Network Innovation

Annual Summary 2018-19

Northern Gas Networks

Innovating on the streets of
the North of England

we are the network

Meet the Innovation team

Our core innovation team looks after the overall management of our NIA funded projects, sets the strategic direction, and identifies new and exciting opportunities.

The team also provides support to colleagues across the business, helping them devise and deliver innovative ways of working, become earlier adopters of new innovations, and embrace an innovation mindset.

We believe a culture of innovation should permeate our whole business, and not be restricted to a single function.

Through collaboration with colleagues and suppliers, we're developing novel solutions that make our customers' lives easier, and make bills go further.

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Everyday innovation... innovation every day

Mark Horsley
Chief Executive Officer
Northern Gas Networks

Whether we are replacing pipes, responding to gas emergencies, supporting vulnerable communities or exploring new forms of energy, innovation can help us do a better job, at a better price.

Like the other UK gas networks, we receive funding from our regulator, Ofgem, to develop innovative products and techniques that allow us to do our core work more effectively.

This funding stream is called the Network Innovation Allowance (NIA).

In 2018/19 we continued to invest in new innovative projects that stand to make a real difference on the streets of the North of England. Our STASS robotics project is a standout example of this – a robot that can be inserted into pipes to carry out condition surveys and repairs. This technology, unthinkable just a few years ago, is now reducing the cost of our pipeline maintenance activities, and reducing disruption to our customers.

Our innovation programme has now reached a state of maturity, with a well-established process for delivering value-added projects.

Many of our innovation projects have now become business as usual, delivering cost savings and customer benefits each and every day.

As we prepare for our next regulatory period from 2021, with a new business plan, innovation will continue to be at the heart of everything we do – helping us to meet stretching performance and cost-reduction targets.

In the pages that follow, we take a look at the latest crop of NIA funded projects (along with some Network Innovation Competition projects) and review recent successes.

We also focus on our future energy projects, which are examining the potential of green, sustainable forms of gas, such as hydrogen.

I hope you enjoy reading this year's report. If you'd like to find out more about any of the projects featured, or have a great idea to share, please do get in touch.

About us

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

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

As well as providing a safe and reliable service to our customers in the North East, Northern Cumbria and much of Yorkshire, we work with our partners to develop green and sustainable energy solutions, fit for a low carbon future.

01

Our areas OF FOCUS

All UK gas networks face similar challenges. We all need to deliver a safe, reliable service, at the best price, while preparing for a low carbon future.

To provide greater coordination around innovation, the five UK networks collaborated with the Energy Networks Association (ENA) to create a national innovation strategy.

The Gas Network Innovation Strategy is designed to help the gas industry share knowledge, avoid duplication and provide a clear steer to the supply chain, decision-makers and the public about the sector's priorities.

It is a living document and is reviewed periodically. The next review is due in 2020.

There are seven innovation strategy themes:

- Fu — Future of gas
- Sa — Safety and emergency
- Rm — Reliability and maintenance
- Re — Repair
- Di — Distribution mains replacement
- En — Environment and low carbon
- Se — Security

These themes closely align to our own business priorities at NGN, and we are proud to support this national strategy, and help the industry speak with one voice.

We have 'badged' the case studies in this report according to these themes.

02

Our STRATEGIC OBJECTIVES

To maximise the potential opportunities of innovation, our innovation strategy sets out a number of strategic objectives, which are closely aligned with the shared, national objectives, described on the previous page.

Our objectives are:

Optimise investment to deliver benefit for customers

Deliver a portfolio to make us reliable and safe

Collaborate with innovative partners

Be socially and environmentally responsible

Be efficient and deliver value for money

Key developments in our innovation programme

It has been an extremely busy year for our innovation progamme, with 17 projects completed in the past 12 months. We have worked closely with our supply chain and fellow utility companies to develop projects and share knowledge. And we have expanded the range of internal support we provide to colleagues, to help them embrace innovation in their everyday roles.

Measuring the BENEFITS

After six years of NIA funding, our innovation programme has reached a level of maturity.

Projects that began as desktop research or early factory-based trials are now part of our daily operations – delivering major cost savings and customer benefits.

Over the past 12 months, we have:

- Collaborated with industry on **5 new NIA projects**
- Reduced spoil to landfill by **10,600 m³**
- Reduced number of holes dug by **2,485**
- Cut vehicle journeys miles by **4,562**
- Worked with **45** suppliers to develop and progress the most valuable innovative proposals
- Completed **17** NIA funded projects
- Started **16** new NIA projects
- Implemented **6** new innovative ways of working
- Delivered more than **£2.6 million** in cost savings

Throughout GD1, we have delivered 97 NIA-funded projects, with a further 20 in the delivery stage. Of the completed projects;

26%
have been embedded into everyday working

14%
have informed the future energy landscape

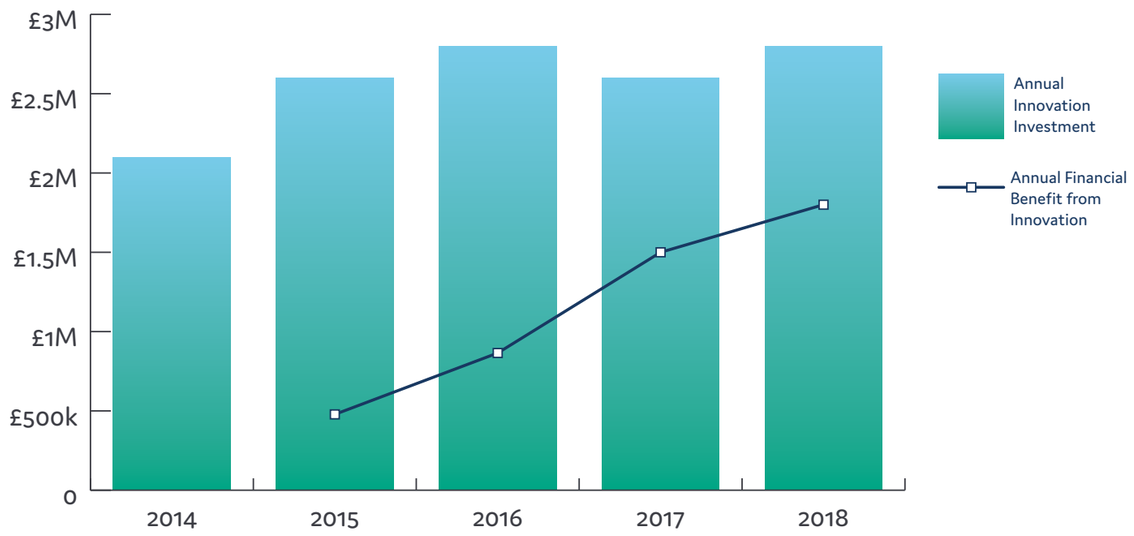
14%
are currently being evaluated or are in the implementation delivery stage

3%
have contributed to the development of an NIC bid

29%
have successfully delivered their intended scope and provided valuable learnings to the network, but further work is necessary before a final solution can be implemented

9%
were unable to successfully deliver the intended scope but have provided wider learning to the networks

The financial benefits of our innovation programme have continued to increase year-on-year, as more and more of these projects have become embedded within the business. Our investment of £12.9M throughout GD1 has delivered £4.6M of savings and will long continue to deliver benefit not only in the current pricing control period, but throughout GD2 and beyond.



Going beyond **POUNDS AND PENCE**

While cost savings provide essential evidence in evaluating the success of an innovation project, some projects can't be easily measured in pounds and pence.

For example, much of the work we are doing around clean forms of energy is focused on the future – and as such – present-day cost savings are not available.

Similarly, projects with a social focus, such as our 'Connecting homes for health' project (see page 15) can lead to dramatic improvements in quality of life, which are not always easy to quantify in terms of monetary value.

To facilitate a consistent way of measuring both the quantative and qualitative impact of innovation, we have been working with other energy networks on an EIC coordinated project.

Working together, we have developed a new innovation measurement framework which contains six key outcome measures and a number of secondary indicators. Making the project a success was the continued interaction with key industry stakeholders, who helped shape the outcome. The completed framework is expected to be implemented later in 2019.

Working with **the supply chain**

Where we face challenges around core service delivery, we often put the challenge back to the supply chain, leading to some surprising and imaginative solutions.

In February this year, we held our first Innovation Pioneer Workshop, made up of members of the supply chain, academia, local authorities and other utilities. The group's purpose is to discuss all things related to innovation, including working more effectively with the supply chain, and sharing ideas that can support business planning and organisational change.

We also recently worked with Digital Catapult North East – an organisation which supports the competitiveness and growth of the region's business sector - to run an event in Sunderland. The event was designed to help local companies learn more about us and give them the opportunity to propose solutions to the service delivery challenges we face.

The event had some great outcomes:

£8K £ saved in initial set up of a procurement event

33 Number of businesses attended

25 Number of companies now in our supply chain who previously weren't

10 Business proposals received as a result

2 Projects in the sanction process

1 Projects sanctioned

As a direct result of the event in Sunderland, we have sanctioned funding for a printable pressure sensor which has tremendous potential to save time, money and environmental impact once implemented.

"Northern Gas Networks has demonstrated that it is a forward-thinking organisation that is willing to explore and embrace emerging technologies. The event we ran on its behalf was very well attended, and it's encouraging to see that Northern Gas Networks has selected not one, but three projects to take forward."

David Dunn,
CEO at Sunderland Software City
(which manages Digital Catatpult NETV)

03

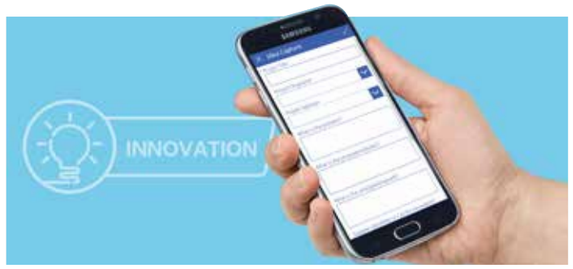
A business wide
CULTURE OF INNOVATION

We want all our colleagues, both front-line and office-based, to challenge convention and propose new and innovative ways of doing things.

We do this through:

Our innovation app

We encourage all parts of the business to submit ideas for improving the way we work.



Colleagues can submit ideas or business challenges they are experiencing through a dedicated app, and these are then evaluated by our business experts via an online survey.

The most promising ideas are taken forward to be explored further at our Think Tank (see below).

Our Think Tank

This group is made up of colleagues from across the business, who meet monthly to assess potential innovation projects. Potential projects can be proposed by anyone in the business.

Over the past year, the scrutiny provided by this group has become even more rigorous and demanding – ensuring that projects which get the green light have an excellent chance of success.

Professional development programme

To help colleagues play an active role in our innovation culture, we've developed a three-stage professional development programme:

Bronze: colleagues take part in a two-hour innovation awareness session, delivered by our core innovation team.

Silver: colleagues become members of our innovation 'Think Tank' (see above) for two months.

Gold: colleagues lead the delivery of an innovation project, from start to finish.

Industry-wide
COLLABORATION

Utility companies often face the same challenges. Collaboration through recognised industry groups allows us to share knowledge, work together and avoid duplication of effort. These groups include:

Gas Innovation Governance Group

A monthly gathering of UK gas networks, providing an opportunity to share knowledge and explore opportunities for collaboration.

Group members have recently carried out a mapping exercise of existing capabilities, and agreed a process for sharing information about completed projects, to improve collaboration, avoid duplication and increase the pace of adoption.

The Energy Innovation Centre (EIC)

The EIC provides an effective, single route to the vast SME sector. Through the EIC we can source ideas and expertise from a community of 2,000 innovators, and invest in regional and national businesses.

Over the past year, we have continued to work with the EIC to investigate alternative sources of innovation funding, allowing us to establish a shared risk and reward partnership with our suppliers.

Cross Utility Innovation Group

A regular get-together of water, power and gas providers. Membership of this group helps us to broaden our thinking beyond the gas industry, through knowledge sharing of innovation projects and best practice processes. We are maturing the group to explore collaborative projects.

Utility Week Live conference

For the past five years, we have attended the annual Low Carbon Network Innovation Conference, at which electricity and gas networks showcase their innovation successes and disseminate project learnings.

This year, the gas sector made a collective decision to allocate our conference budget to a different event – Utility Week Live – in order to extend our reach, and learn from a broader range of companies.

We were one of the five gas networks showcasing our projects on a collaborative stand. The conference was extremely well attended, and proved a great opportunity to meet, share knowledge and learn from utility colleagues, suppliers and customers.

Northumbrian Water Innovation Festival

We took part in the iconic Northumbrian Water Innovation Festival, bringing multiple innovative minds together under one roof to solve industry challenges.

During the event, we took part in a 'sprint' with our fellow utilities to map underground assets. This proved the catalyst for a much bigger pilot project for underground utilities mapping, attracting the attention and 'backing' of Government's Geospatial Commission. The Commission awarded the project £3.9 million to fund two 'up and running' feasibility pilot schemes.

Digital Leeds

As part of this month-long digital festival held in 2019, we attended the region's first ever Energy Innovation Summit.

Richard Hynes-Cooper, our Head of Innovation, was one of a number of speakers, focusing on the role that tech plays within energy efficiency.

The event allowed us to reach a wider and more diverse range of stakeholders, beyond the utility sector.

Our next business plan: what next for innovation?

This year, we are submitting our next business plan to Ofgem. The plan covers the period 2021-2026 (known as GD2) and describes how we will deliver a world-class service, at the right price.

The current business period has proved that investment in innovation can deliver enormous benefits for customers, shaping the way we deliver our business objectives and helping us to be even more ambitious.

We want to go even further in GD2. Innovation is pivotal to the plan, allowing us to meet stretching performance target and cost savings.

04

Delivering
BENEFITS EVERY DAY

In GD2, we want to:

- Continue to develop our people and empower them to innovate.
- Reduce the cost of innovation to our customers, by developing more sources of funding.
- Work with innovators across a range of sectors – not just constrained to the energy sector.
- Improve the monitoring of our innovation portfolio, to support future decision making and more informed conversations about the value of innovation.

We have completed a total of 97 NIA funded projects over the past six years. Many of these are now firmly embedded across our routine operations, delivering cost savings and customer benefits every day.

Here are some of our embedded projects.

Gas detection dogs

We have been using sniffer dogs to detect gas leaks for the past 18 months, with great success.

On average, the dogs are used six days a month, helping our engineers to identify leaks. To date, we have generated £113k of cost savings.

Following our success, other gas networks have expressed interest in using sniffer dogs, and North West water company United Utilities has deployed its first dog to sniff out water leaks.

£113k cost savings realised to date

STASS (System Two Access and Seal Solution)

STASS is a state-of-the art robot that can travel down our pipes and show us what is happening beneath the surface.

The robot transmits live footage of a pipe's condition, as well treating joints by applying 'flex spray'. It can travel 250 metres from one access-point, reducing excavations, cost and environmental impact.

We began using STASS in January 2019, deploying it on an average of two jobs per week. The average duration of jobs has reduced from three weeks to just one week, and cost savings of up to £2k per operation.

Measuring the societal impact of network activities

Last year we joined Northern Powergrid, Northumbrian Water and Yorkshire Water for a collaborative NIA project to help networks better measure the social impact of their activities on customers.

The project was designed to give utilities a better understanding of how their work affects local communities, and provide a common methodology for measuring impact.

A final, shared report has now been published. We have begun to use the report's recommendations in our day-to-day work, such as including societal impacts in our cost benefit analysis work.

Total stub end abandonment

A technique to cap off small diameter gas pipes, without leaving a short 'stub' of live pipe, was introduced to the network in 2015, following a successful NIA-funded trial.

The technique, which sees a foam bag inserted into the pipe, prevents the need to have to dig up these stubs.

To date, more than 533 jobs have been carried out using the technique, saving more than £2.9M

Core and Vac

In 2016, we introduced two 'core and vac' rigs to the network. These game-changing rigs can drill a small sliver from the road during a repair, preventing the need to make a large excavation.

The extracted road 'core' can then be reinserted, dramatically speeding up reinstatement times.

We have used our core and vac rigs 499 times to date, saving an estimated £600k, whilst avoiding 998 days of highway disruption.

05

Our
NETWORK INNOVATION ALLOWANCE PROJECTS

Unlocking even more value for our customers for the years ahead, is our latest crop of NIA projects. Here are just some of our latest projects

Taking to the skies to survey gas pipes

Like all other gas networks, we need to keep a close eye on the condition of our large, higher pressure pipelines.

To do this, we take to the skies, conducting helicopter surveys every two weeks. The helicopters fly over the network to check pipe condition and ensure that there are no civil engineering works which could potentially cause damage.

Rapid advances in drone technology present an opportunity to conduct these surveys using unmanned aerial vehicles – offering a cheaper, more convenient solution.

Beyond Visual Line of Sight (BVLOS)

Smarter Networks Portal Project
Reference: NIA_WWU_045

Partners: Coordinated by the EIC, the project is a collaboration between ourselves, the other UK gas and electricity distributors, supplier Callen Lenz, and the Government's Drone Pathfinder Project

Project summary: Conduct a series of trials with a tailor-made drone to test the practical and safety issues associated with using the unmanned craft to inspect gas networks.

Current rules mean drones must be kept within the pilot's view – but this trial will involve flying the craft several kilometers. If successful, it could help inform a change in Government legislation, allowing drones to be flown beyond visual line of sight, for a variety of industrial applications.

Current status: Flight trials are currently underway.

Benefits: Using drones instead of helicopters offers significant time and cost savings. The trial ties neatly into a wider Government Pathfinder programme to explore the use of drones for a variety of industrial applications.

"We have 1200km of pipes which require aerial surveys by helicopter. Using drones would be considerably cheaper and better for the environment. They are also safer too – given the drones are unmanned.
"If the trials are successful, we can see the drones' use being extended to other areas – such as surveying flooded areas from a safe distance.
"While there are lots of advantages, we recognise that drones have had a bad press recently. It will be important to reassure our customers about how we are using them, and why."

Andy Middleton, NGN
Network Integrity & Compliance Lead

"With the potential to revolutionise the maintenance of critical infrastructure, the benefits of creating a standardised provision for drone operation across the UK's gas and electricity networks are significant, and through obtaining CAA approval, the framework will pave the way for utility companies to use drones in inspections of their network infrastructure."

Andy Walbridge,
Chief Designer, Avionic Systems, Callen-Lenz

Heating for health: EXPLORING A NEW APPROACH

Customers living in cold homes, with no gas connection, can suffer both physically and mentally.

Under current rules, households in fuel poverty (i.e. spending a disproportionate amount of total income on energy bills) are eligible for a free gas connection.

The criteria does not take account of the health of residents, however.

We wanted to see if targeting free gas connections at customers suffering from poor health could improve their wellbeing and save health providers money.

The findings could potentially inform a future change in the eligibility criteria for free gas connections.

Connecting Homes for Health

Smarter Networks Portal Project
Reference: NIA_NGN_195

Partners: National Energy Action

Project summary: A two-part project to explore the impact of free gas connections on households suffering from poor health.

Status: We began by conducting desktop research, to look at the existing evidence–base around cold homes and poor health. This confirmed a causal link between the two.

We then installed a free gas connection, along with gas central heating, in 103 homes across Durham and Sunderland.

Households will be monitored over the course of a year to assess the impact on their health.

Benefits: Examining the health impact of a free gas connection, plus the potential cost savings to the NHS, stands to fill a big gap in current knowledge. It could help to expand the criteria for providing free gas connections in the future.

"Warm homes are vitally important for people's physical and mental health.
"The current criteria for providing free gas connections does not take account of the health status of households – so this project intends to fill this crucial evidence gap.
"As well as improving quality of life, the knock-on savings to the NHS could be enormous.
"We will be closely monitoring the impact of a gas connection across a number of households in Durham and Sunderland in the coming year, and providing recommendations based on the results."

Jill Walker
Social Strategy Project Manager

"I'm looking forward to it. I will be able to get hot water during the day and then the central heating itself - I'll be able to leave it on. I've got a few health problems and I get cold. I suffer from osteoarthritis and all this sort of stuff, so the colder it gets the worse it is."

Customer Participant

Fewer supply interruptions ARE IN THE BAG

We carry out lots of daily operations that require us to switch off a customer's gas supply – including replacing old Emergency Control Valves (ECVs) and sending cameras down pipes to conduct surveys.

To keep the gas flowing, even while this work takes place, we are trialling the use of a new encapsulation device, which acts rather like a sophisticated zip-lock plastic bag!

The project, which builds on an earlier NIA funded project, stands to save time and money, and avoid inconveniencing our customers during routine network maintenance.

Project Zero

Smarter Networks Portal Project Reference: NIA_NGN_238

Supplier: Synthotech

Project summary: We are developing an encapsulation bag which can be fitted over a pipe valve, forming a pressurised seal. Gas continues to flow through the mesh-reinforced plastic, avoiding the need to switch off the gas supply.

Current status: The device is currently being developed in the factory, ahead of network trials in autumn 2019.

Benefits: The device can be used in lots of different scenarios, including replacing old ECVs, replacing Service Isolation Valves (which control the flow of gas to high-rise buildings) and when sending cameras down pipes for surveys.

Its versatility stands to deliver major cost and time savings while avoiding the need to interrupt customers' gas supplies.

"Every time we have to switch the gas supply off, it causes inconvenience for our customers, and costs us time and money.
"This technology will allow us to carry out a variety of routine jobs on the network, while keeping the gas flowing to customers' homes.
"In the previous phase of the project, our engineers commented on how quick and easy it was to fit the bags over pipe valves. This bodes really well for the new trials later in 2019."

Jarred Knott
NGN Innovation Team

"We're using a special engineering plastic for the bag, which could be further reinforced with mesh on the inside.
"Following an initial trial on ECVs, we all realised there was scope to use the bag in several other scenarios too. In response, we are now developing the design further, to make it modular and easy to adapt to different jobs."

Simon Langdale
Synthotech

Traffic plans at the CLICK OF A BUTTON

Roadworks are a regular source of frustration to motorists and communities – but their impact can be lessened by well-planned schemes which are sensitive to local conditions.

Traditionally, utility companies buy-in traffic management plans from third parties.

For example advances in computer coding and rules engines mean it is now possible to generate automated traffic plans, in-house, which are optimised for customer convenience.

Smart Signing, Lighting and Guarding (SLG)

Smarter Networks Portal Project Reference: NIA_NGN_246

Partner: 1Spatial

Project summary: Development of a software programme that can produce automated traffic management plans, on a scheme-by-scheme basis, to be shared with local authorities and other key stakeholders.

A wide range of criteria can be used to generate each plan, including location of the works, proximity to local homes, businesses and schools, traffic flow data and compliance with industry rules and regulations.

Status: a feasibility study and proof-of-concept demonstrator (based on Leeds City Council traffic area) has been successfully completed.

We are now underway with the second phase of the project, which will see the development of a production-ready model, for use across the wider network. As part of this second phase, we are seeking to integrate additional data feeds into the modelling software, such as traffic flow data.

Benefits:

- The ability to automatically generate traffic management plans will save money, by avoiding the need to pay third parties to produce plans for each scheme, reducing the need to send managers to site, and removing a variety of administrative tasks.
- Key stakeholders such as local authorities will benefit from timely, accurate and consistent plans.
- The ability to use traffic flow data, and other information such as road layouts and street furniture, such as bus stops, will allow the creation of sophisticated plans which put customers first.

"The ability for our own designers, planners and engineers to generate traffic management plans, at the click of a button, is a potential game-changer for the industry.
"It will save money on every traffic management scheme we create, as well as ensuring that our key stakeholders, such as local authorities, have quick and easy access to plans for sign-off.
"However, what is most exciting about this innovation for me is the ability to make our schemes even more customer-focused. By building in key information such as local traffic flows, we can design schemes which are less disruptive, and more sensitive to local issues."

Richard Hynes-Cooper
Innovation Team

Upgrading service pipes, WITHOUT THE NEED TO DIG

We carry out around 29,000 planned, and 5,000 unplanned service renewals, each year.

Current techniques mean we often have to dig a small excavation in the customer's driveway or garden, in order to insert the new pipe through the length of the old one.

To avoid the need to dig, we are developing a new process which involves inserting the new pipe from inside the customer's property, starting at the gas meter.

Internal Live Service Insertion

Smarter Networks Portal Project Reference: NIA_NGN_228

Partner: Steve Vick International

Project summary: Development of a new technique to upgrade service pipes, which sees the new length of pipe inserted from within the customer's home, starting at the gas meter control valve. This avoids the need to dig a hole in the customer's garden or driveway.

The new technique is more complex than the current one, and requires the development of new equipment and processes.

Status: Factory trials have been successful, and we will soon be conducting network trials.

Benefits: Avoids the need to make any excavation outside a customer's property. This eliminates mess, inconvenience and can cut the duration of each job in half, delivering considerable cost savings per job.

"Instead of starting outside a customer's property and working inwards, this new process means we start inside the property, and work outwards.
"This eliminates the need to dig entirely.
"The process presents some technical hurdles, but our supplier, Steve Vick International, has made great progress in overcoming these.
"We're excited about the potential of this new technique to improve the overall experience for our customers, while saving money on every job."

James O'Brien
NGN Site Manager

"Adapting our established process for inserting PE pipe presented a number of technical challenges.
"Working next to the meter, inside a property, means cramped conditions, so we've had to develop a powered applicator for the pipe sealant.
"We've also developed a new 'mini-pusher' to get the new PE pipe along the length of the old metal pipe. Starting inside the property means it now has to travel a longer distance."

Richard Ditte
Steve Vick International

Providing hot water when THE GAS GOES OFF

When gas supplies are interrupted for a sustained period of time, either due to a network problem or planned work, it can be hugely inconvenient.

We had always assumed that lack of heating and cooking facilities were the biggest issues during gas loss. However, customer research revealed that loss of hot water can be just as impactful, especially for our more vulnerable customers.

In response, we are exploring a variety of options to provide a source of temporary hot water when the gas goes off.

Temporary Provision of Hot Water

Smarter Networks Portal Project Reference: NIA_NGN_231

Suppliers: MMI Engineering Thornton Thomasetti

Project summary: Examined a range of different solutions for providing temporary hot water/cleaning facilities to customers during gas loss. These include electrical water heaters which attach to sink taps; portable shower units which can be used over a customer's bath or shower and waterless cleaning kits (containing wipes, dry shampoo etc.).

Status: A variety of different products from national and international suppliers are currently being sourced and tested, following completion of our initial research project into available and viable products.

Benefits: The project will present the industry with a comprehensive understanding of the various hot water solutions on the market, and their effectiveness in supporting customers during gas loss.

It provides an opportunity to offer customers – especially those in vulnerable circumstances - an additional layer of support, when they need it most.

"We provide temporary heating and cooking facilities to our customers during gas loss incidents. It's a well-established process, with regulatory targets and guidelines.
"Providing hot water is not a regulatory requirement, but it is something our customers have told us really matters.
"Loss of hot water presents a number of health and hygiene issues for customers, which can be especially pronounced for families with young children, or customers who are medically dependent on hot water.
"By testing the products currently on the market, we have the opportunity to offer customers an additional layer of support, when they need it most."

Steve Dacre
NGN Customer Experience Development Manager

A stopper for
PLASTIC PIPES

The traditional way to stop gas from flowing through plastic pipes, in order to carry out repair and maintenance work, is known as 'squeeze off.'

This involves using a clamp to squeeze the pipe shut. The technique does present technical challenges, however. Since 2008, the industry has favoured a different technique, involving inflatable stoppers, on metallic mains.

We have been working with our supplier, Radius PLUS, to extend the stopper approach to plastic mains, so that the benefits can be realised across much more of our network.

Squeeze Free Flow-Stopping on PE Mains

Smarter Networks Portal Project Reference: NIA_NGN_212

Partner: Radius PLUS

Project summary: Develop an alternative to the traditional 'squeeze off' technique which is still in use on plastic pipes. The project involves inserting a plastic bag inside the main, through a tube. The bag is then inflated, forming a seal and stopping the flow of gas. Once the job is complete, the bag can be removed, and used on the next job.

Status: Factory testing has been successful, and trials on the network will begin soon.

Benefits: Using an inflatable stopper, instead of squeezing the main closed, is a safer, cheaper and less disruptive alternative. The excavation can be much smaller – reducing traffic disruption, cost and waste. The inflatable bag can be extracted and reused on future jobs.

"Squeeze off has been the industry standard for many years. However, it's an inefficient technique, requiring a large excavation, and all the cost and disruption that goes with it.

"We developed an alternative technique, involving an inflatable stopper, which has been used very successfully on metallic mains.

"The NIA funding has allowed us to work with Northern Gas Networks to adapt the product, so that it can also be used on PE mains.

"The benefits, in terms of reduced size of excavations, less disruption and improved safety, stand to be enormous.

"We're now looking forward to trialling our solution out on the network."

Dave Sykes
Radius PLUS

06

Future
ENERGY PROJECTS

With climate change an increasingly important topic in our homes and schools, customers are now more ready than ever to embrace cleaner, greener technologies, providing it is at a reasonable cost and delivered with minimal impact.

In March 2019's Spring Statement to Parliament, Chancellor Phillip Hammond called for greater volumes of green gas to be injected into the gas network, in order to help the country reduce its dependence on fossil fuels for heat.

Over the past year, we have continued to work at regional and national level to explore the potential of green gas, particularly hydrogen, in a low carbon economy.

H21 NIC

Backed by £10.3 million Network Innovation Competition funding, this three-year project is delivering critical safety evidence, proving that a 100% hydrogen gas network is equally as safe as the natural gas grid heating our homes and businesses today.

Working with the Health and Safety Executive (HSE) and safety experts DNV GL, we've created two bespoke testing facilities at the HSE's laboratory in Buxton, and RAF Spadeadam in Cumbria, and will be carrying out a range of safety trials.

All the safety evidence collected will assist the government in progressing towards a policy decision on hydrogen by 2025.

H21
PROJECTS

As well as the NIC project (see previous page), a raft of H21 Network Innovation Allowance projects are underpinning the safety case, and gathering essential supporting evidence. These include:

Strategic Modelling, Major Urban Centres

Smarter Networks Portal Project Reference: NIA_NGN_204

This project seeks to extend the principle of hydrogen conversion from Leeds City Gate across the NGN network and beyond. This includes Newcastle, Hull, West Yorkshire, Liverpool, Edinburgh, Cardiff and Bristol.

H21 – Alternative Hydrogen Production and Network Storage Technologies (North of England Report)

Smarter Networks Portal Project Reference: NIA_NGN_206

Partners: Cadent, Equinor

This builds on the Leeds City Gate study by presenting a conceptual design for converting the North of England to hydrogen between 2028 and 2035. It is a blueprint of the various stages needed to convert gas infrastructure at a very large scale, providing insight into the production, storage systems and distribution changes required for conversion over a six-year period, in order to ensure clean heat supplying the North's major conurbations (Manchester, Liverpool, Leeds, Teesside, Tyneside, York, Hull, Bradford). The report was launched to industry and Government stakeholders in November 2018.

HYDEPLOY NIC

HyDeploy will begin a live trial at Keele University in September 2019.

In November 2018, the project was awarded a further £15 million from the Network Innovation Competition for two further year-long public trials. These will take place on the NGN North East network in 2020, and Cadent's North West network in 2021, with blended hydrogen supplying 700 homes in each location.

Helping the NIC project to understand hydrogen public perception is the NIA project:

NIA_CAD0032 - Hydrogen Perceptions, Practices and Possibilities in two UK communities

Understanding public perceptions of hydrogen is vital for it to be accepted into everyday life. We worked with Newcastle University to gain these insights, and find out what the possible barriers and perceived risks might be.

Not all Innovation
IS SUCCESSFUL

City CNG – project closed early

In recent years, we have been working collaboratively with Leeds City Council to construct a CNG refuelling station. Initially, the station was to be used to power the council's fleet of bin lorries, with potential to expand its use to heavy goods vehicles.

Unfortunately, the council has been unable to secure a suitable site for the station, an essential dependency for the project. As a result, this NIC project is no longer feasible at this time.

07

Sharing knowledge AND BENEFITS

NGN funded projects

Alongside our NIA and funded projects, we use our own TOTEX budget, or time and resources, to work with suppliers to co-develop products which meet our needs.

Developing a shared risk and reward process with suppliers benefits our customers, and gives suppliers an opportunity to test and improve their products and techniques in real-world conditions.

Here are some recent examples:

Booking appointments with Localz

We perform around 70,000 purge and relights each year – the process of reconnecting a property's gas supply following planned or emergency work, and carrying out essential internal safety checks.

Last year, we missed 8,000 such appointments – an 11% abort rate – because customers were not home when our engineers called round.

> Each missed appointment costs us £35 – that's £280,000 per year.

In response, we are trialling a new text message appointments service with solutions provider Localz, enableing us to arrive at a time which is convenient for the customer, keeping them informed and providing an easy means of two-way communication.

All purge and relights booked through the text service were successfully completed first time, resulting in no missed appointments, a great outcome for our customers.

Benefits

- Through reducing the number of missed appointments, across five years, this project has the potential to save us £1.4 million.
- Improves customer convenience.
- Avoids unnecessary road journeys.

Remote pressure management for biomethane producers

During periods of low demand (e.g. summer months, overnight), biomethane producers can struggle to inject their product into our medium-pressure network. With the network already full of gas, there is simply no room.

We are working with supplier Utonomy on a remote pressure management system, which allows us to alter pressure and free up the space biomethane producers need.

The system had originally been developed by Utonomy for a low tier network, but we are working with them to adapt it for our medium pressure network, with field trials likely to take place towards the end of 2019.

Innovate UK is helping to fund the project.

Benefits

- Ability to alter pressure remotely means we can be more agile and responsive.
- Overcomes the biggest impediment facing biomethane producers.
- More flexible pressure control can help to reduce risk of leaks.

Adopting existing technology and processes

Network Innovation Allowance funded projects don't just benefit a single utility company and their supply chain. Knowledge is shared across the industry, - allowing others to replicate successful projects.

The following projects are all former NIA projects, developed by other utilities, which we are now adopting for our own network.

ServiFlex

ServiFlex is industry-standard PE pipe, originally developed by Radius Systems for SGN

We have adopted a 40 mm version of this pipe, which can be inserted inside two-inch steel services.

By avoiding the need to relay the original pipe, jobs can be delivered more cheaply, simply and quickly through the use of this novel insertion technique.

ServiFlex reduces the needs for excavations and reinstatement, and avoids moving the location of the customer's commercial gas meter.

We have successfully trialled the product, saving an average of £500 on each job.

ServiFlex is currently being rolled out across our network.

Benefits

- Minimises customer disruption.
- Reduced excavations.
- Easier and faster to install.
- Estimated cost savings.
- The new technique will save an estimated £500 per job.

Steel cutters

Wales and West Utilities (WWU), working with supplier Steve Vick International, developed a highly effective pipe cutter, by repurposing a tool used for cutting ductile iron pipes.

At NGN, we lacked a dedicated tool for cutting steel pipe, and recognised the time and cost saving benefits of having such a tool.

We are now in the process of 'piloting' the WWU tool, before rolling it out across the network.

Benefits

- Faster, easier way of cutting steel pipe.
- Supports other, more efficient working practices on site.
- Estimated cost savings.
- Anticipated annual savings of £34,000.

Bond and Bolt

To support the use of our new robot, STASS (see page 12) we have repurposed an existing technique developed by Cadent and ALH Systems, known as bond and bolt.

This is an established method for gaining access to live, large diameter metallic mains (e.g. to launch CCTV cameras into the pipe, or flow stop equipment) without the need for large excavations.

The method involves applying a saddle to the crown of a main. Traditionally the full circumference of the main would be required to be exposed. The technique has proved ideal for launching our STASS robot.

Benefits

- Allows use of STASS robot with only a small excavation
- Simple and quick
- Safer way of gaining internal access to a pipe

ServiBoost – Synthotech

ServiBoost is a device which provides a pressure boost to compensate for poor gas pressure. It was originally developed by supplier Synthotech for utility Cadent.

When customers have a new boiler installed, they can sometimes experience a drop in pressure, and require a new service pipe to be installed. ServiBoost provides a temporary uplift in pressure in such circumstances, keeping the customer gas supply on, until the new service pipe can be installed.

We are now currently reviewing the product for trial on our network.

We hope you have enjoyed our report, for regular updates follow us on LinkedIn
linkedin.com/showcase/innovation-at-northern-gas-networks

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