

Network Innovation Allowance

Annual Summary 2014/15



SGN

Your gas. Our network.



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“Implementing the learnings of our Innovation projects is helping us to drive performance and deliver value to GB gas consumers.”

Angus McIntosh, Innovation and New Technology Manager



Foreword

Welcome to our annual summary of Network Innovation Allowance (NIA) activity for 2014/15. Continued innovation is key to us and is now an integral area of our business. It helps us ensure we go on adding value to our customers as well as to the business.

Over the course of the year, our portfolio has included 48 projects which are funded using the NIA funding mechanism. These projects are wide-ranging and link across a number of our key business departments. Around a third of these are collaborative partnerships with other Network Licensees, both gas and electricity. We continually seek to collaborate and share knowledge and learning with the wider utilities industry to help us achieve our common goals. This year we were proud to become the first gas distribution network (GDN) to complete and implement an NIA project, Osprey Pressure Validator, from which the learning was shared and the technology adopted by the other GDNs.

The strong innovation strategy and culture is now embedded well into the Innovation team and wider organisation. A key focus this year, and moving forward, has been innovation delivery with a specific push on implementation. I'm pleased to report that over the year there have been several NIA funded projects which we have adopted as business as usual and are already having a positive impact on our daily operations.

A handwritten signature in black ink, appearing to read 'John', with a horizontal line underneath.

John Morea
Chief Executive Officer

We have implemented over 10% of our completed NIA projects into business as usual.

About us

We provide a safe and reliable gas supply to each of our 5.8 million customers through 74,000km of gas mains services and are the second largest gas distribution company in GB.

Formed in June 2005, we are owned by three shareholders – SSE plc (50%), Borealis Infrastructure Europe (UK) Limited (25%), which is indirectly wholly owned by OMERS Administration Corporation and OTPPB Investments (UK) Limited (25%), which is owned by Ontario Teachers' Pension Plan Board.

By actively engaging with and helping our customers, our environment and our communities, and by demonstrating the highest standards of safety, reliability and efficiency, we aim to become GB's leading gas network operator.

Our people take pride in making a real difference, continuously improving and innovating. We are committed to delivering excellent customer service in all areas of our business.



Angus McIntosh with Jonathan Reynolds, Shadow Minister for Energy and Climate Change

Innovation strategy



Safety first

Safety is at the heart of everything we do as a business and our innovation projects aim to provide a safer and more reliable gas supply to our customers as well as improving safety and the working environment of our operatives.



Driving performance

We aim to drive performance forward through our Innovation projects and improve our efficiency as a business. We also aim to open up the market through widening the range of gas quality which can be distributed.



Putting people at the heart

By including structured and detailed governance at the heart of all our projects, we work to ensure that our projects can be carried out successfully and the best quality of information is gathered by our operatives.



Looking after customers

Our projects are helping to improve the relationship we have with our customers and the public by reducing the disruption we cause when working and improving the efficiency of work carried out on the network.



Sustaining our world

Embedded into many of our projects are environmental benefits. We support entry into the network from renewable sources of gas and support the low carbon economy.

Ignite

The number of internal and external suggestions submitted through our Ignite suggestion scheme has continued to gain momentum. Some of which have progressed to ongoing NIA projects. Furthermore, we are now receiving a larger amount of external proposals per month from new and existing project partners.

Good ideas can come from many sources. Our popular Ignite suggestion scheme (ignitescheme@sgn.co.uk) allows all our employees and external stakeholders to submit ideas and suggestions. All ideas are welcome and do not need to be fully developed.

IGNITE

Innovating
now



“We strive to design projects to deliver outcomes, not merely outputs. It is essential that we maximise project progress in to business as usual”

Angus McIntosh, Innovation and New Technology Manager

Collaboration

Collaboration is a key focus for the industry as a whole, and we are working alongside the other Network Licensees to ensure the maximum amount of valuable information is shared. Over the next year, we will continue to grow the amount of collaboration between the networks to help maximise value from our projects.

Maintaining our effective sharing of learning was identified as a target in our Annual Summary 2013/14. This target has been met and exceeded with learning dissemination improving and becoming more effective over the year. We have achieved this through developing our relationships with the other Network Licensees as well involvement in other external groups. We currently chair the monthly Gas Innovation Governance Group (GIGG), which includes all the GDNs and National Grid Gas Transmission (NGGT). From January 2015, there have been several new initiatives introduced, such as a quarterly newsletter. This all helps to ensure knowledge and learning is shared and includes the opportunity to have each network host a GIGG meeting to allow them to present and demonstrate their most recent project learning.

32%
of our current
project portfolio are
collaboration projects

“GIGG is a great platform to allow us to share our problem definitions, ideas and project learning to aid successful collaboration. It is testament to how working together can benefit us all.”

David McLeod, Innovation Delivery Manager and GIGG Chair.

Story of the year



Some of our team taking part in our Community Action Program



Team growth

Over the year our Innovation team has grown and now spans across our whole network from Edinburgh to Poole.

In addition to other exciting appointments, we have added two graduates to the team, which is a clear demonstration of the focus we have on driving innovation and delivering long term improvements.

Project partners

We have continued our strong working relationship with many existing project partners as well as forging new relationships and links not only in GB but also overseas.



Total expenditure
of **£3.31m** on
effective and efficient
NIA projects in 2014/15



A few of the team receiving an award at the UK Energy Innovation Awards in April 2014



Awards/recognition

Over the year, many projects in our portfolio have been recognised in a variety of forms. The efforts of the innovation team and project partners were recognised by The Innovation Institute and National Joint Utilities Group (NJUG). Furthermore, the team successfully won at the Utility Week Stars Awards and the UK Energy Innovation Awards. Along with our project partners, we have won several industry awards for our innovation projects since the start of NIA in 2013:

- UK Energy Innovation Awards 2014 - Best Innovation Contributing to Customer Quality and Reliability of Supply - CISBOT™
- NJUG Awards 2014 (Vision for Streetworks) - Special Award for Outstanding Innovation - CISBOT™ and Robotics
- Innovation Awards 2014 (NEF - The Innovation Institute) - Innovator of the Year - Sam Wilson
- Utility Week Stars Awards 2014 - Innovator Award - CISBOT™
- IGEM Gas Industry Awards 2014 - Customer Service Award - Opening Up the Gas Market
- AGSM Gas Safety Awards 2015 - Gas Innovation Award - Opening Up the Gas Market
- UK Energy Innovation Awards 2015 - Best Innovation Contribution to Quality and Reliability of Gas Supply - Optomole
- London Construction Awards 2015 - London Innovation of the Year - CISBOT™ and Robotics
- IGU Global Gas Awards 2015 - Opening Up the Gas Market



Implementation

Our key Innovation focus in the past year and through the remainder of the RIIO price control period is on implementation.

In our daily operations, we are already seeing the benefit of several projects which concluded last year, including NIA_SGN0022 Small Pressure Pot and NIA_SGN0026 Customer Self Isolation and Restoration (stage 2). These have been well received in our business and have helped to improve the working conditions of our operatives as well as improving our efficiency. Therefore, helping improve customer service and the value we provide to consumers.

£20m committed to implementation since 2012/13

10% of our NIA projects have been implemented

SAT

Project snapshot

Project reference: Self Amalgamating Tape (stage 2) (NIA_SGN0030)

This project successfully evaluated Self Amalgamating Tape (SAT) as a repair activity for screwed joints up to 2" diameter on riser and lateral pipework.

The benefits of using SAT are:

- Reducing environmental impact by effectively and efficiently repairing joints.
- Minimising disruption to our customers by carrying out repairs in one site visit rather than multiple visits using traditional methods.
- Minimising the time customers supplies are interrupted.

On completion of the project, an evaluation was carried out on the benefits of undertaking the operation using SAT compared to traditional methods, using

the information obtained during off-site and live field trials. This analysis showed a cost saving on each repair compared to traditional methods and so an implementation plan was created and 500 SAT repair kits were purchased.

The equipment was distributed to both our Scotland and Southern networks and proved an extremely effective form of repair.

On completion of this project, the learning was disseminated effectively through the creation of a training video (<http://youtu.be/MVttCFM7BzA>), sharing the project report and a live demonstration of the technology to the other networks. The implementation strategy was also shared, along with samples of the equipment to assist all the GDNs to successfully implement the technology.



Project reference: Large CISBOT™ (NIA_SGN0019)

Upon completion of a very successful NIA project, Large CISBOT™ was implemented throughout the business. Operations are underway to rehabilitate a number of joints in our 18” to 48” cast iron mains in both our Scotland and southern networks.

The benefits of using the CISBOT™ system are:

- Working on live gas mains safely and efficiently, without closing off supply
- Increases public safety and removes risk from the gas network by renewing joints that are leaking or prone to leakage
- Seals over 365m of main through one small excavation
- Forms seals that last for 50 years (proven by Cornell University) thereby extending the life of large diameter mains considerably
- Minimises the environmental impact (amount of waste sent to landfill and carbon emissions of queuing traffic, shorter periods of exhaust fume inhalation etc)

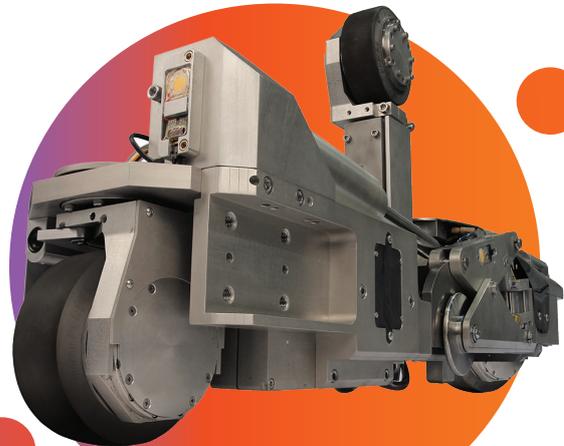
A package of work has been agreed with ULC Robotics, the company who developed CISBOT™ to implement the technology in our network, repairing and remediating some of our highest risk pipes covering a distance of over 9km.

The learning from the project has been disseminated to the other GDNs and we are working closely with them to help make CISBOT™ a viable option for joint repair and remediation. Presentations and demonstrations have also been provided through the Institution of Gas Engineers and Managers (IGEM), and disseminated to the wider utility and street works community at conferences and company visits.

“I would like to thank all of SGN on behalf of myself and ULC Robotics for providing outstanding support and professionalism throughout the project.

Our CISBOT™ technicians had an outstanding experience working and living in Edinburgh and were able to work very efficiently and productively with the help from SGN’s highly skilled support crews and management.”

Ryan McGowan, Director of Field Operations, ULC Robotics



IGEM Technical site visit -
George Street, Edinburgh

Osprey Pressure Validator **Project snapshot**

Project reference: (NIA_SGN0021)

This project was to support the field trial of a wireless, intrinsically safe, battery-powered remote monitoring unit that fits inside bollards, posts and meter boxes and monitors gas pressure up to 100mbar.

The project proved successful in realising the following benefits:

- Field trial reported pressures consistent with the recordings of our existing pressure loggers with $\pm 1\%$ differential (considered a very high accuracy level).
- The network planning team report that pressure data was easily accessible and allowed for real time analysis.
- Total installation time averaged approximately 22 minutes (six minutes signal recognition), showing a substantial improvement on the historical average of 45 minutes per logger unit.
- Successful remote downloads realised the success of the product in removing the manual download process.
- Comprehensive field trial report produced and available to stakeholders and Network Licensees on request in order to support implementation and learning dissemination. A report covers field trial outcomes regarding project objectives as well as working procedures and ATEX verifications.
- Savings are being made in terms of cost of units, with the new Osprey Pressure Validators using off-the-shelf, rather than specialist battery packs. Furthermore, the use of the Pressure Validators allows less site visits by operatives and for team managers and the network planning team to receive information in real time rather than historic information to allow for more immediate and accurate action to be taken.

On completion of this process, a supplier was selected and 910 Osprey Pressure Validators were procured. The feedback from the use of the units to date is very positive with environmental benefits as well as efficiency benefits.

The units have already been successfully installed in our network and the information is helping our Network Planning department in their daily operations. Other operatives are also utilising them too, however to help get live pressure information for the purpose of monitoring pressures on the network.

Matthew Morland, Team Manager and innovation lead in Aldershot said: "We fitted the devices on three services which were suffering from low pressure. The data from the Osprey Pressure Validators was then monitored at times of peak demand. The information that was provided by the devices allowed us locate the problem. By using the new technology we saved over 16 man hours and avoided disruption of supply to our customers."

Following on from successful learning dissemination and sharing of reports, the technology has now been adopted by other GDNs. This was the first example of an NIA project's learning being effectively disseminated and resulting in the technology being adopted by the other GDNs. The benefits being realised already by the industry as a whole are:

- A new competitor was brought to a monopolized market place offering economic and technical advances going forward.
- GPS is an innovative addition to the technology and allows a number of benefits in terms of informing Network Planning the exact location of the hardware as well as accurate historical data.
- The move to off-the-shelf batteries mean that replacements can occur in situ and avoid the loss of logging time associated with sending the hardware back to the manufacturer.



OPV being tested prior to installation

"By using the new technology we saved over 16 man hours and avoided disruption of supply to our customers."

Matthew Morland,
Team Manager and innovation
lead in Aldershot

Our 2014/15 portfolio

Facilitating knowledge transfer is one of the key principles of the NIA. It is vital the learning generated is disseminated as effectively as possible to ensure all Network Licensees (gas and electricity), as well as customers, benefit from each project.

To support the dissemination, a learning portal has been developed on our behalf and that of the other Network Licensees. This is a website where external parties can access and gather more details on any of our projects, including progress and closure reports. For further information, please see the Energy Network Association (ENA) learning portal online: www.smarternetworks.org.

All our projects can be found under 'Gas Distribution' – from which there are eight technology research areas which contain the individual innovation projects. The areas highlighted in this summary align effectively with our business plan and innovation strategy.

The technology research areas are as follows:



The following section includes each individual project which continued into or was commissioned by us during the period 1 April 2014 and 31 March 2015. We have also included project snapshots to provide further insight into some of our existing projects.



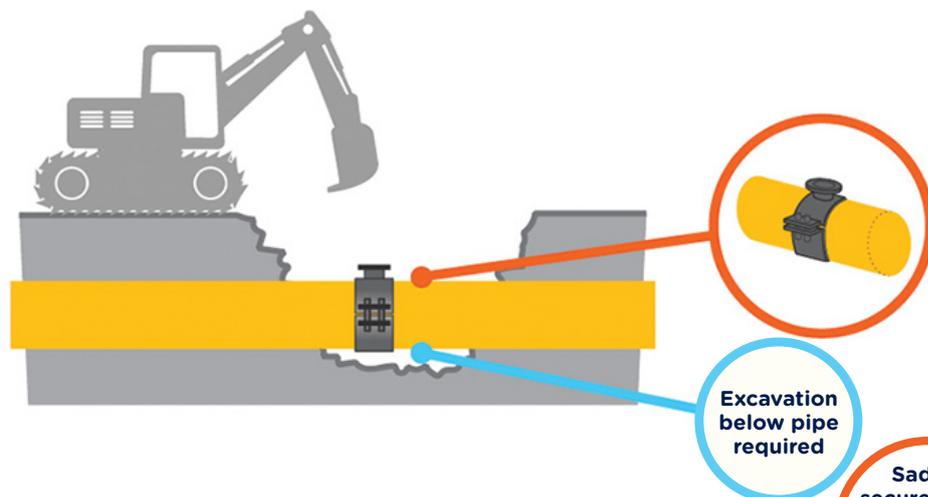
Mains replacement

Mains replacement activities are disruptive and cause inconvenience to our customers. Therefore, our projects focus on the introduction of new methods, equipment or techniques that will reduce customer disruption and inconvenience to road users. Several of our projects in this area focus on increasing the volume of work we can carry out through keyhole technology after the success of our Core and Vac implementation. These projects aim to improve the quality, safety and reliability of our network through a reduction in the size of our excavations:

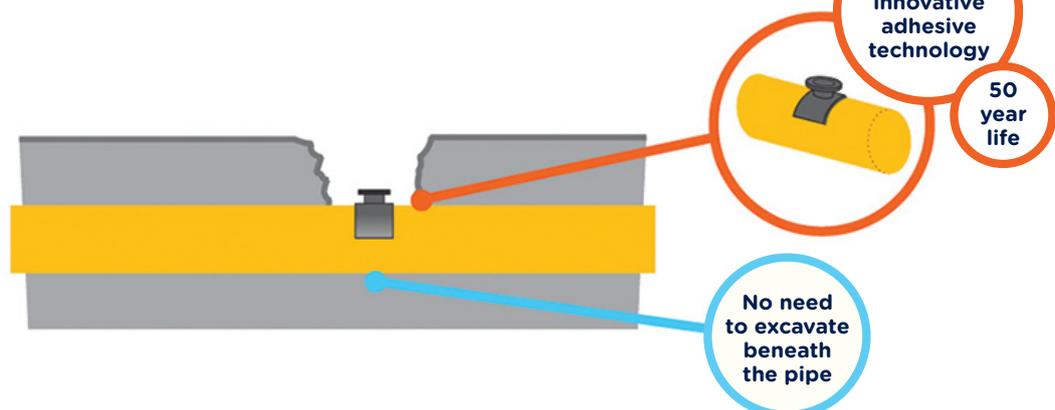
- Cured In-Place Pipe (CIPP) (stage 2)
- Pneumatic PE Pushing Machine
- Microstop
- Bond and Bolt Saddle System
- Gas Eco (GECO) Gas Pump
- Mains and service replacement through keyhole
- Core Drilling and Flow Stop, WASK
- Long Handled PE Top Tee Cutter
- Olympic Rings for RIIO
- PE Bodied Valves
- GasLight Q Field Portable Nondestructive PE Material Analyser
- SynthoScope
- Fracture Monitoring Using Acoustics
- Investment Prioritisation in Distribution Systems
- RCA GPS Survey

Bond and Bolt Saddle System

Current method



Proposed method



Mains and service replacement through keyhole

Project snapshot

Project reference: NIA_SGN0056

Partnership: SGN, Tracto-Technik and DNV-GL

Project start date: July 2014

Research area: Distribution mains replacement

Progress of NIA activity in 2014/15:

This project will involve detailed technical assessments, designs, development and field trials of keyhole tooling methods and equipment for mains and service replacement activities that have the potential to be distributed and utilised safely and efficiently.

The project has been split into two elements, with the first having made significant progress in the year. Element 1 involves the design, development and manufacture of a pipe installation system, inserted through keyhole technology. It specifically focusses on a range of Long Handle Tooling designed and manufactured to install and remove service connections as required. The conceptual design work on these tools is well underway. Developments have also been made in the year against other objectives such as the manufacture of a vehicle to house the equipment and tooling, the development of the coring and Grudopit KHD drilling units.

icore

TECHNOLOGY

Core • Drill • Connect



TRACTO-TECHNIK



TT-UK



“SGN’s skilled project management process has consistently provided us with timely detailed data and a level of support which has helped ensure that every aspect of the project has been a success.”

Billie Turner, Executive Sales Manager, TT UK

Emergency



The Tomado Max adaptor being used to remove trapped gas safely

Emergency operations is a high cost area and has significant impact on customers. Our emergency projects aim to protect the safety of the public, and to safeguard those who work with us. The introduction of innovative projects such as the Portable 'Gas in Ducts' Sample System allows us to quickly and accurately pin point the source of a gas escape, thus improving the efficiency and reliability of supply to our customers:

- Optomole (stage 1)
- Tornado Max
- Portable 'Gas In Ducts' Sample System
- Stent Bag
- Advanced Gas Detection
- Water Extraction Reel and Y Branch
- Gas Risk in No Access Properties
- Bar Hole Zone Rating (stage 1)

Optomole

Project snapshot

Project reference: NIA_SGN0006

Partnership: SGN and OptoSci

Project start date: March 2013

Research area: Emergency

Progress of NIA activity in 2014/15:

The purpose of this project is to develop a mobile, optical methane sensing system which GDNs can utilise to quickly and accurately detect the location of natural gas ingress points in ducts.

A prototype has been built and successfully tested on several occasions when appropriate opportunities to trial the technology have arisen. During the trials, Optomole has quickly and accurately traced the gas entry point in the ducts, reduced the need for excavations and aided the gas escape teams in finding the source by indicating the proximity of the leak. The final stage of the project allows further refinements to be made to improve the product, after which further testing will be carried out. Furthermore, the results have proven that the unit is fit for purpose and its performance is not prohibited by the conditions it faces, such as water, mud and silt in the ducts.

Improvements which the Optomole system will bring to all GDNs in GB include:

- Reduced costs - 'no dig' gas detection in ducts reduces time on site and excavation costs



- Real time - precise measurement in real time ensures accurate profile of gas concentrations
- Improved safety - all optical, intrinsically safe system with no spark risk
- Wide measurement range - 500ppm to 100& methand. No cross-sensitivity to other gases
- Quick and easy deployment - simple, graphical user interface. Minimal operator training required
- Robust and reliable operation - basic servicing in the field and no ongoing calibration required

“We’re looking forward to continuing to work with SGN over the next six months to deliver the finished Optomole instrument, ready for deployment within the UK networks.”

Gregor Cranstoun, Business Development Executive - OptoSci Ltd

Repair

Our repair activity is disruptive to customers and businesses. It is also one of our high cost areas. Our repair projects aim to either improve technology, current operational processes or techniques in order to provide a safe, secure and reliable supply to our customers:

- Internal Stress Corrosion Cracking (ISCC) Assessment Work
- Cast Iron Fitness For Purpose (CIFFP)
- Self Amalgamating Tape (stage 2)
- Seeker Particles (stage 2)
- Gas Polymerisation - Proof of Concept
- Development of Specification of PE repair Systems
- Acoustek
- Aerosol Sealant - stage 1A - Initial Development
- 40mm Serviflex



40mm Serviflex

Gas Polymerisation Project snapshot

Project reference: NIA_SGN0058

Partnership: Steer Energy

Project start date: August 2014

Research area: Repair

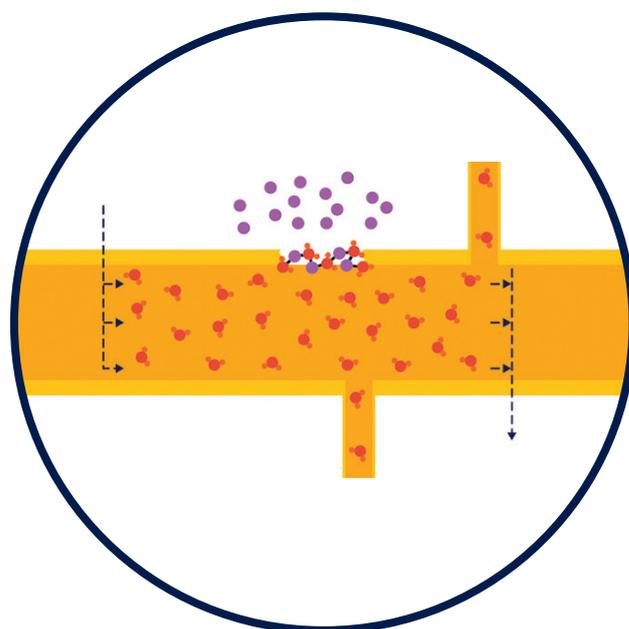
Progress of NIA activity in 2014/15:

Gas Polymerisation led on from our Seeker Particles project (NIA_SGN0012), and investigates technology which exploits innovative chemistry that reacts with unique environmental factors found only at leak sites to repair metallic pipes, while leaving customer supplies unaffected.

This project was a success and proved under laboratory conditions that the concept is possible. The learning from this project has been disseminated and utilised to further the project to the next stage and develop the technology towards the field trial phase.

“By equally challenging and supporting us, SGN has encouraged us to have a bigger vision and greater aspiration for the project. We are seeing the rewards from this partnering in the success that we have had to date.”

Iain Chirside, Director, Steer Energy



LTS and storage

LTS and storage is a specialist area of our business that is costly to manage and maintain. Our projects in this domain aim to either improve technology, current operational processes or techniques in order to provide a safe, secure and reliable supply to our customers. For example, one area of focus for us is to investigate the latest developments in paint and coating technology and products for use on our plant. This would allow the potential for utilising more cost effective solutions for the protection of both above and below ground assets:

- Orbis Oxifree (TM198) Corrosion Coating
- Beyond Visual Line of Sight Aerial Inspection Vehicle
- Smart Paints and Coating Systems

Beyond Visual Line of Sight Aerial Inspection Vehicle **Project snapshot**

Project reference: NIA_SGN0035

Partnership: VTOL Technologies Ltd

Project start date: March 2014

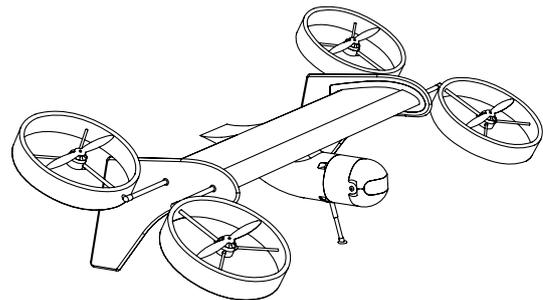
Research area: LTS and storage

Progress of NIA activity in 2014/15:

Working alongside our partners, this project was designed to develop a specification for remotely piloted aerial inspection and surveillance vehicles for operation beyond visual line of sight which is endorsed by the Civil Aviation Authority (CAA).

The project has progressed well with the simulation models being created and refined to develop an optimal solution to the inspection problem. The findings to date have been shared with the CAA, which was impressed with the initial findings and keen for us to develop further.

VTOL Technologies



A new perspective in aerial inspection operations

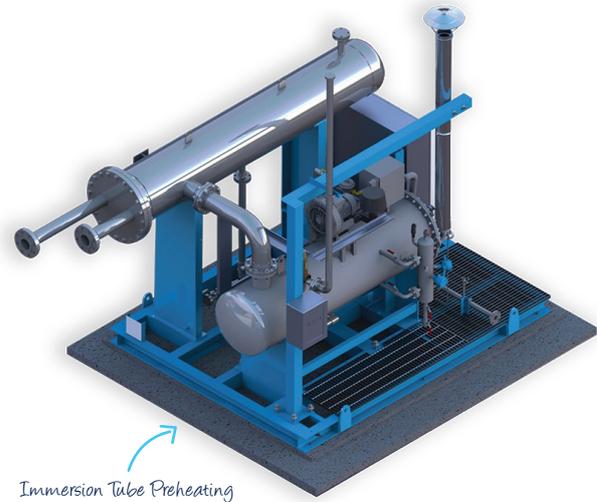
“By gaining approval for the use of unmanned, beyond visual line of sight vehicles in the UK, we are creating the potential to revolutionise how we inspect our assets and ensure we deliver a safe and reliable gas supply.”

Oliver Machan, Innovation Project Manager

Pressure management, maintenance, electrical and instrumentation

Pressure management, maintenance, electrical and instrumentation are all high costs areas of our business. Several of the projects we have introduced in this category aim to radically change the way that we currently undertake specific activities or operational techniques, as well as introducing new innovative solutions that may replace our ageing assets in the future:

- Novel Pressure Reduction Station (stage 1)
- Starline/Marwin Valve Bolt Replacement
- Oscillating Energy Harvester (phase 2)
- Acoustic Communications in Gas Mains
- Immersion Tube Preheating



Oscillating Energy Harvester

Project snapshot

Project reference: NIA_SGN0037

Partnership: ECS Partners

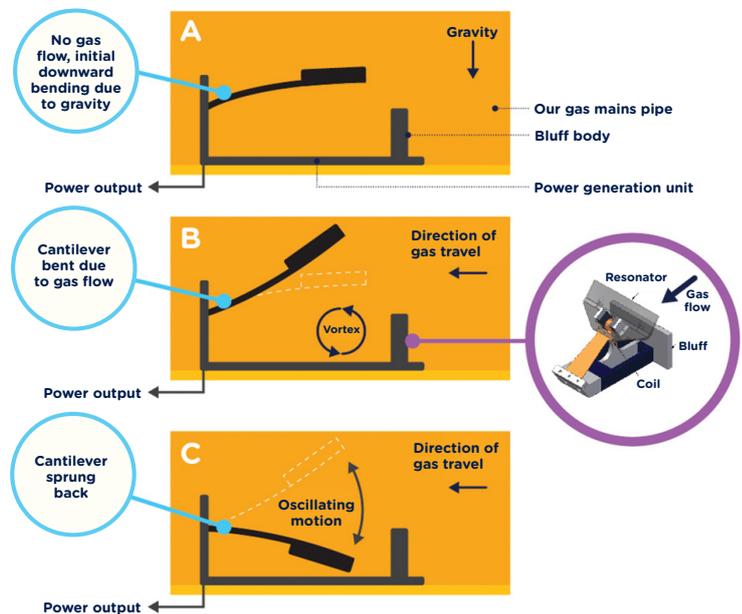
Project start date: February 2014

Research area: Pressure management, maintenance, electrical and instrumentation

Progress of NIA activity in 2014/15:

This project uses the energy from gas flow in our network to generate the power to operate pressure data loggers and profile control equipment.

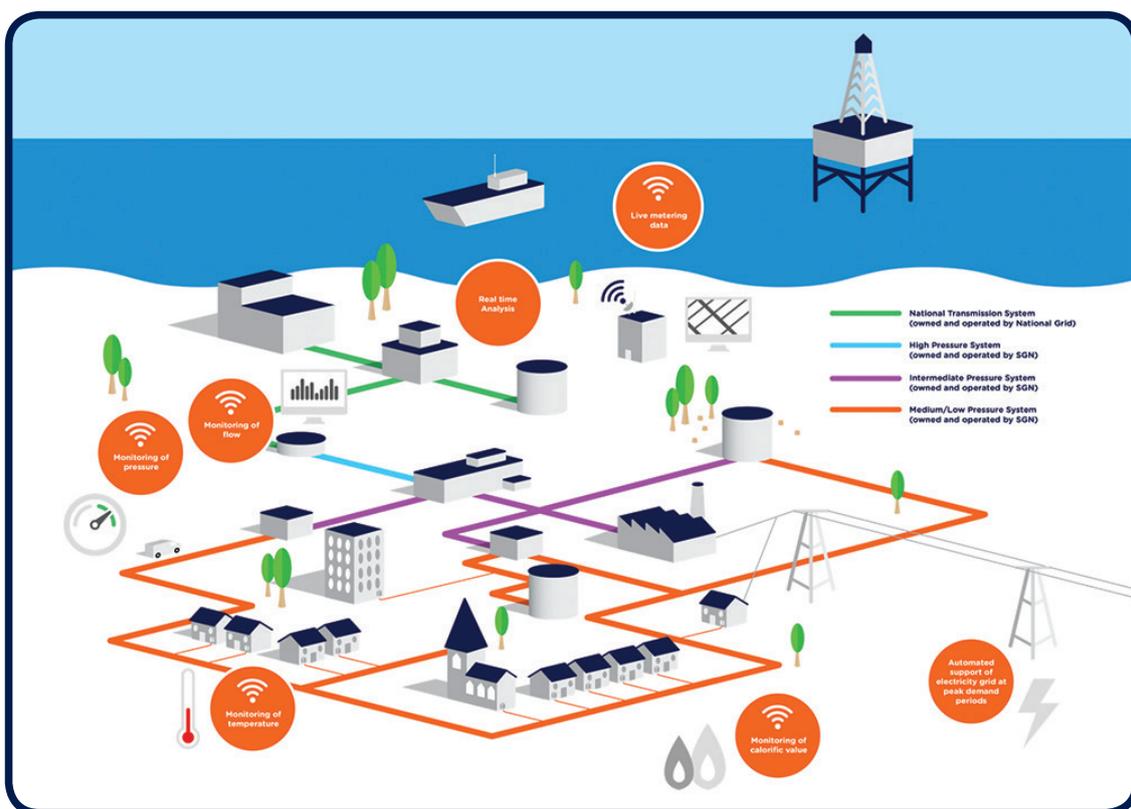
A prototype energy harvesting unit was identified and purchased based on the size restrictions of SGN's regulator sites. A sample unit has been produced to allow off-site trials to commence.



New and renewable gas sources

The future of the gas industry is a key focus for our business. Through the introduction of new and renewable gas sources we are able to open up the gas market, which promotes the low carbon economy. The projects in this category seek to demonstrate the flexibility of our network and ensures that gas continues to be the energy fuel of choice for our customers:

- Siloxane Impact study
- Real-Time Networks Feasibility study



*Real-Time Networks
Feasibility study*

Other

Other projects give the gas distribution networks the flexibility to register projects which do not fall into any of the defined categories but are still compliant with Ofgem regulations and may deliver value to the GB gas consumer:

- Development of DANINT FWAVC software for New Gas Chromatograph
- Orifice Plate Deformation
- Asset Health and Criticality Modelling
- Project Futurewave
- Development of Gas Industry Specification for Polymeric Pipe Lining Systems for Multi-Occupancy Buildings
- Asset Health Modelling (Pipelines, Special Crossings, Block Valves)

Looking to the future

Building on the success we have already achieved through our NIA portfolio, we are looking to continue implementing our projects and sharing the learning to maximise the benefit for GB gas consumers. We will continue to build and diversify our our portfolio to deliver solutions to problems which currently block us achieving our optimal performance.

Next steps

We have been successful in building a strong team and portfolio in the initial two years of NIA.

Our focus for next year will be to continue building on this success and meet and exceed the following goals:

Implementation

Continue to successfully implement projects

Diversity of portfolio

Diversify our portfolio to ensure the best outcomes for GB consumers are realised

Collaboration

To maintain effective dissemination and sharing of information with other Network Licensees

Message of thanks from the SGN Innovation team

We would like to take this opportunity to thank all our project partners, participants, our colleagues and of course the other Network Licensees for their commitment and hard work throughout the year. We're delighted that across the industry innovation is gaining momentum and the benefits are already being realised through our implemented projects. We look forward to building on the success so far through NIA and, in particular, increasing the collaboration and learning dissemination with other Network Licensees.



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