research and data on fuel poverty, vulnerability and decarbonisation, to ensure fuel poor customers are not left behind in the green revolution.

FACT FILE
Project name: InTEGReL: Academic review of fuel poverty, vulnerability, and GB research capability
Project Reference: NIA_NGN_283
Collaboration: NGN

Project Summary
NGN undertook a review of latest research into decarbonisation, in collaboration with Newcastle University Centre for Energy, with specific focus on developing our knowledge of the challenges of energy decarbonisation in the domestic and light commercial sectors and to understand the extent of research undertaken to date, alongside the capability of existing GB research facilities that support such work.

The outputs of this research activity have fed into our strategy to develop our InTEGReL [whole energy systems research] facility and specifically the design of the Customer Energy Village within the complex. This work provided insights that are facilitating our RIIO-2 innovation and research which aims to deliver a more rapid, customer centric and sustainable transition to netzero, across a broad range of challenges.

This research supported our commitment to deliver the wider InTEGReL facility and customer centric research and innovation led to this innovation project to ensure that the final design concept for the InTEGReL CEV delivered a nationally [perhaps internationally] significant facility and capability that supports a whole energy systems approach, promotes open access and collaboration across industry, academia and government and drives solutions to net zero to an accelerated timescale.

"This extensive project has delivered informative research, across a range of issues. It highlighted gaps and has made recommendations for future areas of future research and innovation that progress the UKs pathway to net zero. Collaborating with Newcastle University's Centre for Energy has led to far great insight and visibility of the wider energy system context, specifically around whole energy systems thinking, which adds far greater value to the future work and designs of the InTEGReL research facility we are creating in Gateshead. The outputs have provided insight for the energy and water sectors into these important areas and allow greater focus and collaboration through RIIO-GD2 to unlock some of these difficult challenges as we progress towards the energy systems transition to net zero."
Keith Owen,
Northern Gas Networks

Benefits
The outputs of this project are supporting NGN and our fellow utility companies [including the water industry] to better understand where we need to focus our research and innovation activity when developing truly inclusive green technologies and approaches that work for all customer, regardless of their ability to pay or any specific vulnerabilities. In doing so we fulfil our ambition to make the transition to net zero rapid, with minimum impact and importantly one which delivers a fair transition for all.

The research will captured the extent of research to date and outlined future themes of work. it highlighted the unique capability of the InTEGReL Customer Energy Village in the context of GB facilities and provided clear impetus to the future focus of innovation and research at the facility.

Status: Completed

"This review has highlighted how the UK future energy transition can deliver low carbon heating, and what this might mean for the Customer Energy Village at InTEGReL. Our findings demonstrate the potential for the Customer Energy Village to be a unique facility to investigate the impact of retrofit scenarios on utility networks, to consider this from a whole, multi-vector energy system viewpoint, and to evaluate the impact from a fuel poverty and data point of view."
Dr. Sara Walker,
Director for the Centre for Energy, Newcastle University

Case Study

Tee Nee: a way to replace service pipes without entering the home

SUPPORTING VULNERABLE CUSTOMERS

The Covid-19 pandemic created new challenges in our day to day work to ensure customers, especially the most vulnerable, are kept safe and warm.

Currently, when we need to replace or alter service pipes, we need to enter a customers' property – a requirement that has been made far more complicated by the pandemic.

We've recently launched Phase 1 of an innovative project to develop a fitting called a Tee Nee that will allow engineers to perform the required work remotely and without interrupting gas supply.

"The pandemic has brought to the forefront of our attention the safety of our engineers and customers during their everyday interaction. Covid-19 restrictions accelerated the need for essential tasks to go ahead using innovative approaches, away from traditional methods – and provided an opportunity to explore what solutions we could create. The Tee Nee project is a great example of this."
Tom McPherson,
Northern Gas Networks

FACT FILE
Project name: Tee Nee
Project Reference: NIA_NGN_290
Collaboration: NGN and SGN

Project Summary
We're working with the team at Steer Energy and fellow gas distributor, SGN, to develop the Tee Nee - an electro fusion fitting that enables engineers to fit a new piece of pipe without any disruption to the customers.

"The challenges faced by our colleagues and customers as a result of the Covid-19 pandemic were nationwide and needed all GDN's to collaborate. Along with SGN, WWU and Cadent we set up a 'CEO Repex Taskforce' to identify Covid-19 related challenges impacting our respective mains replacement programmes. Over a period of several months we worked collaboratively to come up with innovative solutions to remove these blockers. TeeNee is a perfect example of cross-network innovation, every GDN fed into the early thinking for this project and established a clear scope for development. Amazing teamwork!"
Richard Hynes-Cooper,
Northern Gas Networks

The Tee Nee clamps to the service pipe to make a tight seal – allowing the pipe to be replaced without the need to switch off the gas supply.

The fitting is currently in development with a 3D printed version being created that will be tested and then introduced into gas live tests. When this model is approved, we will move into Phase 2 and hope to have a physical product finished in late 2022.

"Currently working with a manufacturing partner, when readily available the Tee Nee will revolutionise how NGN field staff work and reduce the amount of disruption to customers. The investment in such technology and equipment is crucial and shows the innovative thinking that Northern Gas Networks has as an organisation."
Iain Chirside,
Steer Energy

Benefits
Fittings like the Tee Nee, although still in the early stages, will future-proof our gas services as they enable crucial work to continue without excessive disruption to the community, while also looking after staff and customers both through the Covid-19 pandemic and in years to come.

Status: In development phase 1



Case Study

Preventing doorstep fraud

SUPPORTING VULNERABLE CUSTOMERS

Doorstep fraud is on the rise. Some cases have documented fraudsters impersonating utility engineers in order to gain access to properties. Citizens Advice reports that nearly 20% of people have experienced attempted doorstep fraud and of the people surveyed, no one had taken any preventative measures to help protect themselves from doorstep fraud.

Utilising modern technology, we can provide more safety and assurance to our customers.

This solution will transform doorstep engagement and mitigate the risk for both customer and colleagues, enabling a best-of-class safeguarding processes to be adopted and creating the opportunity to redefine how utility companies interact with customers.

FACT FILE
Project name: Doorstop
Project Reference: NIA_NGN_272
Collaboration: NGN, Cadent and Northern Powergrid



Project Summary
The project has successfully produced an app that can securely and quickly verify the identity of doorstep visitors who claim to represent a gas distributor.

A unique code, generated by the engineer on the doorstep, is read out to the customer, who then enters it into a web page, to verify the identity of the caller.

Customer engagement was ongoing throughout the project, and user feedback was incorporated into the solution throughout the development process.

Knowledge dissemination and awareness sessions will be undertaken to share learning from the project. This will enable broader market penetration for the product.

"The need to keep our customers safe has never been so important, especially with the arrival of the Covid-19 pandemic, the need for social distancing and the increase in doorstep fraud and thefts. This has allowed NGN and our partners to rethink initial customer interactions and embracing technology whilst keeping the customer at the heart of everything we do."
Steve Dacre,
Northern Gas Networks

Benefits
This project provides an opportunity for NGN, our collaborating partners and the broader industry to prevent customers being exposed to door sto crimes. This project reduces the dependency on the ID card identification method, which is easily circumvented, and is inaccessible to many vulnerable customers.

Status: Completed

"DoorStop is a potentially game changing anti-fraud technology, making phone calls and in-person visits significantly safer for customers. NGN's funding and enormous support to the project demonstrates their dedication to customer safety and passion for industry leading innovation."
James Perry,
Director of Egnida Innovation

Case Study

Making site layouts more accessible



SUPPORTING VULNERABLE CUSTOMERS

Many customers find streetworks inconvenient, but for customers with vulnerabilities such as mobility challenges or visual impairments they can present a much bigger obstacle.

The safety equipment, such as warning signs, lights and guard rails that we place around streetworks conform to strict standards stated in 'Safety at Street Works and Road Works: A Code of Practice'.

However, whilst the current guidance states what is required to make a site compliant with the rules and take account of the needs of for vulnerable customers, this is only to a certain degree and not always practically possible subject to site conditions. Complex layouts at busy road junctions can be a significant challenge for a person in a wheelchair, someone with young children or an elderly person who is unsteady on their feet.

To see if we could improve the layout of our streetworks, we launched Streetscore - a research project carried out with a number of specialist organisations who work with vulnerable customers.

FACT FILE
Project name: Street Score – Customer Navigational Experience
Project Reference: NIA_NGN_254
Collaboration: NGN, WWU and SGN

Project Summary
This project aimed to develop a risk assessment tool for challenges currently experienced by our vulnerable customers and by the wider public, when navigating streetworks.

The project prioritised areas of streetworks design, looking at ways to enhance and improve the customer experience.

"Barriers and signs on a narrow pavement or street can be inconvenient for all our customers, but often present a significant obstacles to customers with movement restrictions or other difficulties such as reduced or no vision. The Streetscore project is about trying to go beyond the current industry code of practice to design streetworks in a way that is more sensitive to the needs of these vulnerable customers."

Steve Dacre,
Northern Gas Networks

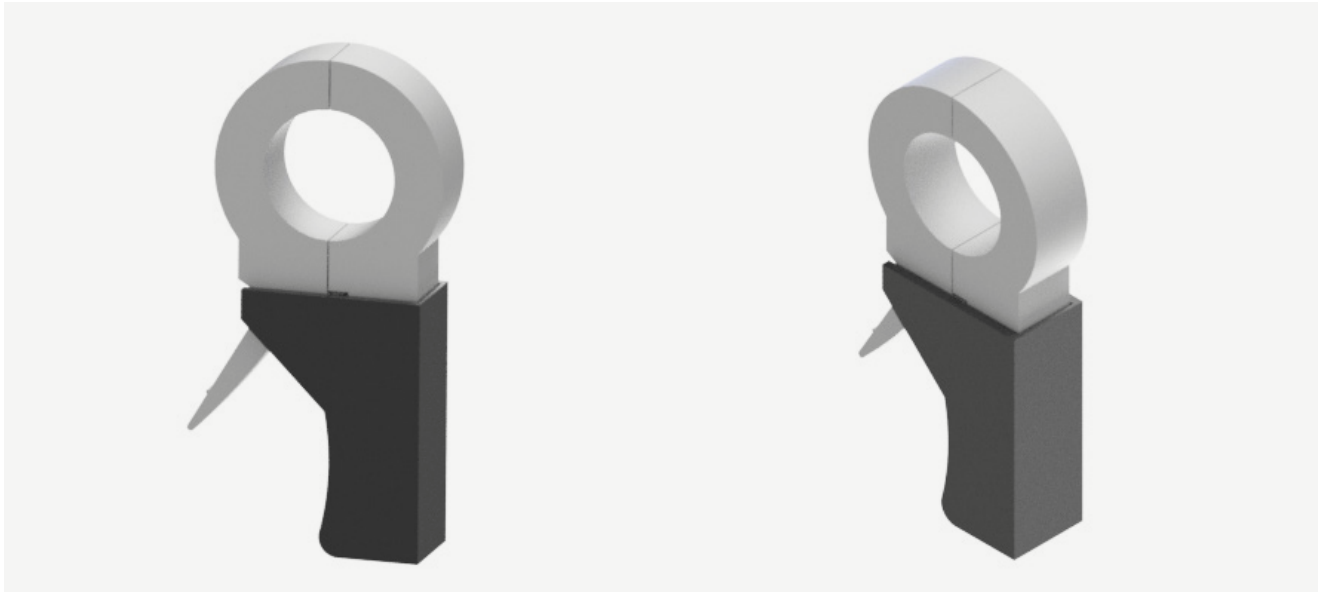
The direction of the development was directly informed by our customers, explored through stakeholder engagement. The project took time to assemble and work closely with a user group, including those on the Priority Services Register, as well as wider public groups.

Benefits
The project is intended to further enhance the design of streetworks, by using insights from vulnerable customers to improve the layout of these works. Streetscore will take an enlightened view of streetworks design, in order to make life easier for all customers.

Status: In progress

"This project stands to enhance streetworks standards across the country, making sites more accessible for customers who face mobility restrictions or other challenges."

"It's great to be working with NGN on such a positive and forward-thinking piece of work."
Iain Chirnside,
Steer Energy



Case Study

Detecting hidden electricity cables



LOOKING AFTER OUR NETWORK MORE EFFICIENTLY

It is not uncommon for electrical cables to be inserted within old steel gas pipes in customers properties. When our gas engineers are tasked to perform a 'live/dead check', they have no way of knowing whether an electrical cable is present in the pipes and if the cable is live – presenting a significant safety risk.

The Live & Dead Check Analyser project, which kicked off in October 2020, is developing prototype technology to accurately identify unknown pipes that could potentially be live with electricity.

FACT FILE
Project name: Live & Dead Check Analyser
Project Reference: NIA_NGN_261
Collaboration: n/a

Project Summary
This 12-month project intends to create five prototype hand tools that are proven to detect live cables within iron, steel or plastic polyethylene gas pipes. The project is now nearing the field trial stage where NGN field engineers will use on a range of trial sites. Following this, the final stage will be to manufacture 10 prototype hand tools and then provide 'train the trainer' packages for roll out across Northern Gas Networks.

"As a gas distribution network, we usually rely on utility plans to identify where cables are situated – but these plans will not always document cables within pipes. This project is looking at a safe and more accurate way of identifying unknown cables within pipes, in order to keep our colleagues and customers safe."

Andy Simcoe,
Northern Gas Networks

Benefits
The project will keep our colleagues and customers safe, by enabling accurate detection of hidden cables.

Status: In progress

"The research and design time invested into creating the Live and Dead Check Analyser is second to none. It is going through rigorous testing before being brought to market. It is expected this handheld tool will modernise the way field engineers work, while also greatly improving their safety."

"The research and design time invested into creating the Live and Dead Check Analyser is second to none. It is going through rigorous testing before being brought to market. It is expected this handheld tool will modernise the way field engineers work, while also greatly improving their safety."
Matthew Love,
Mage Control



Case Study

Plugging bigger pipes

LOOKING AFTER OUR NETWORK MORE EFFICIENTLY

Replacing large diameter gas mains can be time intensive and disruptive to motorists, businesses, and nearby households – due to the size of excavations required.

On smaller pipes, we can reduce the size and number of excavations using the ESEAL technique which is an expanding foam plug that seals off sections of gas mains that are to be abandoned. Unfortunately, this method, developed via previous NIA projects with NGN and Steve Vick International, can only be used on pipes up to 14” in diameter, known as Tier 1 and Tier 2 pipes.

To solve this problem, we launched the ESeal 2 Extension project which will create a 15” - 18” diameter sealing system, that will draw on the findings of the previous projects, to find a solution for abandoning this additional range of large diameter Tier 2 and 3 pipes.

FACT FILE
Project name: ESeal 2 Extension
Project Reference: NIA_NGN_284
Collaboration: n/a

Project Summary
The ESeal 2 Extension project is split into three phases. Part one involves data gathering and investigation of the work and sets out detailed objectives. Part two encompasses design, development and testing to enable us to move forward with trialling the system and Part three will comprise the field trails. The new 15” - 18” system will be an adaption of current designs from Eseal and Eseal2 that will speed up development and testing times.

A total of five field trials on 15” - 18” diameter pipes will be required to provide substantial evidence to ensure a safe rollout. The trials will involve measured pressure testing, installation, validation testing and data collection. Findings from the project will be shared with all other gas distribution networks.

“The successful completion of the ESeal 2 Extension project will allow NGN to maximise the opportunity to seal and abandon 15” - 18” diameter Tier 2 and 3 service pipes. It will reduce the size of excavation and improve traffic management and the associated workload for our field engineers.”
Chris Reed,
Northern Gas Networks

Benefits
There is a large impact on the environment due to excavation size and substantial knock-on effect with traffic disruption. The activity required when cutting out Tier 2 service pipes using the standard techniques is substantial. The new technique stands to substantially reduce traffic disruption, operational costs and carbon emissions.

Status: In progress

“The ESeal 2 Extension project is building on the great work that has already been done to develop the Eseal application. The redesign for the large Tier 2 service pipes will be used on busier roads and at large junctions, meaning road users and local residents will benefit greatly from the application, as it will reduce disruption and enable NGN to work even more efficiently.”
Rich Ditte,
Steve Vick International

Case Study

Plugging legacy pipe ‘stubs’ with minimal disruption

LOOKING AFTER OUR NETWORK MORE EFFICIENTLY

In March 2020, we launched a trial to reduce the time, cost and disruption associated with legacy stubs – short sections of underground pipe, following historic mains replacement work. Typically, a ‘legacy stub’ will be shorter than the minimum length requirement to allow safe flow-stopping.

Working in partnership with Steve Vick International we’re now testing ways to inject foam remotely into these pipes from strategic locations above ground to remove the pipes from risk and increased efficiency.

Field trials in our Yorkshire regions of Bridlington and Bradford have seen a 100 percent success rate and we’re confident we will be able to roll out the technique more widely in summer 2022 to deliver reduced disruption for our customers.

FACT FILE
Project name: Legacy Stubs
Project Reference: NIA_NGN_273
Collaboration: n/a

Project Summary
The traditional way to replace legacy stubs is to dig up the road in order to access them. This is costly, as well as inconvenient to motorists, businesses and domestic customers.

Our new solution allows targeted, keyhole entry to the pipe from above ground, using a foam injection machine that transfers the substance directly to the ‘stub’ that is no longer in use. This method has little or no adverse effects on local residents or businesses, by removing the need for traditional excavation.

“We’re delighted to be working in partnership with Steve Vick International to develop a process that will benefit our customers, engineers and the wider communities by increasing efficiency and reducing the duration of our streetworks.”
Tom McPherson,
Northern Gas Networks

Benefits
The benefits of using the remote injection of the foam are a significant reduction in time, environmental impact and disruption for every job. Carbon savings will also be accrued by avoiding the need for excavation.

Status: In development

“The Legacy Stubs project means that Northern Gas Networks can work in a less disruptive way. This new method is less invasive, it reduces the need to dig up as much of the road as usual and so means less waste heading for landfill and fewer carbon emissions.”
Rich Ditte,
Steve Vick International



Case Study

Digitising our Safe Control of Operations

CREATING A SMART GAS NETWORK

We're always looking at ways to streamline our in-house systems to deliver improvements.

Working with the tech team at QEM, we are in the process of developing a new digital reporting database for our Safe Control of Operations (SCO). This new software will replace a 10-year-old legacy system and greatly improve compliance and efficiency.

FACT FILE
Project name: Digitisation of SCO Database
Project Reference: NIA_NGN_281
Collaboration: n/a

Project Summary
The authorisation process for engineers to undertake high risk and complex tasks and our network is outdated and still requires phone calls to be made before work can commence.

This project will deliver a brand-new system meaning we can confirm the qualifications and competence of staff for each job within minutes, monitor how jobs are going and when they will be completed. It will also allow for more efficient reporting and auditing of jobs and allow for permits to be raised outside of normal working hours, so jobs can be completed safely and in a timely manner.

The system will be made available to other GDNs to improve their systems and compliance.

The design brief for the project also includes a geographical 'visualisation' tool to be able to show live work. This reduces conflict and controls risk management for engineers working in the field.

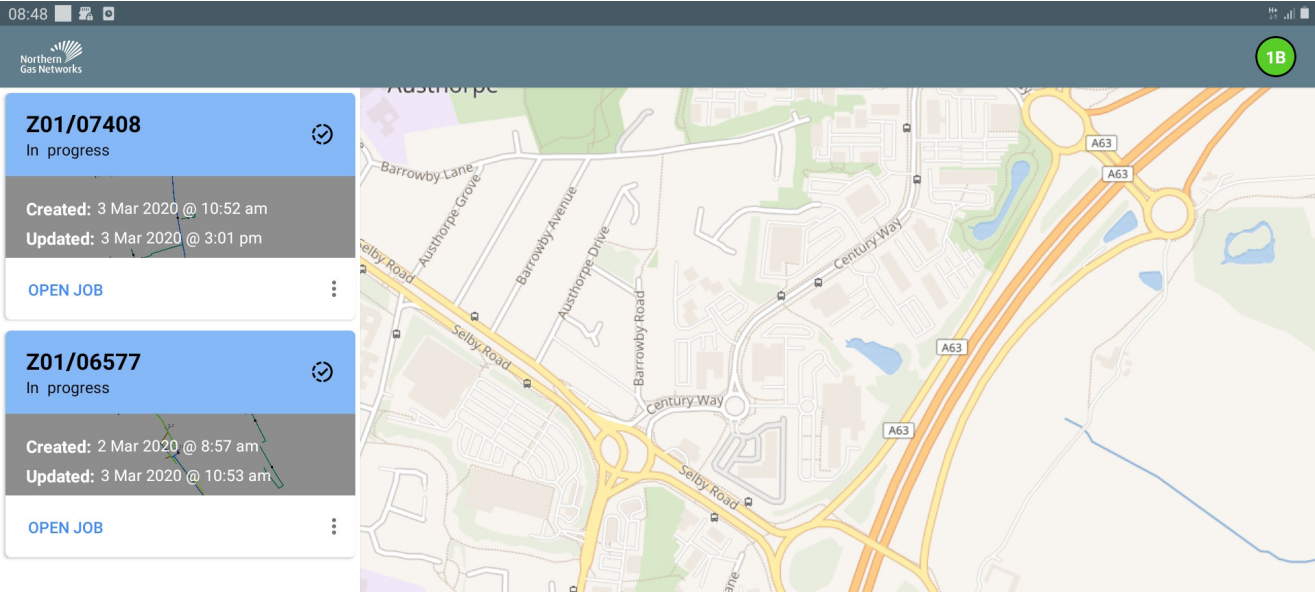
"Nothing like this has been created before and we're working closely with QEM to get a bespoke system that can then be used by NGN and other networks. We're looking forward to seeing it implemented across the business in 2022."
Geoff Harle,
Northern Gas Networks

Benefits
The new SCO database is expected in 2022, once it has gone through three phases of research and development and been rolled out across our network. It will slash disruption time to our customers by reducing delays in work being authorised and carried out.

The SCO database will help Northern Gas Networks to streamline processes and reduce our carbon footprint and fuel usage by removing the need for managers to travel to site on every occasion to authorise jobs.

Status: In development

"It just makes sense to digitise the Northern Gas Networks compliance and reporting systems. The new operations system will streamline processes and allow for greater clarity on crucial jobs for all office staff and engineers."
Rob Graham,
QEM



Case Study

myDart 2: capturing field data more efficiently

CREATING A SMART GAS NETWORK

All the work carried out on our network needs to be meticulously logged. Accurate records are essential, so that future work can be carried out safely and efficiently.

The current method of capturing this essential data is outdated. Key information still needs to be entered manually, which is time consuming and can be prone to reporting errors.

In response, we have partnered with 1Spatial, leaders in software solutions, to create a mobile application that includes automated validation at the point of data collection – the myDart Digital Asset Record Tool - to take the headache out of reporting essential information.

FACT FILE
Project name: myDart Phase 2 - Digital Asset Records Tool
Project Reference: NIA_NGN_271
Collaboration: n/a

Project Summary
The myDart Digital Asset Record Tool will be a mobile app and web-based software solution. It will help reduce data entry errors through automated validation protocols, cut the need for manual check of data and increase the quality of data captured.

"The myDart 2 project focuses on improving efficiency by utilising the benefits of robust data validation that will benefit everyone from site managers to our customers. It is a user-friendly, field-based application that allows rules-based data capture to ensure the accurate recording of NGN assets. We're looking forward to seeing the difference it can make."
Glen Batterham,
Northern Gas Networks

When it comes to market in late 2021, it will be available for site managers on their Samsung phones and for office staff on their computers.

Benefits
Data validation and accurate records will improve efficiency and safety of future jobs, remove the need to return to a site to check data and reduce the risk of disturbing customers.

Status: Phase 2 in development

"The Northern Gas Networks staff were in need of technology to enable them to be able record and report accurate information. The new bespoke mobile application, coming later this year, will improve the quality of data capture from their offices right through to employees working on the side of the road."
Jess Hampton,
Head of Utilities, 1Spatial

5. NIC Project summary overview

Alongside NIA funding, gas distributors can also bid for Network Innovation Competition (NIC) funding, which is designed to support larger and longer-term projects with the potential to push the industry forwards. Here we take a look at our ongoing NIC funded successes.

H21



Collaboration: UK GDN's, NGGT, HSE, DNVGL and Leeds Beckett University

Hydrogen's potential role in a UK future energy mix has taken huge steps forward over the last 12 months, in the wake of key government documents such as the 10 Point Plan for a Green Industrial Revolution, and the Energy White Paper. But for government to form policy, it's essential to prove the safety case.

Our pioneering H21 NIC project is delivering the critical safety evidence needed to prove that the existing gas network can safely transport 100% hydrogen in the same way it carries natural gas today.

Phase 1 a & b

We completed the £10.3 million first phase of the NIC project this year, through asset collection research and testing at the HSE Science Division in Buxton and consequence testing on a bespoke rig at DNV's Spadeadam site in Cumbria. The work showed that, with certain mitigation measures in place, the existing network can safely transport the green gas to homes and businesses. It would also see the risk of carbon monoxide poisoning from inefficiently burning gas appliances completely eliminated, reducing the overall societal risk.

We also worked with Leeds Beckett University to carry out research into public perceptions on hydrogen. While customers need assurance on cost and timelines for new appliances, support for a hydrogen conversion, and trust in the networks to safely deliver it, is strong.

Phase 2

H21 has now moved into the demonstration phase. We are carrying out everyday gas network operations and procedures, with 100% hydrogen, to understand any changes that we might need to make to our day-to-day activities.

We're doing this on a specially-constructed microgrid at Spadeadam – a mini replica of a gas distribution network – and later this year at a site in South Bank, Teesside. The site previously housed domestic homes which were demolished a decade ago, but the underground gas infrastructure remains intact and disconnected from the local network, making it a perfect host for H21. And we're delving further into public understanding of hydrogen, working with Leeds Beckett University to develop communication material and messaging that is built on the outputs from customer research.

HyDeploy



Collaboration: NGN, Cadent, Keele Consortium, Progressive Energy, HSE

This pioneering clean energy project we're delivering with Cadent and the Health & Safety Executive is exploring blending 20% vol. hydrogen into the natural gas supply in order to reduce carbon emissions, without requiring any change to domestic appliances.

HyDeploy completed the first year-long live trial on a closed network at Keele University earlier this summer, supplying around 130 campus buildings and houses with the blend. We'll host the next demonstration, as part of the HyDeploy 2 NIC project, on the NGN network up in Winlaton, near Gateshead starting this summer, with blended hydrogen injected into the local public network to supply cleaner heat to around 700 homes.

HyDeploy is paving the way for wider commercial rollout of hydrogen in the gas network, allowing producers to inject the green gas in much the same way as biomethane producers.



6. Going beyond NIA funding

NIA funding is crucial to support the delivery of innovation projects which would otherwise be deemed too high risk or expensive for gas distributors to fund with bill payers' money. However, NIA funding is often only the start of an innovation journey that can accrue major customer benefits, many years after the initial project has been completed.

At NGN, we have continued to invest in former NIA funded projects to make them 'business as usual', as well as funding our own innovation programmes. We have also established a framework for match funded innovation. Working in partnership with the Energy Innovation Centre (EIC) and our supply chain, we have secured £152,113 of match funding in the 2020/2021 financial year alone.

Highlights from 2020/21 include:

ESEAL2:

By embedding this former NIA project into business as usual operations, this solution has become the go to method for stub end abandonment for Tier 2 mains, up to 14 inches. The new technique means less time on site and excavation away from main carriageways. It also reduces safety risk through the avoidance of deep excavations and is more efficient as a result. Last year we used the service 20 times.

EZE Shoring:

This reusable, adaptable and flexible trench support system has improved safety and time taken with deep excavations, while addressing concerns from the HSE over how we manage sites with deep excavations.

Gerbrit Mapress:

This stainless steel "crimping" system involves cheaper, flexible and non-corrosive fittings that can be used in damp and wet environments such as cellars, basement and under public footways, reducing the need for hot works permits and welding equipment. It can also be used in loft and crawl space where there is a fire hazard. The new technique reduces time, the requirement for specialist engineers and operational complexity and, as a result, reduces customer inconvenience. In eight months, we used it 49 times.

Acoustic cameras:

We have invested in using thermal imaging to detect gas escapes from over ground assets – in particular high risers on multi-story buildings from ground level. These iPad sized devices reduce the need to work at heights, improve the safety of our workforce and customers, as well as addressing a specific area of concern from the HSE that we weren't able to assess risers adequately. The solution enables a significant reduction in time and associated operational efficiency, increased accuracy and reduces customer disruption. Predicted future workload is between 300 and 350 jobs every year.

Industry wide projects – National Underground Asset Register (NUAR):

Last year, we continued our work in support of a project to create a combined underground infrastructure map – showing all utility pipes and cables in a designated area.

The project is led by the Geospatial Commission, with partners including Ordnance Survey, water, electricity, telecoms providers and local authorities – all of whom have been sharing asset data to create the combined map.

A reliable and comprehensive map of what exists below the street surface is crucial to ensure the safety of operatives and the general public and to avoid expensive disruption for stakeholders.

We remain engaged with the process and have high expectations for NUAR as the innovation project progresses through to the next phase of development.



Preparing for RIIO-2 – Look ahead

Over these final pages, we have shared insights from some of the key members of our business about the importance of innovation and the continuation of NIA funding over the next regulatory period.

A look back on RIIO-1 and thoughts for the future

Richard Hynes-Cooper – Head of Innovation

The NIA innovation stimulus in RIIO-1 has acted as a strong catalyst for our innovation activities – allowing us to develop new technology, undertake research and provide essential evidence to support the move to a decarbonised energy system.

Throughout RIIO-1, all our employees have been empowered to behave in an innovative manner. We believe our culture and specifically the devolved nature with which we approach innovation is a key differentiator for our business.

Our NIA projects throughout RIIO-1 have been undertaken at a range of technology readiness levels (TRLs). However, the clear majority have started at a high risk, low TRL and would not have progressed without investment through the NIA funding arrangements. We will continue to use NIA funding in RIIO-2 to deliver projects that enhance people's lives and support the transition to a green economy.

I am very proud of the way we have approached innovation, especially our engagement with our supply chain partners, and look forward to building upon this platform in RIIO-2.

Using digital technologies to support decarbonisation

Keith Owen – Head of Systems Development and Energy Strategy

Decarbonisation requires new ways of working, new systems, and solutions to support an affordable, customer-focused transition.

We see the continued evolution of digital technologies, including advancement in data analytics and modelling capabilities, as a key part of this change.

These advances will enable greater information exchange, support new services, enhance system capability and resilience, and deliver customer and industry benefit.

Our innovative and agile approach to the development of new digital based solutions will support the identification, capture and sharing of evidence. This is necessary to provide a clear pathway for national and local net zero policy direction.



Using innovation to tackle customer vulnerability in RIIO-2

Steve Dacre – Vulnerability Innovation Lead

Innovation in RIIO-2 will allow us to continue to remove or reduce the impact of our everyday operations on customers in vulnerable situations.

At recent engagement events, our stakeholders have stressed the need to expand the reach of GDNs and to undertake research to define vulnerability in the context of gas network activities.

We will build upon the learning from innovation projects in RIIO-1, where we identified that the impact of cold homes on wider health is a wide ranging and complex issue. We will further explore where network operations create situations that are unmanageable for vulnerable customers and undertake research and development to mitigate risk.

Strategic direction to meet the industry needs

Gareth Mills – Regulation & Strategic Planning Director

NGN is committed to supporting the achievement of the UK's net zero emission targets.

We recognise the importance of the gas network in the wider energy landscape, helping to facilitate a low carbon economy while keeping costs down for energy customers. The primary focus of our of innovation strategy in RIIO-2 is continue to deliver the evidence essential to support the Government's energy policy decisions identifying the optimal pathway to net zero. NGN has been at the forefront of research into repurposing the existing gas network infrastructure to transport 100% hydrogen through our H21 projects and exploring the potential for using up to 20% blended hydrogen through the HyDeploy projects. This has been made possible as a result of the network innovation mechanisms put in place by Ofgem.

The energy systems transition will create significant change within our industry, with technology development, evidence gathering, and policy change essential steps on the decarbonisation journey, that go beyond the timescales of RIIO-2.

It is therefore essential that the funding available for future focussed network innovation continues to deliver value and we are aware of the crucial role we fill. Our innovation portfolio will undertake targeted research and development that will support our sustainable heat solutions strategy.



7. Meet our team

Our core innovation team helps keep NGN at the cutting edge.

The team looks after the overall management of our Network Innovation Allowance (NIA) and key business funded innovation projects, sets our strategic direction and identifies new opportunities and partnerships.

Team members also provide support and facilitation for colleagues who take on the project management of innovation projects.

Team members:

Richard Hynes-Cooper

Head of Innovation

Ashley Burnhope

Innovation Portfolio Manager

Michael Charlton

Innovation Implementation Manager

Nick Smith

Operational Innovation Lead

Steve Dacre

Vulnerability Innovation Lead

Keith Owen

Head of Systems Development and Energy Strategy

Contact us:

innovation@northerngas.co.uk





HyDeploy

GAS INSTALLATION - IMPORTANT NOTICE
Prior to commencement of any work on or within 10 meters
of this site or in case of an EMERGENCY please telephone
0800 111 999
and give details of the location

5



No unauthorised entry



No naked flames



No smoking



Mobile Phones to be left in vehicle



Potentially explosive atmosphere



Hard hat area



Eye protection must be worn



Protective clothing must be worn



Protective footwear must be worn



High visibility clothing to be worn



CCTV in Operation

Minimum standards of Personal Protective Equipment (PPE) when working on site must be worn at all times when undertaking operational work.

Ear defenders must be available at all times.

Be aware of safe exit routes before starting work.

STOP, THINK! SAFETY
Do not proceed until you have carried out an ON SITE risk assessment

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we are
the network

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