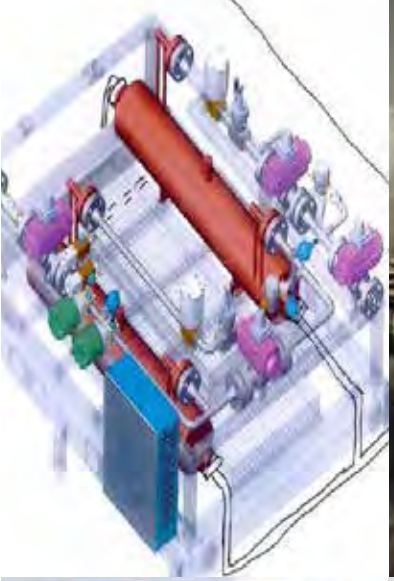
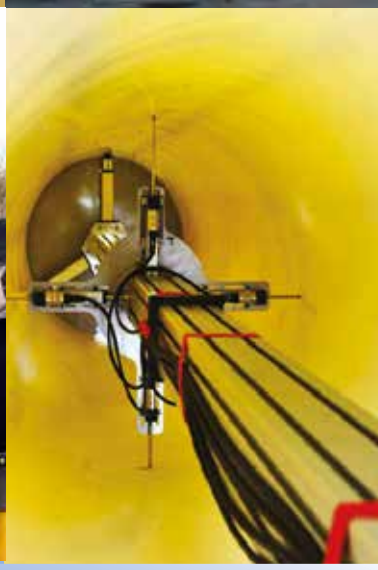




IFI/SD Annual Report

Innovation Funding Incentive for Sustainable Development

2012/2013

Scotia Gas Networks

...innovation is a new way of doing something that adds value to our customers and our business and it is now very much at the core of everything that we do.

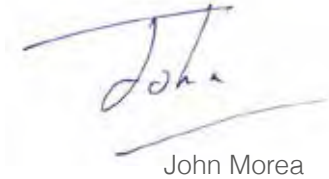
Contents

Executive Summary

Welcome to our final Innovation Funding Incentive (IFI) Annual Report. For us, innovation is a new way of doing something that adds value to our customers and our business and it is now very much at the core of everything that we do.

In the last five years, through the IFI mechanism, we have commissioned a total of **103** projects with **40%** of the projects being commissioned via collaborative partnerships with the other Gas Distribution Networks (GDNs).

We have utilised the IFI to develop and deliver a strong, well-balanced portfolio of projects that has allowed us to advance industry knowledge, technology, competition, products and services, and develop new ways of working. We firmly believe this portfolio demonstrates learning that will provide positive contributions to the challenges faced by the UK energy sector, as a whole both today and in the future.

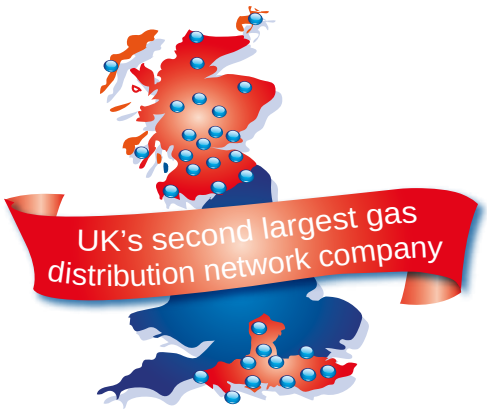


John Morea
Chief Executive Officer

Abbreviations and acronyms

AD	Anaerobic Digestion
ANG	Absorbed Natural Gas
BSP	British Standard Pipe
CAS	Competence Assurance System
CBT	Computer Based Training
CCTV	Closed Circuit Television
CFD	Computational Fluid Dynamics
CHP	Combined Heat and Power
CI	Cast Iron
CIP	Cured in Place
CIPs	Close Interval Potential Surveys
CISBOT	Cast Iron Joint Sealing Robot
CO2e	Carbon Dioxide Equivalent
CO2	Carbon Dioxide
CP	Cathodic Protection
DECC	Department of Energy and Climate Change
DG	District Governors
DRS	Discretionary Reward Scheme
ECU	Engine Control Unit
EIC	Energy Innovation Centre
ENA	Energy Network Association
ERS	Engineering Research Station
FCO	First Call Operative
FEA	Finite Element Analysis
FWACV	Flow Weighted Average Calorific Value
GDN	Gas Distribution Network
GIS	Geographic Information System
GS(M)R	Gas Safety Management Regulations 1996
GT	Gas Transporters
H_2	Hydrogen
H2S	Hydrogen Sulphide
HDPE	High Density Polyethylene
HP	High Pressure
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act 1974
ICE	Internal Combustion Engine
IE	Intelligent Energy
IFI	Innovation Funding Incentive
IGEM	Institute of Gas Engineers and Managers
IP	Intermediate Pressure
ISCC	Internal Stress Corrosion Cracking
JFN	James Fisher Nuclear Limited
kWh	Kilo Watt Hours
LCD	Liquefied Crystal Display
LDZ	Local Distribution Zone
LNG	Liquefied Natural Gas
LP	Low Pressure
MBH	Modular Boiler Heating System
MRPS	Mains Risk Prioritisation System
MW	Mega Watts
NEA	Network Entry Agreements
NIA	Network Innovation Allowance
NIC	Network Innovation Competition
NPV	Net Present Value
NTS	National Transmission System
OFGEM	Office of Gas and Electricity Markets
P&ID	Piping and Instrumentation Diagrams
PDF	Portable Document Format
PE	Polyethylene
PSR	Pipelines Safety Regulations 1996
PSSR	Pressure Systems Safety Regulations 2000
PU	Polyurethane
R&D	Research and Development
RHI	Renewable Heat Incentive
RIIO	Revenue= Incentives + Innovation + Outputs
SD	Sustainable Development
SDR26	Thinner Walled Polyethylene Pipe
SGN	Scotia Gas Networks
SI	Spun Iron
SIU	Scottish Independent Undertakings
SME	Small/Medium Enterprises
SSE	Scottish and Southern Energy
SSM	Storage Simulation Model
ST	Steel
SYMS	Specified Minimum Yield Strength
TDLS	Tuneable Diode Laser Spectroscopy
TRS	Transmission Reduction Station
UAT	UAT User Acceptance Testing
UK	United Kingdom
UNC	Uniform Network Code
USA	United States of America
WBH	Water Bath Heater
WRc	Water Research Centre
3D	Three Dimensional

About Us

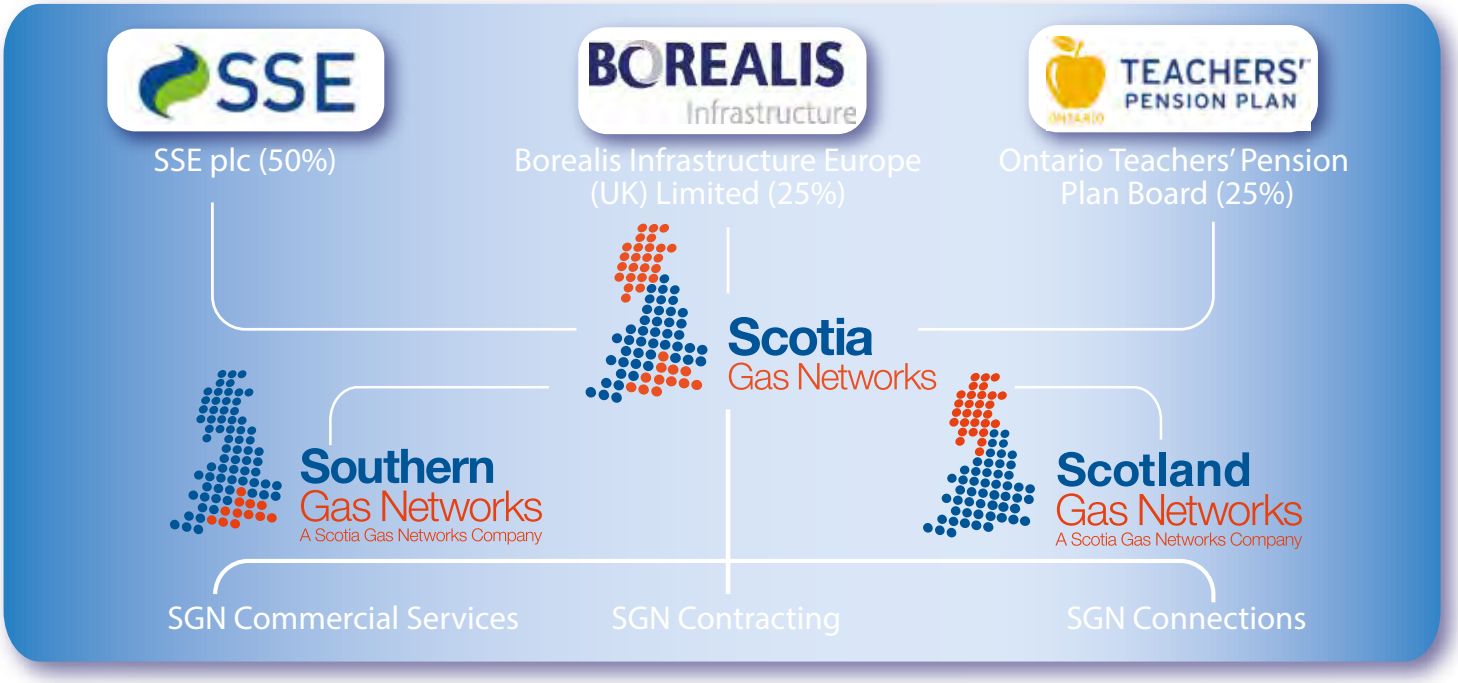


Scotia Gas Networks (SGN) operates two of the UK's largest gas networks through 74,000km of gas mains and services. Scotland is served by Scotland Gas Networks and Southern Gas Networks encompasses the south and south-east of England. We provide a safe and secure supply of natural gas to 5.8 million customers and are the second largest gas distribution company in the UK.

Formed in June 2005, we have three shareholders who are the UK-based SSE plc (50%) and two Canadian pension funds: Borealis Infrastructure Management Inc (25%) and Ontario Teacher's Pension Plan Board (25%).

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 the UK'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 and aim to be the leading operator of gas distribution networks in the UK.



Innovation Funding Incentive

Following the price control (GDPCR1) proposals from Ofgem in 2007 we have operated the Innovation Funding Incentive for Sustainable Development (IFI/SD). This scheme was intended to provide funding for projects primarily focused on the technical development of our networks and to deliver value whether it was in terms of financial, quality of supply, environmental or safety benefits to end customers. We were allowed to spend up to 0.5% annually of our Distribution Network Transportation Activity Revenue on eligible projects. All these projects have aligned with the requirement set out by Ofgem and have met one of the five Sustainable Development Themes, as set out below, to qualify:

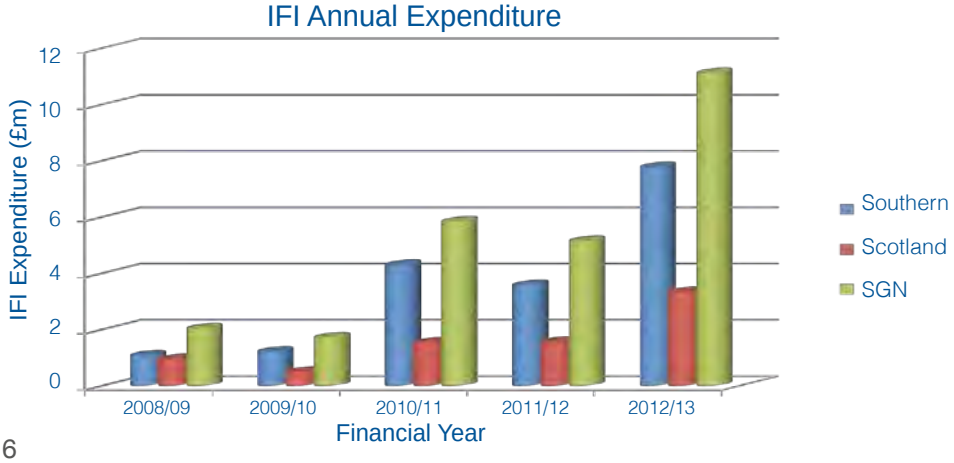
1. Managing the transition to a low carbon economy
2. Eradicating fuel poverty and protecting vulnerable customers
3. Promoting energy saving
4. Ensuring a secure and reliable gas and electricity supply
5. Supporting improvement in all aspects of the environment

Over the last five years we have welcomed approaches from all business types to partner with us in delivering innovation and as a result have built constructive relationships with key UK gas industry suppliers and companies across the energy sector. In total we have commissioned **103** projects with **40%** of the projects being commissioned via collaborative partnerships with the other Gas Distribution Networks (GDN). IFI has allowed us to build up a strong, well-balanced portfolio of projects that has allowed us to advance industry knowledge, technology, competition, products and services, and develop new ways of working.

In total we have commissioned **103** projects

We firmly believe this portfolio demonstrates learning that will provide positive contributions to the challenges faced by the UK energy sector as a whole both today and in the future.

Since IFI began in 2008/09 we have steadily increased our innovation activity year on year. As illustrated below, it has taken time to build our relationships and project portfolio culminating in 2012/13 where we maximised the available allowance. We have reassessed our strategy to meet the new challenges as we move forward into RIIO. The start of the new stimulus package introduces increased funding opportunities, which will enable us to broaden our areas of innovation focus under Network Innovation Allowance (NIA) and Network Innovation Competition (NIC).



Introduction

...there were a number of key learning points that we can take from IFI and apply to the new NIA funding mechanism...

This report provides a summary of IFI/SD project activities detailing costs and anticipated benefits of individual projects undertaken by our networks during the period 1 April 2012 to 31 March 2013. The reports have been produced in accordance with the Good Practice Guide, published by the Energy Networks Association on behalf of the GDNs and electricity networks. We are committed to ensuring best practice across our group; therefore in the majority of cases the project reports cover the benefits to both networks (Scotland and Southern).

In 2012/13 we have been working on a total of 49 projects, both individually and collaboratively with the other GDNs. The report draws attention to each individual project providing a project summary including; a financial summary, themes and areas addressed by the project, potential benefits and likelihood of success achieving these.

Overall, this year's portfolio of projects has resulted in significant learning. A number of projects are now being implemented throughout our business, and project outputs shared with the industry and the other GDNs, such as the new camera insertion head developed with Synthotech. We are continuing to share developments and learning from previous projects too, such as our industry leading biomethane projects.

It is also important to know when to stop a project, and we have been prudent in doing so at various stages where it was recognised that further investment in the project would not add value or useful learning.

In summary, there were a number of key learning points that we can take from IFI and apply to the new NIA funding mechanism, including the speed of the collaboration approval process. Furthermore, a vital learning point from the Improvements to Mains Risk Prioritisation System (MRPS) project has been the positive effect of an engaged steering group comprising representatives from each GDN. This structure has now also been applied to a number of the other collaborative projects and has been extremely effective.

Looking to the future

The introduction of the new RIIO-GD1 stimulus package brings about increased funding opportunities, enabling us to broaden our areas of focus under NIA and continually deliver innovation.

The conclusion of IFI has provided us with an opportunity to develop our innovation strategy for 2013/14 and beyond. In preparation for transition we have re-assessed the objectives and challenges of our projects to ensure they add value under the new RIIO-GD1.

This includes identifying those projects that meet the new NIA criteria and are eligible to transition from IFI. As a result,10 projects presented in this report will transition over in 2013/14 and will be registered with Office of Gas and Electricity Markets (Ofgem) by the end of July 2013, these are:

- Synthotech Service Relay Initiative
- Immersion Tube Preheating
- SynthoTrax I-Seal Robot
- PE Asset Life Research (Stage 3)
- Orpheus Valve Corrosion Mapping System
- Optomole
- Internal Stress Corrosion Cracking (ISCC) on Pipelines
- Fracture Monitoring Using Acoustics
- Orifice Plate Deformation
- E-Pipe

In advance of the RIIO-GD1 period we have expanded our innovation team in order to build on our current approach to innovation. The innovation team will manage a portfolio of projects, with each project being managed and delivered by a Project Manager who is working in the innovation department and has expertise in the desired project area.

Going forward we will continue to build on the benefits we have delivered under IFI, to ensure a safe, reliable network for future generations. In addition we will continue to utilise our popular Ignite suggestion scheme (ignitescheme@sgn.co.uk) that allows all employees and external companies to submit ideas and suggestions. All ideas and suggestions are welcome and do not need to be fully developed.

Every week our innovation teams meet to discuss the latest suggestions, and those with merit are either passed out to the business for evaluation and sponsorship, or if they align with our Innovation Funding Strategy are fast-tracked into concept development.

Improve the way in which we work to be more efficient, more customer focussed, less disruptive whilst carrying out road works and reduce our carbon footprint.

ISupport entry into the network from renewable sources of gas and support the low carbon economy.

Open up competition in gas distribution through provision of alternative entry points.

Leading the way in Biomethane to Grid

Our projects

2012/2013

Overview of Innovation Portfolio

Project name	Page	Network	12/13 Project costs (£) Total	Southern	Scotland
New Intervals Methodology		Both	9,604	6,723	2,881
Synthotech Service Relay		Both	4,247	2,973	1,274
Bournemouth Dust Removal Trial		Both	14,483	10,138	4,345
Wall Thickness for PE Pipe		Both	55,284	38,699	16,585
Cathodic Protection		Both	2,000	1,400	600
SGN Biomethane Didcot Demonstration		Both	30,267	21,187	9,080
Hydrogen Vehicle		Both	29,413	20,589	8,824
PE Asset Life Research (Stage 2)		Both	81,621	57,135	24,486
ANG Storage Feasibility Study		Both	32,001	22,401	9,600
Cured In Place Polyurethane Spray Lining		Both	53,714	37,600	16,114
Poundbury Biomethane Feasibility Study		Both	47,148	33,004	14,144
Internal Long Range NDT Trial		Both	16,170	11,319	4,851
Diurnal Storage Modelling		Both	13,532	9,472	4,060
CR714 Desktop Risk Assessment Toolkit		Both	78,789	55,152	23,637
Poundbury Biomethane Development		Both	1,540,348	1,078,244	462,104
Cast Iron Joint Sealing Robot (CISBOT)		Both	4,951	3,466	1,485
Oscillating Energy Harvester Feasibility Study		Both	13,412	9,388	4,024
Energy Innovation Centre Membership		Both	94,120	65,884	28,236
SR25 Calculator		Both	7,883	5,518	2,365
Hydrogen Blending Feasibility Study		Both	115,402	80,781	34,621
Gas Escapes		Both	18,017	12,612	5,405
Computer Controlled Gascoseeker for Training		Both	13,862	9,703	4,159
Innovation Workshop Number 2		Both	23,415	16,391	7,025
Biomethane Blending Co Mingling at Virtual Pipeline Connection Facilities		Both	64,995	45,497	19,499
Improvements to MRPS Model (Stage 5)		Both	18,383	12,868	5,515
Immersion Tube Preheating Modifications / Field Trials		Both	182,122	127,485	54,637
Domestic Heating Project		Both	19,612	13,728	5,884
Wireless Water Detection and Level Sensor		Both	42,942	30,059	12,883
Vertical Insertion Head		Both	15,412	10,788	4,624
Self Amalgamating Tape		Both	34,354	24,048	10,306
20mm Serviflex Pipe in 1¼" Metallic Service		Both	81,679	57,175	24,504
29mm Mains Inspection Camera		Both	34,001	23,801	10,200
Service Pipe Replacement Matrix		Both	7,647	5,353	2,294
Orpheus Valve Filter Corrosion Mapping System		Both	27,767	19,437	8,330
Synthotrax I-Seal Robot		Both	52,943	37,060	15,883
OptoMole		Both	8,386	5,870	2,516
Internal Stress Corrosion Cracking		Both	5,735	4,015	1,721
Fracture Monitoring Using Acoustics		Both	23,530	16,471	7,059
Orifice Plate Deformation		Both	7,993	5,595	2,398
E-Pipe		Both	52,107	36,475	15,632
Biomethane Import & Blending Station		Both	2,743,009	1,920,106	822,903
PE Asset Life Research (Stage 3)		Both	110,539	77,377	33,162
Project Cost Adjustments (See Appendix 1)					
Hydrogen Demonstrator Step 1		Both	-190,593	-133,415	-57,178
CHP Field Trial		Both	-60,002	-42,001	-18,001
Development of DANINT FWAVC Software for New Gas Chromatograph		Both	-18,236	-12,765	-5,471
Customer Risk Assessment Work		Both	-4,631	-3,242	-1,389
Gas Escapes CBT (Phase 2)		Both	-3,307	-2,315	-992
HSE Tier 2 Risk Threshold		Both	-1,500	-1,050	-450
Feasibility Studies for Glenmavis		Scotland	89		89
		Total	**£5,554,659**	**£3,888,199**	**£1,666,460**

Project Title	New Intervals Methodology		
Description of project	Development of the revised methodology for the scheduling of in-line inspections of high pressure (HP) pipelines for consistent compliance with Pipeline Safety Regulations 1996 and IGEM/TD/1.		
Expenditure for financial year: **2012/13**	Internal £1,441 External £8,163 Total £9,604	**Expenditure in previous financial years**	Internal £3,135 External £19,500 **Total £22,635**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£110,650**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: A risk based approach for the scheduling of in-line inspections has been developed, therefore allowing maintenance of HP pipelines to be pigged when necessary.		
	Supporting improvement in all aspects of the environment Mitigating against potential incidents and will alleviate against loss of gas to the atmosphere.		
Technological area and / or issue addressed by project	The intervals methodology is currently used for the scheduling of in-line inspections of high pressure pipelines in accordance with internal and industry documents. The existing methodology takes into account the probability of corrosion failure, predicted failure frequency of corrosion, cost of corrosion failure, security of supply costs and inspection/repair costs. Cost factors are having too great an influence in determining the frequency of inspections and the methodology needs to be revised to a more risk based criteria approach focussing on integrity and safety as required by the Pipelines Safety Regulations (PSR) and Institute of Gas Engineers and Managers (IGEM) standards. This project extends the model originally developed by National Grid and addresses the following areas: • Enhanced tool that caters for 30% and 50% Specified Minimum Yield Strength (SYMS) pipelines in gas distribution networks. • More efficient links between Cathodic Protection (CP), Close Interval Potential Surveys (CIPs) and scheduling of in-line inspections. • Common methodology and consistent application of in-line inspections across gas pipeline operators in the UK. • Improved methodology which takes account of lower stress in pipelines. • Improved data entry incorporated as an enhancement, and alignment in engineering assumptions with defect distribution model levels.		
Type(s) of innovation involved	Incremental		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
11	-10	21

Expected Benefits of Project	HP pipeline failures could potentially lead to costs of £100m. Such failures have the potential to cause multiple fatalities as seen in Belgium in 2004 when over 25 people were killed. Inline inspection is an important element to the integrity management of HP pipelines. Reduce the potential release of gas from corroding pipes. The revised methodology dependent upon the risk based approach will allow GDNs to focus investment effectively ensuring that remedial action is prioritised on those pipelines most at need. By not using a risk based criteria approach GDNs would have to revert to the IGEM/TD/1 recommended inspection intervals. This would result in a maximum interval frequency of 10 years whereas the majority of pipelines are on a higher interval. Reduce the cost of carrying out inspection activities and will also be shared between the GDNs thus creating a good leverage ratio for each collaborator.		
Expected Timescale to adoption	Complete	Duration of benefit once achieved	5 Years
Probability of Success	100%	Project NPV = (PV Benefits – PV Costs) x Probability of Success	(-£110,650)
Potential for achieving expected benefits	From a safety perspective the project delivered the anticipated benefits as the GDNs have already gained credibility through the project as the Health and Safety Executive (HSE) reviewed the output from Stage 1 in November 2010. Feedback received to date has been extremely positive to the extent that we see the output as driving improvements in corrosion management. In addition to the above, through close collaboration and the sharing of knowledge and technical issues we have achieved the expected benefits, thus leading to a common understanding between us and the other GDNs that can be related to the project outputs.		
Project Progress	The project has delivered an enhanced intervals inspection tool that can be used by our operators for pipelines operating at 30% and 50% SMYS. The output contains: • Improved methodology which takes account of lower stress in pipelines. • A Model that takes into account CP and CIPS in a more robust manor • Clear and consistent assumptions agreed by all GDNs and National Grid Transmission (NTS). • Improved data entry incorporated as an enhancement, and alignment in engineering assumptions with defect distribution model levels. • Additional enhancements include secure sign in facility; pipeline selection from displayed list; provision of log of changes; inclusion of Inspection history records; associated notes and records and listing of inspection schedules for pipelines all of which enable the tool to be more flexible and user friendly for intervals/inspection management. The completed output will now enable us to target specific problems and focus investment via a prioritised approach. In the short term pigging frequencies will increase, but once the residual issues (new risks identified) have been resolved financial benefits may occur but it is not possible to quantify these at this stage. This project is now complete and all outstanding payments have been made to National Grid.		
Collaborative Partners	National Grid, Northern Gas Networks, Wales & West Utilities		
Service Provider	PB Rune		

Project Title	Synthotech Service Relay		
Description of project	This project consists of two parts: 1. Project X12 - Live Service Insertion of 1" pipe using 20mm Serviflex pipe, from the meter position to the main negotiating up to 2 x 90 degree short radius elbows over an insertion distance of 12m 2. Project X13 - Dead Service Insertion for 3/4" pipe using 20mm Serviflex pipe, from the meter position towards the main, negotiating 1 x 90 degree short radius elbow over an insertion distance of 5m		
Expenditure for financial year: **2012/13**	Internal £637 External £3,610 **Total £4,247**	**Expenditure in previous financial years**	Internal £11,639 External £70,875 **Total £82,514**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£115,939**	**Projected 2013/14 costs for SGN**	Internal £7,289 External £21,889 **Total £29,178**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: Reduction in the time customers, especially vulnerable customers are off gas during the service relay.		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: N/A		
	Supporting improvement in all aspects of the environment Reduction in the number of excavations associated to service replacement, hence providing an environmental benefit. The project also provides the opportunity to enable the majority of the service relay work to be done from inside our customers' properties, reducing the time needed for road opening notices/permits. This will provide societal benefits in terms of reduced road congestion and visual impact of our works.		
Technological area and / or issue addressed by project	The principle of operation is to avoid the need to relocate the gas meter from inside the property to a suitable external position.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
21	-5	26

Expected Benefits of Project	• Significant cost reduction in the replacement of a service. • Enables replacement of a service that is not otherwise possible. • Replacement of a service to the existing position therefore avoiding pipe work re-runs.

continued

<table>
<tr><td></td><td colspan="3">

Selective excavation.
Flow characteristics close to 20mm polyethylene (PE).
Avoids the need to isolate gas supply prior to application.
Can be used in conjunction with all replacement techniques.
Reduced customer disruption.
Increased productivity due to the time taken to complete each service replacement.

</td></tr>
<tr><td>Expected Timescale to adoption</td><td>1 Year</td><td>Duration of benefit once achieved</td><td>5 Years</td></tr>
<tr><td>Probability of Success</td><td>75%</td><td>Project NPV = (PV Benefits – PV Costs) x Probability of Success</td><td>£3,757,758</td></tr>
<tr><td>Potential for achieving expected benefits</td><td colspan="3">The benefits of this project will be gathered upon successful completion of the field trials. Developments over the last year have indicated that this project is likely to be a success and provide key benefits to both our business and customers.</td></tr>
<tr><td>Project Progress</td><td colspan="3">
The project has currently delivered the following milestones:
Milestone 1 - Development of Specifications and Procedures

Development of theoretical method statement/instructions.
Gas analysis between current practice/procedure/equipment.
Development of a specific Serviflex insertion specification for testing.
Development of parameters and scope of the project.

Milestone 2 – Feasibility Study

Evaluate the gap analysis and identify possible solutions.
Review annular sealants in the market for compatibility.
Review effort/resource/probability of success with each element to be developed.
Complete a cost benefit analysis about Serviflex insertion.
Evaluate the parameters and scope of the project against anticipated probability.
Evaluate development timescales and time to market.

Milestone 3 – Parts and Equipment Design Folder

Concept design for installation equipment.
Concept design for the annular sealant.
Concept design for house connection fitting.
Concept design for the garden connection fitting.
Procedure of operation.

Milestone 4 – Manufacture of prototype parts
Milestone 5 – System testing

75mbar with a safety factor of 2.
Dynamic testing of insertion parts.

Milestone 6 – Review of data and design folder and field trial

Concept review.
Parts review.
Procedural review.

At the start of this project, some samples of the materials were sent for long term testing to build confidence in the process of service replacement on a worst case scenario. The testing data has been received and has shown that the process significantly reduces the life of the pipe. Therefore, further modifications have been made to the pipe with Synthotech and us planning to conduct a small number of field trials which will provide a new sample of pipe to be sent off for re-testing. For each of these field trials both parties have taken a cautious decision not to leave any pipe in the ground.

We have delayed this project until suitable test sites have been located. At this time the project will be re-aligned to ensure that it satisfies the criteria set out for the NIA funding mechanism, prior to being registered with Ofgem and progressed through to completion in 2013/14.
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continued

Collaborative Partners	None
Service Provider	Synthotech Limited

Project Title	Bournemouth Dust Removal Trial		
Description of project	The aim of this trial was to improve the integrity of UK natural gas distribution by removing the dust from the system and allowing those affected networks to operate with increased capacity and at lower pressures. The basis of this project was to facilitate a trial of utilising reverse cyclone technology on the filtration element fitted to the inlet of a number of District Governors (DG) feeding into our low pressure (LP) network.		
Expenditure for financial year: **2012/13**	Internal £2,173 External £12,310 **Total £14,483**	**Expenditure in previous financial years**	Internal £3,238 External £20,000 **Total £23,238**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£37,721**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Measurable reduction in average source pressures on the network.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: This project focuses on extracting the dust off the network and thereby securing a reliable gas supply to the end user.		
	Supporting improvement in all aspects of the environment Reduction in the number of site visits required to clean and/or change filters, therefore fewer emissions will be realised from limited travel by operatives. There is an added advantage on this project of reduction in handling of potentially hazardous material as the reverse cyclone technology removes the need for filter cartridges, avoiding the need to clean or replace them.		
Technological area and/ or issue addressed by project	The UK gas distribution system has historically suffered with dust problems. The impact of dust within the system can cause existing filters on the inlets to the DG's to become blocked at periods of increased demand, therefore requiring increased regularity of site visits to change and clean filters. These visits mitigate the risk of restrictions in the flow on the downstream system, potentially resulting in failures to supply. In recent years dust problems have persisted in the Moordown area of Bournemouth, following the installation of Muscliffe Lanes pressure regulator. This resulted in a significant change in the direction of flow in this area, which in turn has resulted in significantly increased levels of dust settling in the area in question. We therefore selected this as an appropriate site for field trial. Currently the design and operation of the MP mains system in this area are restricted to operating at a velocity no greater than 20m/s to try and reduce the disturbance of dust in the mains. Operating at this reduced velocity on both mains and governors restricts the capacity these assets can provide.		

continued

	Furthermore, the downstream LP network is a large integrated system consisting of over 60 governors and has a total shrinkage cost of £880k per annum. Profile control was installed on the network five years ago with the objective of optimising the network to minimise leakage. Currently limitations are placed on the operation of the system above a predetermined demand level (45% daily demand), as a result of the dust. The effectiveness of the profiling is therefore significantly reduced with the impact estimated to be increased shrinkage costs and a resultant potential impact on escape levels. In some situations, it has even been found that dust has passed through the governor filters onto the LP network and has ultimately reached customer's appliances. In certain situations this has resulted in number of individual compensation claims. As a result, this particular aspect of our network has been selected as an appropriate location to carry out a trial to establish the effectiveness of the filtration unit and also the impact the removal of dust will have on the system at varying pressures.
Type(s) of innovation involved	Incremental

Project Benefits Rating	Project Residual Risk	Overall Project Score
18	-4	22

Expected Benefits of Project	The cyclone filter unit must be efficient in its collection of dust at flow rates over 19m/s and collects a large quantity of dust without any effect on outlet pressure. Furthermore, it is essential that upon returning the stream to its normal configurations there are no apparent concerns. Moreover, the noise levels of the unit will be reduced and there is no impact on the safety of our operatives. The trial could also reduce carbon dioxide equivalent (CO_2e) by 16,000 tonnes per annum as a result of removal of current limitations on the profiling of network pressures. Lastly, the indicative cost to perform this operation is lower than the current methods.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	5 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£67,903)
Potential for achieving expected benefits	The expected benefits of this project are to make a significant improvement with regard to the extraction of dust from our network and ascertain whether the use of the reverse cyclone filter is effective.		
Project Progress	In order to progress this project the first stage was to design, develop and construct an effective filtration unit, using reverse cyclone technology with optimum sized cones on a LP system with velocities up to 40m/s, taking into account the analysed dust composition. This was then tested in the workshop and all results proved satisfactory. The next step involved assessing the performance by means of a field trial. The results of the field trial were conclusive. Results have shown that the cyclone filter can work efficiently at low inlet pressures and extract large volumes of mains dust, but it would not be possible to use this as a standard filter unit because of its size, and would have to be used in a portable format making its use limited to problem areas.		

Project Progress	The following are recommendations that were made following the completion of the field trial: • High noise levels could be resolved by insulating the input nozzle. • Further test operating at flows above 20m/s and up to 40m/s on a day when demand reaches 55% - 60% of maximum, would be required, to further prove the unit's efficiency, before making the assumption that it would extract more dust at the higher level. • A number of manual handling issues need resolving if we intend to use the unit on other sites including reducing the height of the flange connections to low level and shortening the length of the flexible hoses. • The Bournemouth area has a particular problem with large occurrences of mains dust so the unit should be kept maintained for possible use in the coming winter months 2013/2014 across this network. Taking into consideration the conclusions and recommendations of this project, we will now look to use this filtration unit if and when any future concerns are identified with regards to dust across our network.
Collaborative Partners	None
Service Provider	Porvair Filtration Group – MF&T Gas Division

Project Title	Wall Thickness for PE Pipe		
Description of project	To work in collaboration with Radius Systems to review and field trial thinner walled polyethylene pipe (SDR26) for diameters greater than 180mm.		
Expenditure for financial year: **2012/13**	Internal £8,294 External £46,990 **Total £55,284**	**Expenditure in previous financial years**	Internal £18,748 External £110,820 **Total £129,568**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£184,852**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Development of lower carbon technologies in respect to the utilisation of SDR26. Potential impact of introduction realising a benefit of 8,000 tonnes reduction in carbon dioxide (CO2) output and resultant potential to negate the need for reinforcement in some instances.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving Reducing the energy required by the manufacturer of raw materials in the production of PE pipe supplied to us.		
	Ensuring a secure and reliable gas and electricity supply: N/A		
	Supporting improvement in all aspects of the environment Potential to reduce related emissions production and environmental impact through negating the need for reinforcement in some cases.		
Technological area and / or issue addressed by project	High Density Polyethylene (HDPE) pipe has been used successfully in the larger diameter ranges since 1989. The progression to thinner walled pipe is a natural progression following a number of years of investment by the supplier in material testing and development. There are significant economic and environmental advantages of introducing thinner-walled PE100 pipes into gas distribution practice. However to take advantage of the opportunity it will be necessary to test, in relation to pipe integrity, ground loading.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
20	-4	24

Expected Benefits of Project	• Financial savings primarily based on reduced material use. • Environmental benefits due to a potential reduction of CO2 emissions during production and reduced material usage. • SDR 26 pipe provides increased gas flow capacity when compared to SDR17.6/21. • The lighter weight of SDR 26 pipe to alternatives enables longer lengths to be inserted reducing the number of launch and reception excavations. The pipe is also easier to move around site and is more flexible compared with SDR 17.6/21.

continued

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	5 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£2,840,642
Potential for achieving expected benefits	Before we are able to adopt this pipe, a review and assessment must be completed for each of the technical considerations listed below: • Supply (volume and storage) • 3rd party damage (resistance additional protection) • Flow Stopping Squeeze off/Bagging off This will involve a field trials programme, external testing and assessment.		
Project Progress	The trial has now been complete, and the final external report has been submitted in 2012/13. Overall the project was successful, but the trial was terminated before the planned squeeze off and bag stop evaluations were carried out. The volume of >180mm replacement work has significantly reduced as the RIIO pricing formula has curtailed the amount of >250mm project work being undertaken. The impact of the new RIIO model (Revenue= Incentives+Innovation+Outputs) will need to be considered when assessing potential savings. The cost saving and benefits of using this pipe should encourage the adoption of SDR26 pipe.		
Collaborative Partners	None		
Service Provider	Radius Systems		

Project Title	Cathodic Protection		
Description of project	This project aimed to investigate the feasibility of retrofitting CP for legacy steel (ST) gas distribution pipes with diameters ≤2 inches (51mm), in order to defer replacement of these pipes. The ultimate objective is to de-risk the gas services from the mains, which are within 30m of a building, and to allow estimation of the life expectancy of its corrosion control.		
Expenditure for financial year: **2012/13**	Internal £300 External £1,700 **Total £2,000**	**Expenditure in previous financial years**	Internal £723 External £4,500 **Total £5,223**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£7,223**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy This technology will enable us to proactively assess the condition of our buried assets and where applicable remediate as opposed to replacement which entails significant excavation.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: Provides the ability to apply remediation techniques to extend the life of assets thus ensuring a safe and reliable network		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	Currently, ST pipes ≤2 inch in diameter are not subject to surveying and as a result they do not have an associated risk score. ST pipes deteriorate as a consequence of aggressive soil conditions, use of dissimilar metals, service connections and stray electric (direct) currents (from electrical grounding, etc.). The aim of this project is to critically evaluate the option to carry out a visual inspection of the existing mains when encountered and if found to be in good condition, install appropriate CP.		
Type(s) of innovation involved	Significant		

Project Benefits Rating	Project Residual Risk	Overall Project Score
20	0	20

Expected Benefits of Project	• Determine if there is a fundamental difference in applying CP to a newly installed ST pipe versus installing CP on an existing ST pipe (wrapped or unwrapped) that have been in the ground for a number of years (ideally in ranges of 15 years; i.e., 30, 45 and 60 years, etc.). • Identify whether CP that is installed on a corroded pipe, can be maintained at that level, and decide if there is a dependency on the existing levels of corrosion on that pipe. • Establish the basic model of CP application on existing buried ST pipes in terms of sacrificial anodes.

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
20	0	20

Expected Benefits of Project	• Ascertain whether the basic model change is based on the pipe length and number of services connected. • Determine how much knowledge of the corrosion levels of a pipe would be required to be reasonably satisfied that CP can be installed on an existing buried steel pipe. • Verify the effects of CP installation on an existing buried ST pipe that appears in satisfactory condition but the body of the pipe has disintegrated leaving a small insufficient section that allows current to pass through. • The dependence on ground conditions when installing CP on an existing buried ST pipe.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£4,500)
Potential for achieving expected benefits	The success of this project will be subject to the findings, conclusion and recommendations of the feasibility study.		
Project Progress	This brief review confirmed that there is no current technology which can accurately detect the corroded sites on all buried pipelines. Therefore, the development of multi-sensor tools (hybrid systems) may be required for detecting corrosion. Guided wave technology seems to be the most promising method; however its main applications have been to pipes with relatively large diameters (greater than 2”). The suitability of this technology for small diameter buried pipes should therefore be further assessed. For instance, smaller diameter pipes may require higher excitation frequencies which may be outside the capabilities of the existing technologies. Also, a point that needs to be addressed is the influence of local and well spread corrosion on the performance of the guided wave technology. In particular the suitability of torsional modes on the latter should be investigated. As an initial step in carrying out a long term investigation on the degradation of small diameter pipes, the proposal is to design and construct a torsional wave generator, using a number of shear wave piezo actuators.		
Collaborative Partners	None		
Service Provider	University of Southampton		

Project Title	SGN Biomethane Didcot Demonstration		
Description of project	The project involves construction of a biomethane to Grid plant at Didcot Sewage Works, Oxfordshire, including cleanup, quality monitoring and injection to trial biomethane injection into our network.		
Expenditure for financial year: **2012/13**	Internal £4,542 External £25,725 **Total £30,267**	**Expenditure in previous financial years**	Internal £286,768 External £1,610,989 **Total £1,897,757**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£1,928,024**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy The production of biogas and biomethane is carbon neutral. The success of this demonstration project has the potential to be developed into providing vehicle fuel.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving Less reliance on fossil fuel gas, reducing carbon emissions and making use of material destined for waste		
	Ensuring a secure and reliable gas and electricity supply: Renewable biomethane directly replaces fossil gas, thereby reducing dependency in North Sea gas and imported supplies from Russia and the Middle East. It is estimated that by 2020 up to 50% of the UK domestic gas could be replaced by biomethane.		
	Supporting improvement in all aspects of the environment Methane is 21 times more harmful to the environment than CO2. This demonstration project captures methane from the sewage treatment process and converts it to a useful gas for combustion in the gas network. The use of sewage waste in anaerobic digestion (AD) also reduces the volume of waste sent to landfill.		
Technological area and / or issue addressed by project	This project seeks to demonstrate a UK first for receiving bio derived gas into the existing gas network, to develop the gas scrubbing technology employed, its interaction with the requirement to bring biomethane to grid standards (upgrade of gas) and to develop the technology and equipment to monitor and control smaller flows of biomethane into the gas network.		

Project Benefits Rating	Project Residual Risk	Overall Project Score
20	4	16

Expected Benefits of Project	There are a number of significant benefits to this project: • It presents an ideal opportunity for us and our partners to gain intellectual knowledge of operating biomethane to grid plant; the confidence from this project will allow us to transfer the technologies to other larger projects to enable the UK Government to reach its targets of 15 % of energy from renewable sources by 2020. • First biomethane project in UK, giving us a clear leadership position, with a 'show-case' site easily accessible from London.

continued

	• Direct benefits – diversion of 100m3/hr gas currently flared off, into the gas grid. Development of measurement and flow monitoring of small flows of bio methane into the grid including enrichment, metering and odorisation. • Learning opportunity to our business in relation to biomethane issues: • HSE-Oxygen • Ofgem – flow measurement • Connection issues (telemetry, capacity, enrichment, odourisation) • Network Entry Agreement • Clean-up and upgrading plant, proving scrubbing technologies for removal of hydrogen sulphide (H2S), CO2 and siloxanes. • Developing workable version of the Network Entry Agreements (NEA) for small gas producers • Reduction in harmful gases from the sewage treatment process going to atmosphere.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	15 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£1,928,024)
Potential for achieving expected benefits	For the project to be a success all of the benefits require to be met to a high degree. For example, if biomethane is injected into the grid for only 15% of the day then it has not delivered on all the criteria, success rate is required to be in excess of 90%. The technologies are successful in other countries in Europe, especially in Scandinavia; hence confidence is high in the project's ability to meet the deliverables.		
Project Progress	Initial design work commenced in January 2010 and the commissioning was undertaken by late 2011. Throughout the course of this project there have been a number of technical issues which needed to be resolved and recorded, however the construction, demonstration and learning is now all complete. The outputs from this project have been shared through a variety of mediums including the Discretionary Reward Scheme (DRS), press releases and IGEM presentations. These have now paved the way for the UK biomethane industry and have allowed us to progress into other large scale projects i.e. Poundbury and Crouchlands. We are willing to share such project information, reports and learning on request with the other GDNs.		
Collaborative Partners	The project partners are Thames Water who own the anaerobic digester and produce the biogas to be cleaned up for measurement. British Gas Trading purchases the biomethane passing into the gas grid.		
Service Provider	CNG Services and Chesterfield Biogas		

Project Title	Hydrogen Vehicle		
Description of project	The initial stages of this project were to carry out a feasibility study into the options for utilising hydrogen for fuelling road vehicles, with specific reference to our transport fleet. Following this study we carried out a number of field trials to explore the viability of using hydrogen-based technologies to support the development of the gas distribution network. Specifically the field trials were in the areas of domestic Hydrogen Fuel Cell Combined Heat and Power (CHP) and Hydrogen Reforming for transport or direct injection to the network.		
Expenditure for financial year: **2012/13**	Internal £4,413 External £25,000 **Total £29,413**	**Expenditure in previous financial years**	Internal £4,019 External £25,000 **Total £29,019**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£58,432**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy When burned in an Internal Combustion Engine (ICE) or used in a fuel cell, hydrogen produces low emissions with no CO2. When combined with carbon capture or re-use, reforming can contribute to a low carbon economy.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: N/A		
	Supporting improvement in all aspects of the environment Hydrogen is the lightest of all gases and disperses very quickly; it is also non-polluting and hazardous to the surrounding environment (unlike gasoline a spillage / leak will not cause an environmental disaster). When used as a means of automotive power, hydrogen produces very low exhaust emissions, contributing to improvement of air quality.		
Technological area and / or issue addressed by project	Hydrogen fuel cells can be adapted as a means of providing automotive power to road vehicles. Alternatively, internal combustion engines can be modified to run on duel fuel mixtures, hydrogen/diesel or hydrogen/petrol.		
Type(s) of innovation involved	Significant		

Project Benefits Rating	Project Residual Risk	Overall Project Score
14	4	10

Expected Benefits of Project	• To assist in providing a low carbon future. • To develop a clean transportation network. • To develop a more efficient alternative fuel strategy for our fleets. • To increase the level of understanding as to how these vehicles operate, real running costs, and how they fit into our fleet make-up.

continued

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£58,432)
Potential for achieving expected benefits	This project will meet its expected benefits if the outcome demonstrates that the utilisation of hydrogen-based vehicles is more viable than current operational transport methods.		

Project Progress	Following conclusion of the Hydrogen Vehicle Feasibility Study, it was considered that further work was required to find an alternative vehicle solution that was more appropriate for our business needs, in particular:
	• Reduced cost for vehicle acquisition or conversion.
	• Closer fit of vehicle specification.
	Discussions then took place with Intelligent Energy (IE-LEV) who identified an automotive consultancy, *Revolve Ltd*, who have previously converted Ford Transits to run on mix of gasoline and hydrogen and are currently developing a new conversion for diesel engine Ford Transit vans as part of the Technology Strategy Board (TSB) project.
	The discussions with both these companies were considered to be a success and concluded the following:
	• Conversion is from Ford Transit diesel to diesel/hydrogen (H_2) hybrid (internal combustion engine)
	• Conversion development is complete, signed-off and ready for development upon request.
	• Converted Transit vans have no compromise on load space (H_2 tanks are mounted below load floor) and only small reduction in payload of ca.200kg.
	• Conversion cost per vehicle is much lower than any Ricardo cost indications:
	  • ca. £41,000* (entry level unit with 2 H_2 tanks)
	  • ca. £46,000* (extended range unit with 3 H_2 tanks)
	• Revolve arrange appropriate vehicle certification for compliance with regulations on carriage of goods.
	• Revolve provide vehicle servicing (at £500 per vehicle per annual service) and service technician training and provision of service tools (for Engine Control Unit (ECU) fault reset and H_2 alarm conditions).
	This project has now been closed under IFI. At present it is unlikely that we will pursue further developments in this area under the new NIA funding mechanism; however this study will be valuable if a decision is made to explore hydrogen vehicle technology in the future.		

Collaborative Partners	IECHP		
Service Provider	Ricardo		

Project Title	PE Asset Life Research (Stage 2)		
Description of project	To develop methodology, techniques and decision support tools that establish the current condition of the existing PE network, identify potential threats to the integrity of PE pipes and joints, and also assess the residual life of the PE network and identify and inform us on possible strategies and policies for cost effective pipe maintenance and replacement.		
Expenditure for financial year: **2012/13**	Internal £12,245 External £69,376 **Total £81,621** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £51,102 External £299,868 **Total £350,970** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£1,347,009**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy The first PE gas pipes constructed in the UK are approaching their original design life of 50 years. Early generation PE materials have lower cracking resistance than current materials and similar materials in the United States of America (USA) and mainland Europe have suffered a number of failures and indeed planned pipe replacement of some PE in the USA is underway. It is hoped that this project will demonstrate that PE pipes in the UK can safely and economically be retained in service beyond their design life avoiding the need for the industry to embark on a major planned pipe replacement programme with associated impacts in terms of cost, disruption and environmental impact.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: The principal long term objectives of this 3 stage project is to provide tools and a methodology to allow and demonstrate effective management of ageing PE assets to ensure they remain safe for continued use.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	• Introduction and development of novel retrieval methods and protocols for gathering small PE pipe samples (thin strips and coupons). • Development of chemical and physical characterisation test methods of determining condition assessment and residual life prediction from small samples. • Introducing new test methods to assess the current and long term service performance of recovered sections of pipes and pipe joints and fittings. • Developing a PE materials database and software tools for predicting the risk and residual life of PE systems.		
Type(s) of innovation involved	Significant		

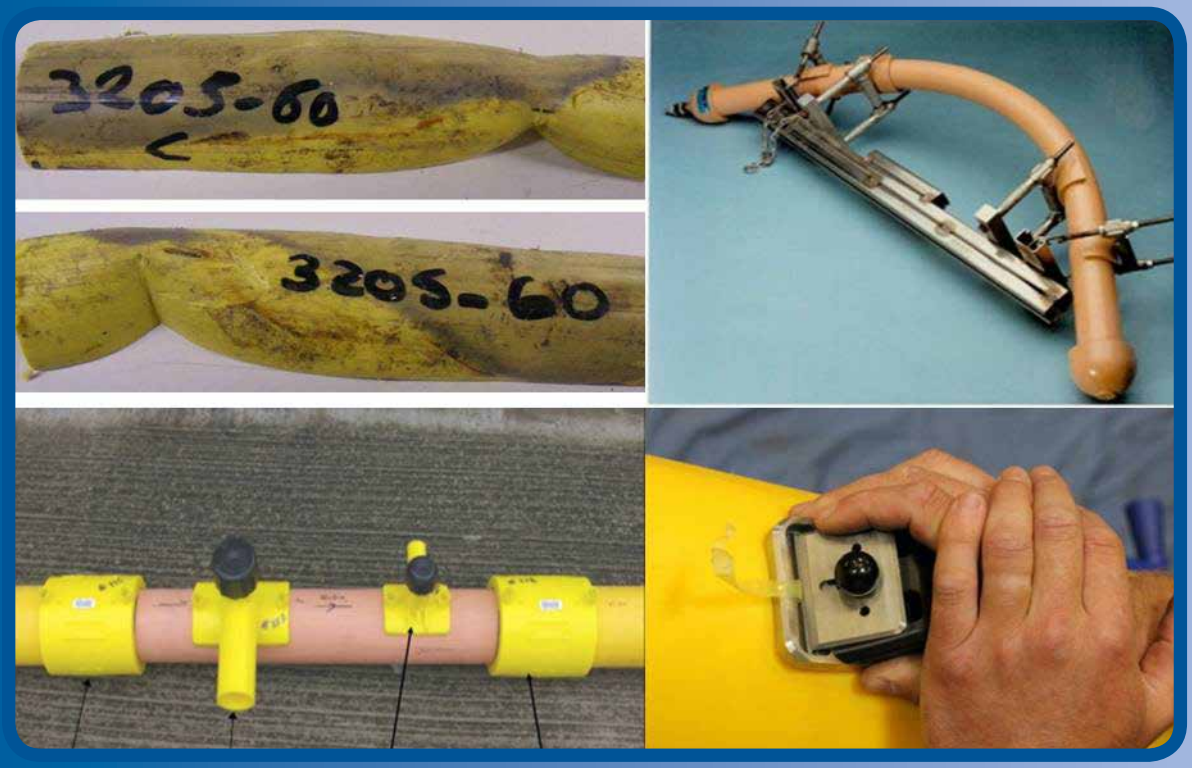
continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
26	2	24

Expected Benefits of Project	Stage 2 of this project will build on work completed in Stage 1 to achieve the following: • Comprehensive review of background technical information on PE systems from a variety of sources will have been undertaken and complied into a report and practical Timeline database. • Creation of a database of chemical and mechanical properties of a wide range of PE pipe and fitting samples and fittings obtained from the Distribution Networks and populated with test results. • Development and demonstration of means to show fitness for purpose of PE pipe and joints from a combination of test results and models aimed at determining the future performance and remaining lifetime plus results of material compatibility and squeeze off tests. • A report and plan for the development of best practice asset management tools and strategy to be undertaken in Stage 3 of the project.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	10 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£922,400
Potential for achieving expected benefits	This project is based on a scheme to collect and analyse samples of pipes and joints across the GDN's from a variety of locations, covering a range of polymers and installation ages. This approach will require development of: • A technique to enable sample extraction from live mains without disrupting gas supplies. • New test methods and protocols to undertake chemical and physical characterisation of PE materials from small samples • Methods to enable the performance of a pipe and joint to be measured and benchmarked against their original performance and predict long terms service performance. • Software tools for managing ongoing and future integrity of PE gas distribution systems.		
Project Progress	A comprehensive and very useful timeline database containing technical background on PE systems was produced, as planned, based upon all available information gathered by the project. Due to the amount of data now held additional improvements in terms of the database user functionality are planned for Stage 3. It is also proposed to make the key elements of the database available to the wider gas business in the UK via the Institution of Gas Engineers and Managers to seek out additional information that may exist to add to the database. This could potentially become an ongoing live publication which would exist beyond this project. This project has selected a range of preferred tests for material identification and condition assessment. The work has shown that the majority of samples tested are not showing significant signs of deterioration except where stress raisers or abnormal loading are present. The work has identified two particular grades of PE pipe material with relatively poor stress cracking resistance, allowing rules for managing these materials including squeeze off to be put in place. The identification of these two grades did require additional focus on areas which was not envisaged at the project outset. The statistical assessment of leakage data, reported observations and trends and development of pipe failure models has progressed well, albeit it has been identified that there are limitations to what can be done using existing leakage data. The project has made a number of recommendations regarding improvements to the level of detail of data that should be gathered in the future. It has also provided an outline strategy for the management of PE assets and recommended a number of tools that should be developed in Stage 3 of the project to assist with this.		

continued

	In addition, two main learning points were identified with regard to the management of the project: 1. The identification of two PE materials shown to have relatively poor stress cracking resistance did divert resource into seeking appropriate management of such assets and required a small number of planned tests on other pipe and fittings to be postponed into Stage 3 of the project. Such risk-based action was agreed by all participants as necessary and appropriate although unforeseen. 2. The second related to the recovery of the required long pipe samples needed for chemical and mechanical testing, squeeze off testing and compatibility testing. There was a delay in identifying suitable samples due to data quality issues but also for operational reasons. In addition testing on some of these samples produced anomalies which prompted additional samples to be removed and added to the required samples for Stage 3 of the project. The project programme anticipated for year 3 has been formulated on the results of the first two years' work and will concentrate on concluding long term accelerated testing of pipe and fittings already underway and continue the programme of squeeze off and materials jointing compatibility testing to obtain a better understanding of the risks associated with field work on older PE materials. The further development of a risk framework including trend performance monitoring methodology and asset management tools that make best use of the data and knowledge available now, is designed to accommodate planned improvements and new developments and can integrate with and complement existing asset management systems and demonstrate that the integrity of PE assets are under control. Stage 3 of this project as referred to within this report has commenced under IFI, however this project will transition over and be funded from April 2013 under the new NIA mechanism. At this time it has been assumed that Stage 3 will meet the revised criteria set by Ofgem.
Collaborative Partners	National Grid Gas
Service Provider	MACAWS Engineering Limited



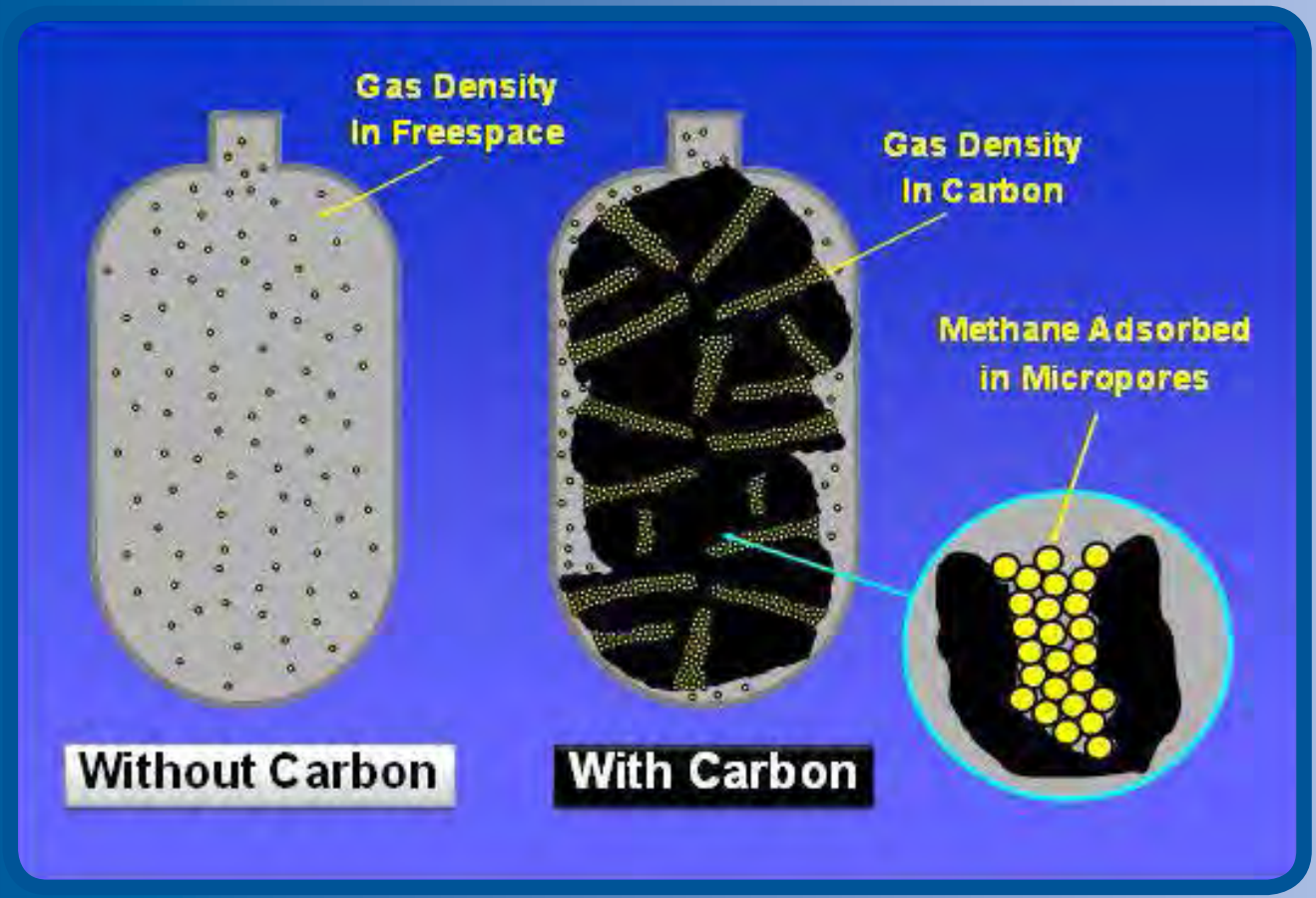
Project Title	ANG Storage Feasibility Study		
Description of project	Feasibility Study to be carried out in order to investigate the potential uses for Absorbed Natural Gas (ANG) technology across our networks.		
Expenditure for financial year: **2012/13**	Internal £4,801 External £27,200 **Total £32,001** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £28,635 External £166,234 **Total £194,869** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£226,870**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving The basic principal behind ANG is that by putting low cost activated carbon inside a pressure vessel the storage capacity is increased by up to five times its volume compared to pressurised storage without the activated carbon.		
	Ensuring a secure and reliable gas and electricity supply: This project will provide the necessary knowledge for an assessment to be made as to the viability of ANG storage adoption across our networks.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	ANG technology has been developing for many years and this has led to detailed understanding of storage parameters, control mechanisms for gas quality management, safety and hazard issues. We have selected a specialist contractor to undertake the feasibility study, assess the potential uses for ANG technology across our networks and recommend a potential trial project.		
Type(s) of innovation involved	Technology Transfer		

Project Benefits Rating	Project Residual Risk	Overall Project Score
6	-3	9

Expected Benefits of Project	Compared to conventional alternatives such as LP gasholders, linepack and compressed natural gas storage, ANG has the potential to deliver significant advantages for its low-medium pressure operation, process simplicity, high storage capacity and inherent safety. ANG could also be used to store the extra gas produced during low demand by embedded entry points and release it when demand increases during the day. An embedded entry point supplying biomethane generated from AD will be designed to supply gas into the network at a constant rate 24 hours a day. However, there might not be sufficient gas demand to accommodate the flow at night and filling an ANG vessel could overcome this. In addition, ANG could offer network planners another tool to use when designing the most efficient way to reinforce and operate our network. The feasibility study will explore the use of ANG technology and report on the preferred option for a trial project, including costs, risks and a decision tool to enable us to determine the potential and form of such a trial. It will also provide insight into possibilities for taking the technology beyond a trial, effectively a road map for future implementation.

continued

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£226,870)
Potential for achieving expected benefits	In order to achieve the anticipated benefits it is essential that we supply all the necessary information with regards to their network sites. This information will ensure that an accurate feasibility analysis can be undertaken to investigate the potential uses for ANG technology.		
Project Progress	The success criterion for the original project was the completion of a feasibility study report exploring possible uses for ANG across our networks and recommending the preferred option for a trial project. This was completed by our service provider and explored possible uses of ANG and recommended one to take forward to a trial project. Following a review of the options acknowledged in this study, we have decided not to progress to a trial project due to ANG costing significantly more than was anticipated at the project inception, making it not financially viable at this time. Furthermore, there are no storage pipelines planned in the RIIO price control formula period presenting fewer opportunities at this time.		
Collaborative Partners	None		
Service Provider	GL Noble Denton		



Project Title	Cured In Place Polyurethane Spray Lining		
Description of project	The basis of this project was to demonstrate the "fitness for purpose" of Cured in Place (CIP) and Polyurethane (PU) Spray Linings technologies as a permanent repair and/or rehabilitation technique for gas distribution mains. Particular attention was focussed towards ferrous mains greater than 12" diameter and up to an operating pressure of 2bar. In addition, it was expected there would be a clear indication of whether CIP and PU spray lining techniques can deliver a level of risk that is acceptable for all stakeholders.		
Expenditure for financial year: **2012/13**	Internal £8,058 External £45,656 **Total £53,714**	**Expenditure in previous financial years**	Internal £25,034 External £143,835 **Total £168,869**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£261,559**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Strong alignment. Utilisation of thinner wall solutions over PE, that is easier to transport and install.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: Strong alignment. Leads to a significant improvement in large diameter replacement.		
	Supporting improvement in all aspects of the environment Strong alignment. Reduction in excavation due to reduced pipe entries and ability to replace longer lengths.		
Technological area and / or issue addressed by project	• Development of lining technologies that are able to withstand pipe fracture and provide a system that enables the carrier pipe to be deemed 'permanently replaced'. • Development of liner thickness measurement devices. • Development of technologies to transport and/or deliver product in long lengths of buried pipe.		
Type(s) of innovation involved	Significant		

Project Benefits Rating	Project Residual Risk	Overall Project Score
7	0	7

Expected Benefits of Project	This project expects to deliver three key deliverables: 1. A world-wide review of deployed systems in both water and gas sectors 2. Proposed performance specifications and a best practice guide for deployment on the UK gas distribution network, and 3. Framework method for assessing the relative risk of deployed systems. It is envisaged that this project will provide a level of confidence that the technology can meet, or can be developed to meet, specifications and installation standards for the UK gas network at acceptable cost.

continued

Expected Timescale to adoption	2 Years	**Duration of benefit once achieved**	10 Years
Probability of Success	50%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£261,559)
Potential for achieving expected benefits	During Stage 1 of this project it is anticipated that in order to achieve the expected benefits, the following work elements would be required: • Set up a steering group that will provide clear guidance of project progress. • Review and assessment of available and/or emerging CIP and PU lining technologies. • Write a performance specification and best practice guide for both CIP and PU linings in the Gas Industry. • Ensure that a thorough evaluation and framework method for assessing the relative risk of deployed systems. • Develop CIP and PU products as required. • Undertake trials and testing of products. • Auditing of process installation and monitoring procedures.		
Project Progress	The Stage 1 project has been completed and the lining performance specifications and a best practice guide have been developed. The project outputs are: • Performance Specification for Renovation of Gas Mains with a CIP Liner, UC9191.04, February 2013; • Performance Specification for Renovation of Gas Mains with an In Situ Spray Lining, UC9240.03, February 2013; • Best practice guide for renovation of gas mains using CIP liners and spray lining, UC9239.02, February 2013; and • Use of CIP and PU Spray Linings for Permanent Repair of Large Diameter Gas Mains, Final Report, UC8972.03, February 2013. The duration of the Stage 1 project was extended by two months to allow lining manufacturers to review and comment on the CIP liner and PU spray lining performance specifications. The outputs from Stage 1 provide a solid platform on which to progress to Stage 2, allowing manufacturers and material suppliers to start the development of lining solutions that will be 'fit for purpose' for use within the UK gas industry. Therefore, the lead GDN has proposed that this project is progressed forward to Stage 2, which would test a range of available CIP lining solutions under controlled conditions and validate the results against these Stage 1 documents, with the goal of establishing the generic approach as 'fit for purpose' as a rehabilitation technique for iron gas mains up to 2 bar. It is anticipated that the CIP performance specification and best practice guide will be refined during this stage, and that the tests may identify a development gap for certain technologies ahead of their acceptance. Furthermore, the test programme will look to embrace the lining materials, the installed liner, and installation practice together with the evaluation of a range of routine maintenance activities (e.g. flow stopping, connections, jointing and repair).		
Collaborative Partners	National Grid, Northern Gas Networks, Wales & West Utilities		
Service Provider	Water Research Centre (WRc)		

continued

Project Title	Poundbury Biomethane Feasibility Study		
Description of project	The scope of this project was to undertake feasibility works to support the scoping and specification development for biomethane connection to the network at Poundbury, Dorset. The project built on previous learning from work at Didcot, Oxfordshire to review network entry plant and equipment required to address current obstacles impeding biomethane connection to the network.		
Expenditure for financial year: **2012/13**	Internal £7,073 External £40,075 **Total £47,148** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£47,148**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Actively supports growth of low carbon biomethane.		
	Eradicating fuel poverty and protecting vulnerable customers: Supports reduction in gas fuel costs.		
	Promoting energy saving Provides overall energy utilisation much more effective than the alternative conventional CHP.		
	Ensuring a secure and reliable gas and electricity supply: Ensure diversification of UK gas supply and less reliance on fossil fuels thereby maintaining a secure and reliable gas supply to customers.		
	Supporting improvement in all aspects of the environment Supports minimisation of waste, best usage of energy available and utilisation of the existing energy delivery and infrastructure and gas appliances.		
Technological area and / or issue addressed by project	The objectives of the study is to: • Develop Renewable Heat Incentive (RHI) compliant operational plant layouts. • Reduce equipment costs associated with network entry requirement. • Develop new suppliers and equipment for network entry plant.		
Type(s) of innovation involved	Incremental		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
25	0	25

Expected Benefits of Project	• Identify plant ownership consistent with Gas Transporter (GT) license, Regulatory and Uniform Network Code (UNC) obligations. • Develop a generic specification for suppliers of network entry plant and associated layout designs, promoting the requirement for new, lower cost gas analysis and instrumentation stations. • Develop a technical design and specification for a public GT custody transfer unit to ensure compliance with duties conveyed to a public gas transporter under the Gas Safety Management Regulations GS(M)R 1996. • Develop a technical design and specification for a transportable "Network Validation" gas analysis unit to provide mobile verification of new suppliers and new network entrants plant, in situ at the injection facility. • Undertake limited network gas analysis and core samples to evaluate existing metallic parts of the network to inform the risk assessment for this particular bio methane entry point.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£47,148)
Potential for achieving expected benefits	In order to achieve the anticipated benefits, Technica Limited was to produce a comprehensive study providing conclusion with reference to the design and construction of future plant.		
Project Progress	The feasibility study was completed on 31/10/2011 and provided sufficient detail to progress to the detailed design and construction of our Biomethane Development at Poundbury, Dorset.		
Collaborative Partners	None		
Service Provider	Technica Limited		

Project Title	Internal Long Range NDT Trial		
Description of project	The purpose of the project was to facilitate a field trial for the Internal Long Range Non Destructive Testing (NDT) inspection of Orpheus and Engineering Research Station (ERS) modules, which are below 7 bar buried governors. This trial will assist us to demonstrate 'fitness for purpose' and ensure that full compliance with Pressure Systems Safety Regulations 2000 (PSSR) is achieved.		
Expenditure for financial year: **2012/13**	Internal £2,426 External £13,744 **Total £16,170**	**Expenditure in previous financial years**	Internal £6,837 External £39,812 **Total £46,649**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£62,819**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: The availability of long range NDT will improve the understanding of assets and contribute to better management of the network.		
	Supporting improvement in all aspects of the environment If successful, this no-dig technique will assist in cutting down carbon footprint and assist in reducing waste material sent to land fill and also the imported virgin material required to reinstate the site.		
Technological area and / or issue addressed by project	The requirements for the Health and Safety at Work Act 1974 (HSWA) and PSSR, supported by the Approved Code of Practice and Guidance document, provide a regime with the aim of ensuring the safety of pressure systems. The aim of the PSSR is to prevent serious injury from the release of stored energy as a result of the failure of a pressure system or one of its component parts. This examination specification describes the inspections required for pressure vessels operating above 0.5barg owned by us to ensure compliance to PSSR. All Orpheus 10 governors must be inspected to Pressure System Inspection ES/94/10 part 2 every six years or less.		
Type(s) of innovation involved	Significant		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
19	-2	21

Expected Benefits of Project	This trial was expected to assist us to demonstrate our compliance with PSSR. Furthermore, this process potentially eliminates the need for excavation, shot-blasting or reinstatement works, therefore making the inspection work safer and more cost effective. If successful, this no-dig technique will assist us in cutting down our carbon footprint and assist in reducing waste material sent to land fill and also the imported virgin material required to reinstate the site. In addition, we will receive a fitness for purpose report from Applus, which shall contain an electronic map of any defects found on the vessel. These maps could be laid over each other year on year to technically assess any defect identified against statutory legislation and procedures.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(£62,819)
Potential for achieving expected benefits	Subject to carrying out a full trial scan using a mini ultrasound NDT scanner owned and operated by Applus NDT Ltd.		
Project Progress	The trial was deemed a success. The first objective of the inspection was to try and create a “fingerprint” inspection which could, in future be duplicated, in order to monitor corrosion levels from one year to the next if required. The second purpose was to evaluate whether or not it would be possible to inspect enough of the vessel from the inside therefore preventing the unit from having to be completely excavated to enable an inspection work scope to be undertaken. A “redundant” vessel, which had never seen any service, was located at our Heathhall Transmission Reduction Station (TRS) and was quickly identified as one which could be utilised for trialling the effectiveness of such an inspection. An Ultrasonic corrosion mapping technique was deemed as being the most suitable technique to create a “fingerprint” and for the collection of data, which would be able to be used for comparison during any future inspections. It should be noted that this inspection was still at trial stage and the main objective was to try and assess the capability of covering the shell areas of the vessel below the internal diffuser plate, as below this area a number of access problems were prevalent. In general all accessible areas of the actual vessel shell below the diffuser plate were successfully inspected. This was with the exception of the areas directly below the inlet and outlet nozzles and the full bottom end cap. It was estimated that approximately 80% of the actual shell of the vessel was inspected and corrosion mapped from the internal of the vessel. This trial has allowed us to fully understand the requirements of the system and its limitations. It was identified that there is scope to increase the percentage of corrosion initially mapped. In addition, it is apparent that the real potential of this NDT technique when developed will be the corrosion mapping of intermediate pressure (IP)/HP filters to have an electronic fingerprint to asses the true condition of new and/or in-service filters. This will allow any defects found to be managed safely, increasing the potential life span of the IP/HP filters with defects. It is proposed that all new filters will be corrosion mapped using this technique before they are commissioned. Therefore, it is recommended that an additional piece of work is carried out to research and develop a corrosion mapping system that allows inspection of over 90% across Orpheus 10 modules. Following this we will generate a clearer understanding of what can be achieved with regards to filters.		
Collaborative Partners	None		
Service Provider	Applus RTD UK Ltd		

Project Title	Diurnal Storage Modelling		
Description of project	To identify and consider the application of new modelling techniques and methodologies for predicting diurnal storage needs to support both investment and operational planning. This assessment is the next step towards our strategic view of storage requirements and will improve and give confidence in the calculation of future requirements.		
Expenditure for financial year: **2012/13**	Internal £2,030 External £11,502 **Total £13,532** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £1,661 External £10,333 **Total £11,994** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£65,000**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A Eradicating fuel poverty and protecting vulnerable customers: N/A Promoting energy saving N/A Ensuring a secure and reliable gas and electricity supply: The key benefit of this research is in improved diurnal storage requirement modelling capability to ensure we are able to make efficient investments or flex bookings to demonstrate regulatory compliance. Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	Diurnal storage provision is a key component of design requirements and significant capital and revenue expenditure is invested to support the maintenance of LP holders and the provision of storage within the HP distribution network as linepack. This is driven mainly by the assumption that for design purposes the take from the National Transmission System (NTS) is nominally at a constant rate, being delivered through offtakes operating in volumetric control mode. This constant in-feed combined with the downstream demand varying in a diurnal profile requires our HP distribution system to absorb the variation in flow. The current Unified Network Code (UNC) arrangements via the Offtake Capacity Statements allow us to book a maximum offtake rate from the upstream provider i.e. the NTS, made up of daily flat rate / 24 plus an amount on flex. On any supply day each GDN has to ensure that sufficient storage is available to meet the customer requirements, taking account of any forecast errors and minimising the storage take from the NTS. The storage requirement of a local distribution zone (LDZ) is statistically calculated using an industry recognised program called the Storage Simulation Model (SSM). SSM uses actual operational and forecast performance to statistically calculate the storage required to maintain a 1 in 20 security level of an LDZ. The storage output of this model is expressed as a percentage of the Peak Day demand. This model was developed by GL Noble Denton and incorporated into each network's policy and procedures at the point of sale in 2005 and has not been updated. Since its introduction there have been a number of significant industry changes such as offtake/interruptible reform, climate change and operating rules and holders' failure rates. All of these have an impact on the storage requirement. Therefore an assessment of the model is required to see if SSM is still fit for purpose and explore development opportunities that satisfy the new requirements.		

continued

Type(s) of innovation involved	Incremental

Project Benefits Rating	Project Residual Risk	Overall Project Score
9	-2	11

Expected Benefits of Project	This study looked at the drivers for storage requirements and investigated the most appropriate method for delivering a tool, which satisfies the agreed requirements. The key expected benefit of this research was to ensure an improvement to our diurnal storage requirement modelling capability over a range of input scenarios. This may allow us to make efficient trade-off decisions and improve network planning performance and allow them to improve the information available to our system operations.		
Expected Timescale to adoption	2 Years	**Duration of benefit once achieved**	8 Years
Probability of Success	50%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£65,000)
Potential for achieving expected benefits	The benefits will be achieved through improving the visibility of the impacts of different input data ranges that influence the storage requirement aiding each GDN to make efficient investments or flex bookings and demonstrate regulatory compliance. Furthermore, the success is subject to each GDN demonstrating its ability to meet 1 in 20 storage requirements.		
Project Progress	National Grid, Wales & West Utilities and ourselves have jointly undertook this IFI Diurnal Storage Modelling project with the objective of developing a report of the requirements of storage modelling and the options for development of that modelling. The project focussed attention towards identifying those solutions that have the most potential for success and therefore warranting further detailed study. The key benefit of this research is in improved diurnal storage requirement modelling capability to ensure the GDN's are able to make efficient investments or flex bookings in demonstrating regulatory compliance. This initial feasibility commenced with the requirements analysis study, followed by the documentation of potential solution options. The work was delivered as a fixed price project without the need for change controls. Key deliverables included; 1. Documentation, presentation and analysis of current modelling capabilities. 2. Workshops and documentation of short and longer term client requirements. 3. A final report proposing areas for further development, together with relative benefit score and complexity of key requirements. The feasibility study also established that there was a high degree of commonality of client requirements for a new and improved solution. Therefore, the outcome of this project delivered the expected outputs and the initial study concluded that there was benefit and scope for providing innovative ways of improving the modelling of diurnal storage and the associated output. In conclusion, it has been agreed by all collaborative partners that we will jointly undertake the next stage of the Diurnal Storage Modelling project with the objective of developing a system to prove the fundamental workings of a new more flexible simulation model. We are awaiting confirmation from Northern Gas Networks whether they will join in the later developments. The next stage of this project will be funded under the new NIA funding mechanism in 2013/14. One of the key areas of the next stage will involve a much more flexible and interactive user interface that will allow users to more freely interact with and mine		
Collaborative Partners	National Grid, Wales & West Utilities		
Service Provider	GL Noble Denton		

Project Title	CR714 Desktop Risk Assessment Toolkit		
Description of project	This project was for the design, build and implementation of a robust and effective online toolkit, to use Geographic Information System (GIS) technologies to assist in viewing information pertinent to assessing risk associated with pipeline networks. The aim was to enable MRPS surveys to be carried out via desktop risk assessment, reducing the need for on-site physical surveys.		
Expenditure for financial year: **2012/13**	Internal £11,820 External £66,969 **Total £78,789** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £21,869 External £107,265 **Total £129,134** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£207,923**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy An average surveyor travels approximately 60 kilometres (km) per day in a small commercial vehicle. Currently there are circa 38 surveyors at any given time carrying out surveys across our geographical remit. This initiative will help reduce the need for travel by 70%, and it is likely that CO2 emissions will be reduced by approximately 1 tonne per annum.		
	Eradicating fuel poverty and protecting vulnerable customers: This feature will trigger a report of the survey to be generated as a portable document format (PDF) and e-mailed to a preconfigured nominated e-mail address. The report will contain a map, map coordinates and all other relevant text from the survey. This function will be used to trigger surveys for vulnerable buildings in support of our policy SGN/PM/LC/18 Management Procedure for Leakage Survey. It also envisaged that a portfolio of vulnerable customers will be maintained via the solution.		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: N/A		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	We have an aspiration to reform the hazardous pipe surveys with a view to carrying out the surveys via a desktop risk assessment toolkit. Therefore we have approached various land and property risk management companies able to develop a desktop solution that contains satisfactory land and property data sets.		
Type(s) of innovation involved	Significant		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
27	1	26

Expected Benefits of Project	The desktop solution will significantly reduce the time taken to complete the survey thus presenting an opportunity to increase the productivity of the surveyor. This approach is likely to enhance the integrity of the MRPS model as data will be more accurate and up-to-date. Ultimately, these measures assist in reducing the risk of an explosion incident. The desktop solution will also provide a portfolio of our high rise buildings thus enabling an enhanced high risk survey program. It also envisaged that a portfolio of vulnerable customers will be maintained via the solution. Benefits in terms of carbon emissions reduction are also expected; see alignment with sustainable development objectives above.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	5 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£438,013
Potential for achieving expected benefits	Firstly the application of the product needs to meet our requirements. Following this, the project team must generate close communication, sufficient training and successful deployment of the product throughout our business in the most efficient manner, in order to subsequently realise the full potential benefits anticipated.		

Project Progress	This project has been successfully delivered by Landmark Information Group. The solution was delivered from one of Landmark's enterprise managed service platforms, which reflects their core business and demonstrates the abundant expertise and experience that they have.
	
	Overall assessment of the project is that the objectives stated were met and the Desktop Risk Assessment Toolkit will allow a high proportion of future surveys to be carried out from the desktop rather than a physical visit. The following deliverables were produced:
	
	• Product
	  • An IT Tool residing on the standard desktop client to allow remote surveys of the environment around the nominated asset which is now being utilised. Whether 70% of physical surveys can be substituted is yet to be proved.
	  • Cellar data and other data types delivered for use within the toolset. This is in addition to data currently used in the Pipe Risk Assessment process.
	
	• Documentation
	  • Business Requirements
	  • Functional & Technical Specifications – Agreed to utilise Training Pack
	  • Training Material
	  • Test pack for system and User Acceptance Testing (UAT) which will become the Regression test pack for the application – within the Quality Centre
	  • Acceptance into support with procedures to escalate to Third Party Suppliers (LandLine) if issues become apparent.
	
	In summary, this product meets the specification requirements. It is an effective solution for a problem which is quite difficult to tackle and provides us with a modern digital solution as opposed to a paper-based system. The whole project team worked well together and communication between all parties was open and honest, which ultimately led to a relatively straightforward deployment throughout our business.		

Collaborative Partners	None		
Service Provider	Landmark Information Group		

Project Title	Poundbury Biomethane Development		
Description of project	This project involved the development and installation of new low cost network entry equipment and oxygen suppression system to enable biomethane produced by new mixed feedstock supply AD (not previously used with the UK), to enter the gas distribution network. The biomethane produced will supply energy for up to 3,000 new homes on the Poundbury estate, near Dorchester, Dorset.		
Expenditure for financial year: **2012/13**	Internal £231,179 External £1,309,169 **Total £1,540,348** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £104,975 External £651,115 **Total £756,090** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£2,296,438**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy This project is fundamental to the short and medium term transition to the low carbon economy by enabling a greater volume of AD facilities and operators to benefit from commercially viable access to the gas grid. The improved economics will be persuasive in enabling the UK government to meet and exceed its 2020 carbon emission targets; biomethane to gas network efficiency is at least 50% more favourable than electricity only applications.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving Provides unique coverage opportunity within the media to promote low carbon housing and the energy savings that the project is expected to support and deliver.		
	Ensuring a secure and reliable gas and electricity supply: By displacing fossil fuel imported 'natural gas' within our UK gas distribution networks, biomethane derived from organic waste streams within the UK provides an alternative secure and reliable gas supply. By continuously looking at areas to improve the equipment and propane used for biomethane entry to the grid, we are looking at ways to bring more biogas production facilities to market and giving access directly to the gas grid providing the end user with greater security and reliability in UK gas supply.		
	Supporting improvement in all aspects of the environment The project looks to enhance the use of sustainable alternatives to natural gas, reducing propane, thereby contributing to the low carbon environment and reducing UK emissions.		
Technological area and / or issue addressed by project	Some key obstacles to biomethane entry into the network remain unresolved; we believe that the new network entry plant ('custody transfer station'), transportable verification unit, oxygen suppression and propane reduction systems all provide a justifiable innovative solution to address the barriers that exist with regards to biomethane entry into the network.		
Type(s) of innovation involved	Incremental		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
27	-1	28

Expected Benefits of Project	This project provides an innovative solution that covers the design of the equipment, integration systems, reliability etc. in order to comply with regulatory requirements and fit a demanding control specification.
	
	Moreover, this project delivers both technical and corporate benefits:
	• Provide a lower cost but sufficiently accurate network entry plant.
	• More effective specifications to support biomethane as a source gas for conveyance into our networks.
	• Enhance the network monitoring regime for biomethane injection applications by provision of a transportable Flow Weighted Average Calorific Value (FWACV) verification unit
	• Provide a parallel gas quality monitoring scheme, using output from an applicable risk assessment, with initial validation against the approved monitoring scheme.
	• Design and install systems that minimise the amount of propane required to be added to the bio methane as an enrichment agent for FWACV.
	• Provide inputs and accuracy levels required for GS(M)R sampling and measurement devices informing NEA.
	• Demonstrate that larger capacity biomethane entry facilities will not incur additional and disproportionate costs.
	• Reduce oxygen concentrations within biogas to provide oxygen compliant bio methane source into the network.
	• Establish the risks to the gas quality output from a new mixed source feedstock supply not previously used within the UK.
	• Enable a pathway for lower cost system integrators to gain a foothold within the UK market place for the supply of network entry plant.
	• Prove plant capability for fully automated running with suitable reliability to meet UK gas quality requirements.
	• Monitor the performance of a new and innovative '3 stage membrane' clean up technology, previously not seen at scale in the European biomethane industry. The new technology has the advantages of:
	  • Reducing planning consent issues.
	  • Improving oxygen content/gas quality in the biomethane over existing water wash technology employed at Didcot.
	  • Reduce upstream biogas clean up costs.

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	10 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£357,850
Potential for achieving expected benefits	This project utilised the learning gained from the Didcot, which demonstrated a UK first for receiving bio-derived gas into the existing gas network, to develop the gas scrubbing technology employed, demonstrate its interaction with the requirement to bring biomethane to grid standards (upgrade of gas) and develop the technology and equipment to monitor and control smaller flows of biomethane into the gas network.		

continued

	We have identified a number of challenges that were presented from this initial project and sought to address these throughout this new project. Specific areas on which attention was focussed to meet the anticipated benefits are as follows: • Plant Costs – reduce the capital cost of the network entry plant (custody transfer unit). • Gas Quality – assess GS(M)R monitoring requirements for the different (mixed) feedstock, suppress oxygen concentrations within biogas production and refine the gas analysis requirements for bio methane derived gases as opposed to that of the natural gas derived monitoring regime and equipment installed at Didcot. A plant capable of minimising oxygen and propane concentrations within compliant bio methane gas transported to the network. • Scale - Poundbury will inject ten times the volume of the facility at Didcot, the project will prove that the network entry plant can be scaled up to address this capacity increase whilst maintaining a lower cost base. In addition, the success will also be dependent upon the ability to install a new custody transfer station, transportable FWACV verification unit, an oxygen suppression system with propane minimisation, all to standards appropriate to biomethane entry requirements.
Project Progress	In 2011/12 it was reported that this project had undergone the planning, design and development phases and by March 2012 the Poundbury AD plant had begun operations. At this point the plant was producing steady state biogas, however there were still a number of challenges to be addressed, such as the installation of an additional flare to encompass rejected biomethane from the network entry plant and modifications to the AD system to minimise oxygen within the biogas. The installation entered service in October 2012, and by the end of March 2013 had performed as follows:- • Transported 1.5 million m3 of biomethane into the local medium pressure Poundbury and Dorchester gas distribution networks, • Operated at 90% capacity. • Availability for service in excess of 96% • Producing a 100% GS(M)R compliant gas, with oxygen levels at 0.17%, well inside the 0.2% allowable under these regulations. • Reduced propane addition from Didcot biomethane by over 40% • Confirming to UK biomethane industry that the lessons learnt from Didcot can be incorporated and deployed at ‘commercial’ scale within the UK.
Collaborative Partners	None
Service Provider	Orbital Gas Systems / DMT / JV Energen LLP

Project Title	Cast Iron Joint Sealing Robot (CISBOT)		
Description of project	This scope of this project was to develop an innovative solution for the repair of leaking lead yarn joints within our CI population. The aim of this project was to undertake a trial of a CI joint sealing robot known as CISBOT. This technology can be inserted directly into live 6" to 12" diameter CI gas distribution mains to seal leaking joints with an anaerobic sealant, without disrupting service, and with minimal excavation.		
Expenditure for financial year: **2012/13**	Internal £743 External £4,208 **Total £4,951**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£4,951**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy If successful, benefits from leakage repair will be realised from the avoided carbon cost of emergency repair works.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: The operation can be performed under live conditions, avoiding the need to shut down an entire main, causing disruption to customers.		
	Supporting improvement in all aspects of the environment This project is designed to reduce the number of excavations required to carry out repairs on leaking cast iron joints, which results in a significant reduction in the amount of excavated material sent to landfill.		
Technological area and / or issue addressed by project	From the 1850's up until the 1950's CI mains were used extensively across our distribution networks. Now the industry has moved away from this source of material and is using steel and polyethylene. However a significant proportion of larger diameter CI is still in use today. These assets are ageing, requiring inspection, repair or replacement. When installed, these sections of mains were connected at the joint by a bell and spigot. To seal the joints; jute (a plant fibre used in making burlap and twine) was packed into the back of the joint, and molten lead was poured into the front of the jute packing creating a gas-tight seal. Over time, however due to ground movement, winter thaw cycles and the fact that jute is drying out causing it to shrink and/or crack we are experiencing leaking joints. In the past we would have fully replaced these ageing assets or aimed to maintain them. However maintenance options have been fairly limited. Repair techniques have included mechanical joint clamps and encapsulants, and since the 1980s anaerobic sealant has been injected into the jute packing. However, these repair techniques can generate a number of disadvantages, such as; large costs due to significant excavations and potential shut downs, causing customer dissatisfaction and road closures. The restoration following the works further increases costs and disruption. Therefore, we are now looking to explore what else can be done to repair these joints and extend the asset life of our ageing networks.		
Type(s) of innovation involved	Significant		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
25	2	23

Expected Benefits of Project	Moving into the new price control formula period we are entering into a revised replacement framework. Under this formula it is no longer acceptable to replace 1000's of km of CI mains at high cost to customers. As a result, this project was expected to provide a cost effective and efficient way in which to assess and maintain the integrity of our cast iron networks. Further benefits that CISBOT was expected to deliver are as follows: • Can be inserted directly into live 6" to 12" diameter CI mains. • Capable of travelling 120ft in either direction from a single excavation. • Internally seals leaking joints. • Reduces the number of excavations required. • Reduces the need for traffic management. • Improves customer satisfaction. • Creates a gas tight seal for up to 50 years. • More effective than external injection because the process can be closely monitored using flow and pressure sensors and the effects of the wicking around the joint can be visibly observed. • Alleviates issues which commonly arise from the reliability of the operatives performances found with external injection.		
Expected Timescale to adoption	N/A	**Duration of benefit once achieved**	N/A
Probability of Success	N/A	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	N/A
Potential for achieving expected benefits	ULC Robotics has already sealed more than 3000 CI joints for Con Edison and gas companies throughout the Northeast of America using the CISBOT robot. It uses the same anaerobic sealant that has been used throughout the UK gas industry for over 15 years. The sealant's 50 year effective life has been tested and verified by Cornell University.		
Project Progress	The initial expenditure associated with this project consisted of preliminary site investigation works. Unfortunately, this project did not progress due to legal issues surrounding the license conditions between ULC Robotics and Con Edison. The project was effectively managed so as to minimise costs upon termination. There was significant learning from the project nonetheless that will feed into a follow on project with ULC robotics in relation to the 'Large CISBOT' will be undertaken under NIA. A project designed to develop a comprehensive robotic solution to distribution mains management has also been entered into the NIC in 2013/14.		
Collaborative Partners	None		
Service Provider	ULC Robotics		

Project Title	Oscillating Energy Harvester Feasibility Study		
Description of project	The basis of this project was to undertake a feasibility study for the development of an energy harvesting device that converts energy present in the gas flow into electrical energy for powering remote pressure monitoring and data logging systems.		
Expenditure for financial year: **2012/13**	Internal £2,012 External £11,400 **Total £13,412**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£13,412**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Although minimal this initiative does contribute towards a low carbon economy. When the batteries that are used for the powering of remote pressure monitors and data logging systems need changing, and a first call operative (FCO) will carry out this activity. By utilising this technique, there won't be a need for an FCO to make this journey. This will result in a reduction of site visits and harmful emissions from vehicles.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: This initiative will utilise the flow of gas in order to power remote pressure monitoring and data logging systems, thereby minimising failures in the gas network due to faulty or run down batteries.		
	Supporting improvement in all aspects of the environment Minimising the need for batteries in remote pressure monitoring and data logging systems, avoids harmful chemicals being added to the waste stream and thereby improving the environmental performance.		
Technological area and / or issue addressed by project	The main objective of this project was the development of an energy harvesting device that converts energy present in the gas flow into electrical energy for powering remote pressure monitoring and data logging systems. Currently Pressure Reduction Stations have pressure control equipment known as loggers that are powered by batteries. Ultimately these batteries require replacing at some point in their lifecycle, whether this is through running out or because they are faulty. Therefore, at this point an FCO must travel to site and replace the batteries. This process can be time consuming and costly. In addition, it has considerable impact on the environment through fuel emissions and the disposal of the batteries. This study aims to explore a solution where the harvester is required to recharge the batteries within the existing logger with a view to allowing such a system to operate continuously without requiring replacement. A further objective of the study would be to investigate the feasibility of charging larger batteries, such as those used for pressure profiling activities, which use typically a Reedex valve system to regulate pressure.		
Type(s) of innovation involved	Significant		

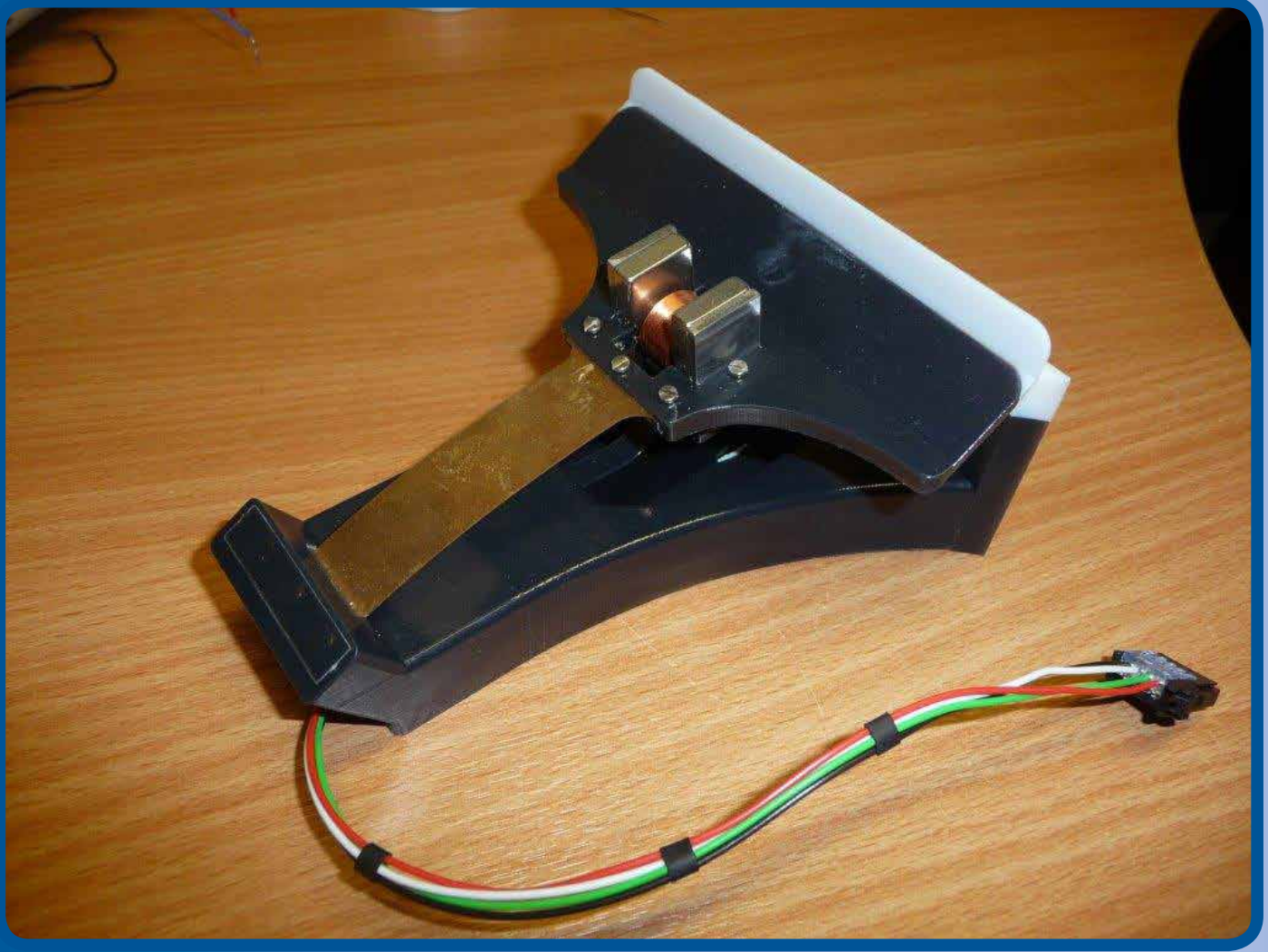
continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
23	-3	26

Expected Benefits of Project	The expected benefits of this project were as follows: • Recharge a battery capable of driving a commercial logger. • Ensure system can operate continuously without battery change. • Investigation into the feasibility of charging larger batteries, such as those used for pressure profiling activities, which use typically a Reedex valve system to regulate pressure. • An independent power generating system also enables new concepts in monitoring.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£13,412)
Potential for achieving expected benefits	To ensure that the benefits are achieved it is essential to carry out a feasibility study that reports on the following three tasks: ***Task 1: Specification*** Finalisation of the operating conditions for the harvester which will define the size constraints and gas flow rates for the harvester. This data will form the basis for the following tasks. Principle items to be defined are: • Size • Flow rates (available within 'add-on' box) • Minimum Target Power output (as a basis for later calculations) In general the larger the size, the larger the output power available. In addition, the flow rate will also have a significant impact on the power output. ***Task 2: Power Calculations and Initial Designs*** Given the size of the device and the specified flow rates, the energy available in the gas flow will be calculated along with the predicted electrical power output of the harvester. Initial designs will be sketched and practical considerations such as fabrication, assembly and reliability assessed. A new target power output can then be evaluated. ***Task 3: Electronics*** Power conditioning circuitry is required to convert the output from the harvester into a form useful for the electronics system. Power conditioning electronics can influence the behaviour of the harvester and are an important consideration for the overall efficiency of the system. The current systems will be evaluated and circuit designs will be defined and evaluated together with energy storage elements (secondary batteries or super capacitors) and a draft specification produced for a stand-alone generator, suitable for charging a power source that the current data loggers can make use of.		
Project Progress	This project was carried out by D4 Technology based at Southampton University. During the last year the research group have carried out a feasibility study into the opportunity behind the use of a novel oscillating electromagnetic generator to generate power from gas flow within regulators, with a view to augmenting or replacing batteries within loggers/pressure controllers. The project estimated the power needed, and then implemented a design study to verify the feasibility of the proposal. Finite Element modelling studies were carried out to allow the basic design principles to be established, together with environmental sensitivity e.g. variation in flow rates, shapes of mechanical housings etc.		

continued

Project Progress continued	The report concludes that: 1. Kinetic energy systems are feasible for generating power to power data loggers and in addition it is possible to generate enough power to power regulating systems, although in this case an assessment of individual situations would be required. 2. An example experimental technology demonstrator should be constructed to confirm the technology operates as expected. A target power output has been specified and the outline design for a generator has been established. D4 Technology has indicated that there is an opportunity to develop this technology to a demonstrator stage. The energy harvesting system is an important first step towards autonomous remote monitoring systems, and once a proven system is available, enables other developments to progress i.e. new concepts in monitoring. We are now discussing the next stages with the service provider, which if progressed will look to be funded through NIA in 2013/14.
Collaborative Partners	None
Service Provider	D4 Technology



Project Title	Energy Innovation Centre Membership		
Description of project	The aim of this project was to become an active member of the Energy Innovation Centre (EIC). The EIC's primary purpose is to actively seek out technologies beyond the boundaries of traditional network operators by facilitating a collaborative platform between GDN's and Small/Medium Enterprises (SME's).		
Expenditure for financial year: **2012/13**	Internal £14,120 External £80,000 **Total £94,120** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£94,120**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: This project will provide new ideas via SMEs that can be developed for the betterment of the Great British networks. These new projects will generate value to the business in terms of network integrity and a platform for ensuring a secure and reliable gas supply to end users.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	The EIC purport to have developed a common approach to actively seeking out technologies and supporting their development and over the years has been successful in delivering solutions in a way that fosters coherence and collaboration across the electricity distribution and transmission industry. The majority of their approach is felt to be transferable to the UK gas industry. Further to facilitating a collaborative platform between ourselves and the other GDN's, the EIC will support the industry in meeting some of its obligations under RIIO-GD1. Ofgem has very clearly identified that they believe SMEs have a valuable role to play in network innovation. To this end they are challenging the industry to expand the existing portfolio of businesses it works with, to include both large suppliers and engage more fully with smaller third parties.		
Type(s) of innovation involved	Incremental/Significant/Radical		

Project Benefits Rating	Project Residual Risk	Overall Project Score
12	-2	14

Expected Benefits of Project	The service offered by the EIC aims to add value to our business in many ways and offers numerous areas of cost avoidance both tangible and intangible.

continued

Expected Benefits of Project continued	The EIC membership is designed to provide the following benefits: • Pre filtered stream of new technologies under development. • Horizon scanning – actively seeking out a broader range of products beyond the traditional boundaries of our network, including international search. • Project Management of invested projects together with company development and support. • Leverage of a broader skill set to identify and support technologies and companies. • Facilitates collaboration across the Industry reducing costs and risk • Service is to be significantly cheaper than each individual company could achieve		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	N/A	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£94,120)
Potential for achieving expected benefits	In order to achieve the anticipated benefits offered by the EIC it is essential that the following occurs: • Increase the number of quality technologies presented per annum. • Technical Project Management for all IFI projects funded. • A conduit for access to third parties and compliance with proposed NIA governance requirements. • Marketing and promotional activity. • Financial management for all invested IFI projects. • Commercial/Business support to all companies receiving industry investment. • Management and adherence to all standardised processes. • Carry out a minimum of 6 Investment Forums and 2 Advisory Boards. • Performance report to Investment Forum and Advisory Board. • Monthly project meetings. • Continual collaboration between all the GDN's.		
Project Progress	Over the last year we have entered into a number of EIC projects that satisfy the criteria set by Ofgem. Moving forward into the new NIA funding mechanism, there will be a total of 5 EIC projects that will transition from IFI and be re-registered under NIA. Each of these projects aims to provide a benefit towards our business in a number of key strategic areas in 2013/14. These projects were passed to the EIC to manage the collaboration between the networks. As yet, there have not been a significant number of new leads with SME's; therefore SGN's membership to the EIC is under review.		
Collaborative Partners	None		
Service Provider	Energy Innovation Centre		

Project Title	SR25 Calculator		
Description of project	The key objective of this project was to create an excel spreadsheet calculator tool to allow the calculations in IGEM/SR/25 Edition 2: Hazardous area classification of natural gas installations to be easily and consistently applied and electronically auditable.		
Expenditure for financial year: **2012/13**	Internal £1,183 External £6,7000 **Total £7,883** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£31,517**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: Good alignment - Accurate and reliable identification of SR25 requirements at operational sites and an output aligned to the requirements if IGEM SR25 ed 2 document.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	GDN's have adopted the requirements of IGEM/SR/SR25 Ed 2 (2010): Hazardous area classification of natural gas installations. This project will develop and implement a calculator that will allow accurate calculations to indicate the current classification of a natural gas installations hazardous area. Remedial work can be undertaken following the use of this calculator to ensure the appropriate level of ventilation is provided for each installation operated by the GDN's. This standard and subsequent calculator enables the user to provide a hazardous area classification for installations that do and do not meet best practise, with regards to design and/or site location. Consequently, requirements are given for: • Ideal and non-ideal venting arrangements • Enclosures that have; more than adequate ventilation, adequate ventilation or less than adequate ventilation, this embraces poor ventilation.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
13	-4	17

Expected Benefits of Project	• Consistent and rapid assessment of hazardous area classification of natural gas installations throughout the UK. • Enable safety of the public, employees and plant to be maintained. • Enable cost savings for the both the assessment of hazardous areas and the cost of implementing the requirements for safety.

continued

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£7,883)
Potential for achieving expected benefits	Firstly it was vital to select a preferred supplier with the knowledge and expertise necessary for the work who will successfully complete the project to our satisfaction. The project was also broken down into a number of tasks in order to achieve the benefits: ***Task 1: Package Specification*** This task will involve reviewing the IGEM/SR/25 Edition 2 documentation and liaising with the IGEM and/or GL Noble Denton to define the details of the updated methodology and the user requirements for the package interface. It is expected that this process will be carried out in parallel with the development work. ***Task 2: Buildings*** Methodology and interface of Buildings module. ***Task 3: Vents*** Methodology and interface of Vents module. ***Task 4: Multi-Venting*** Methodology and interface of Multi-Venting module. The simple 2-vent methodology of the existing tool will be retained but the user interface will change. ***Task 5: Gasholders*** Methodology and interface of Gasholders module. ***Task 6: Outdoors*** Methodology and interface of Outdoors module. ***Task 7: In-house Testing*** All logical pathways through the package will be tested against existing tool (if possible) or manual calculations. ***Task 8: Evaluation by IGEM***		
Project Progress	All deliverables were achieved on time, to the defined cost and the scope as outlined in the scoping document agreed at the start of the project. Each of the GDN's within the UK has had an input and the requirements of IGEM/SR/SR25 Ed 2 (2010): Hazardous area classifications of natural gas installations have been adopted. Following the completion of this project a calculator that will allow accurate calculations to indicate the current classification of natural gas installations hazardous area has now been implemented. In addition, remedial work has also been undertaken following the use of this calculator to ensure the appropriate level of ventilation is provided for each installation operated by the GDN's. • This standard and subsequent calculator enables the user to provide a hazardous area classification for installations that do and do not meet best practice, with regards to design and / or site location. Consequently, requirements are given for: • Ideal and non-ideal venting arrangements • Enclosures that have; more than adequate ventilation, adequate ventilation or less than adequate ventilation, this embraces poor ventilation. The project has successfully met the desired aims and objectives outlined at the start and will become an invaluable tool for us in the future.		
Collaborative Partners	National Grid, Northern Gas Networks and Wales & West Utilities		
Service Provider	GL Noble Denton		

Project Title	Hydrogen Blending Feasibility Study		
Description of project	The basis of this project was to carry out an investigation and feasibility study into the technical, legal and regulatory impediments to adding hydrogen (at various concentrations) to the natural gas distribution network, and the consequential changes in safety risk that would result. It has also attempted to provide a high level overview of the potential sources of hydrogen that might be available for such a 'change of use', and the infrastructure that would be required to achieve it.		
Expenditure for financial year: **2012/13**	Internal £17,313 External £98,089 **Total £115,402**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£115,402**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy The investigation / feasibility study aligns with the Government target to reduce CO2 emissions and provides an alternative low carbon energy source on the road to a low carbon economy.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: The utilisation of the existing gas distribution network to transport hydrogen in place of natural gas would allow the continued use of a valuable UK asset on the road to a low carbon energy economy. It would also provide an alternative low carbon fuel source rather than the further reduction of a finite fossil fuel		
	Supporting improvement in all aspects of the environment The investigation / feasibility study aligns with the Government target to reduce CO2 emissions and provides an alternative low carbon energy source for possible use within UK homes.		
Technological area and / or issue addressed by project	As the demand for lower carbon energy increases, there is a great opportunity for the gas distribution network to support alternative fuel sources. Hydrogen is considered to be a potential candidate to fulfil this role. Hydrogen is the first element in the periodic table and is the lightest and most abundant of all the elements. As it is a highly reactive element it does not occur in its natural form in nature. Instead it occurs in combination with other elements as generally stable compounds such as water, ammonia, methane, etc. It can be liberated from these compounds by a variety of methods, such as electrolysis of water or thermal decomposition of methane. Subsequent combustion of the hydrogen releases all the potential calorific value within the fuel; and the whole cycle of electrolysis to form hydrogen followed by combustion can be over 80% efficient.(i.e. 80% of the energy put into making the hydrogen can be retrieved). This high conversion factor and the absence of any harmful combustion products make it very attractive as an energy vector. Low carbon hydrogen could be produced by electrolysis of water using excess or wasted renewable electricity (i.e. excess renewable electricity from wind farms) and could be stored, blended, injected and transported to end users via the existing LP natural gas network.		

continued

Technological area and / or issue addressed by project continued	The utilisation of the existing gas distribution network to transport hydrogen could incur minimal distribution costs and would reduce the carbon impact of natural gas. Additionally the adjustment of an end users existing gas boiler or replacement with Micro CHP would undoubtedly prove to be technically easier and more acceptable than the Governments envisaged large scale change over to ground/air source heat pumps. The feasibility study will consider the regulatory and practical issues that would arise from the 'change of use' of the existing natural gas distribution network from transportation of natural gas to various blends of hydrogen and natural gas, through to 100% hydrogen. The feasibility study aligns with the Government target to reduce CO2 emissions and will help inform future decisions on use of hydrogen as an alternative low carbon energy source to ensure the continued use of the extensive UK gas distribution network.
Type(s) of innovation involved	Significant

Project Benefits Rating	Project Residual Risk	Overall Project Score
15	1	14

Expected Benefits of Project	The main aims of the study are to: • Provide the relevant information required to make the decision on whether such 'change of use' conversion is a viable option. • Identify examples of networks elsewhere in the world that convey either pure hydrogen or a blend of hydrogen and other fuel gases with a view to learning from their experiences in relation to issues such as: materials problems, any metering and system control problems, leakage rates, or problems with odourisation of the gas. • Clarify any legal and/or regulatory issues that will arise from a change to pure hydrogen or a hydrogen/natural gas blend. • Identify the general safety implications arising from a change to pure hydrogen or a hydrogen/natural gas blend, and the particular implications for rates of leakage, leakage detection, odourisation, and the safety of customer appliances. • Highlight the practical/operational issues that will need to be addressed for such a change.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£115,402)
Potential for achieving expected benefits	Several assumptions were made throughout the study: The large programme of wind farm construction that is currently in progress both onshore and offshore, and the potential for a similarly large nuclear power station construction programme will potentially result in periods when there is surplus 'green' electricity generating capacity available (e.g. windy nights at any time of the year and windy days during mid-summer). Therefore, this study must assume that this surplus electricity will be used to generate hydrogen, which will be available to replace some or all of the natural gas currently distributed through the UK's gas distribution networks. In addition, the study does not consider the economics of hydrogen production, but instead will concentrate on the issues that are of concern to a gas network operator, and in particular to LP gas networks. It assumed that there is no large scale replacement of customer's gas appliances specifically to facilitate the addition of hydrogen. The study must also provide a high level overview of the hydrogen generation and storage infrastructure that would be required to facilitate replacement of some or all of the natural gas currently used.		

continued

Project Progress	The study concentrated on the technical, legal and regulatory impediments to adding hydrogen (at various concentrations) to the natural gas distribution network, and the consequential changes in safety risk that would result. It has also attempted to provide a high level overview of the potential sources of hydrogen that might be available for such a 'change of use', and the infrastructure that would be required to achieve it. The key findings of the study for us were: • The safe conveyance by pipeline of pure hydrogen and other natural gas 'blends' containing a high hydrogen content, by the worlds chemical industries, the former European Towns Gas industry (up until the 1970s), and the current gas industries in a number of Asian jurisdictions strongly suggests there are no fundamental reasons why either pure hydrogen or a hydrogen / natural gas blend should not be distributed by pipeline and safely used within the UK. • However, subsidiary to this overarching statement there were a number of findings with respect to gas conveyance and gas utilisation that needed to be recognised.
Collaborative Partners	None
Service Provider	AMEC and GASTEC at CRE

Project Title	Gas Escapes		
Description of project	This project was to carry out a research study to investigate a way in which to stop and/or reduce leaking gases by the manipulation of the physical properties of the gas or its immediate surroundings.		
Expenditure for financial year: **2012/13**	Internal £2,703 External £15,314 **Total £18,017**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£18,017**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: Minimising leakage or emissions from the natural gas network.		
	Supporting improvement in all aspects of the environment Minimising leakage or emissions from the natural gas network.		
Technological area and / or issue addressed by project	The physics of gases is well known. To alter the behaviour of a gas under normal conditions requires energy and often other catalysts or other physical constraints such as pressue. In order to stop or reduce leaking gases by manipulating the physical properties of the gas or its immediate surroundings, we must explore special conditions which fall within a typical operational environment.		
Type(s) of innovation involved	Significant		

Project Benefits Rating	Project Residual Risk	Overall Project Score
11	-1	12

Expected Benefits of Project	• Determine the likelihood of being able to minimise leakage or emissions from the natural gas network. • Assess the ability to manipulate the physical properties of natural gas. • Provide a comprehensive review that we can evaluate and potentially apply in the future.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£18,017)

continued

Potential for achieving expected benefits	Following completion of a comprehensive report by Staffordshire University that presents the project findings, conclusions and further recommendations.
Project Progress	Staffordshire University were approached to undertake a desk based review, with the outputs being the likelihood of there being theoretical research which may be applied or adapted to the issues of limiting gas escapes. This review was completed and we have not decided to progress this project further.
Collaborative Partners	None
Service Provider	Staffordshire University

Project Title	Computer Controlled Gascoseeker for Training		
Description of project	This project was aimed at improving the efficiency and effectiveness of training and assessment in detecting a gas leak by utilising new and improved equipment in a simulated real-life environment.		
Expenditure for financial year: **2012/13**	Internal £2,080 External £11,782 **Total £13,862**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£13,862**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: The new equipment will be used to train and assess the competence of operatives who attend gas escapes on the network. This contributes towards a robust process for training operatives to perform in a real life environment and helps to improve our response towards ensuring a safe and secure gas supply.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	Following implementation of the revised gas escape procedures there is a significantly increased requirement for operatives (and others with specified roles attending escapes and rechecks) to be assessed in the application of these procedures. These assessments are being included in the Competence Assurance System (CAS) scheme as a regular, routine requirement for the demonstration of competence. The new equipment will improve the realism of the assessment scenarios, thereby improving the quality of the assessment process. Success will be measured on the procurement and usage of the equipment to deliver better quality Safety Street scenario training and assessment. We will be able to compare the feedback given by operatives on the revised training and assessment offered compared with the traditional training techniques.		
Type(s) of innovation involved	Incremental		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
17	-11	28

Expected Benefits of Project	The expected benefits of the project were as follows: • The new equipment will improve the realism of the assessment scenarios when using a gascoseeker. • Improve the quality of the assessment process for operatives. • Increase in process efficiency for training and assessment. • Continual development of existing workforce. • Supports the local management in the CAS. • Enhance our ability to ensure that the workforce can competently apply procedures when attending gas escapes.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£13,862)
Potential for achieving expected benefits	In order to achieve the anticipated benefits we must look to purchase a number of units for Scotland and Southern training teams. Following the purchase of these kits it is vital that a number of training the trainer sessions are carried out. Once trainers are familiar with equipment, we can begin roll out competence based assessments for operatives.		
Project Progress	6 gascoseeker units and tablets have been purchased, 4 for the Southern network and 2 for the Scotland network. This new equipment is being implemented across our business following the revision of the gas escapes procedures i.e. EM72 Work Procedure for Dealing with Gas Escapes and Other Emergencies. The units are now being used on a regular basis when delivering assessments of candidates on the Safety Street scenarios. The unit enables candidates to experience real-life readings on their gascoseeker (rather than being told readings by the assessor) which they then have to interpret to apply correct practices in accordance with procedures. This hopes to result in a much more realistic assessments being undertaken. In addition, these assessments are now being included in the CAS scheme as a regular, routine requirement for the demonstration of competence and feedback is also being gathered from operatives.		
Collaborative Partners	None		

Project Title	Innovations Workshop Number 2		
Description of project	The aim of this project was to generate ideas and strategies for innovation through workshops and to collate the outputs for prioritisation and implementation. Jacobs, one of the world's largest and most diverse providers of technical, professional services has facilitated two innovation workshops, one in the Scotland network area and one in Southern network area.		
Expenditure for financial year: **2012/13**	Internal £3,513 External £19,902 **Total £23,415**	**Expenditure in previous financial years**	Internal £2,121 External £13,192 **Total £15,313**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£38,728**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: The workshops will aid in collating vital information and prioritising the need for improvement in all aspects of our business. This will contribute to having a clear vision of the technologies that are most beneficial to pursue, and to prioritisation of these technologies		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	We wish to gain maximum value from innovation in the future. During the current price control period effort is directed through the use of the IFI mechanism. In the next price control period, RIIO-GD1, potential innovation items will need to be at a suitable stage to deliver significant value to the business/customers from the start of the period. To achieve these objectives, our business wish to begin the process of identifying and implementing the various improvement programmes it deems relevant to its business now and into the future.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
6	-2	8

Expected Benefits of Project	It is envisaged that the following benefits will be received: • Provides a good basis for evaluation of results to where they may have company wide benefits or regional. • Recommendations of what initiatives to pursue with appropriate implementation plan, schedule, and high-level identification of either quantitative or qualitative benefits

continued

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£38,728)
Potential for achieving expected benefits	In order to achieve the anticipated benefits, it is suggested that two separate workshops, one in the South and one in Scotland will take place to ensure all business areas are evaluated effectively. It is also suggested that a large mix of staff from a variety of levels participate in each of the workshops in order to generate sufficient levels of discussion and expose areas of concern. It is proposed that 10-12 participants are present in each workshop.		
Project Progress	Jacobs facilitated two workshops involving a total of 25 employees. The workshops were facilitated with the aim of seeking recommendations from participants to existing ideas and technology. It also provided an opportunity for employees to introduce any new ideas and discuss aspects of the business that require further innovation exploration ahead of the new price control formula period. The two workshops were conducted over two days and were in accordance with the following format: • Presentation to the group of all the innovative technologies, systems and processes that have already been presented by Jacobs in previous reports. • Presentation of additional technologies that Jacobs is aware of as practices used elsewhere. • Facilitated group session to gather input into other areas that require innovation and potential solutions to be considered. • Breakout sessions to discuss and rate the various innovations and innovation needs, split as Technologies and Process/Systems. • Presentation by each group leader of the items discussed, potential ranking, assessment of need, potential benefits and potential barriers. As noted above, innovations discussed were grouped into: a) Processes and Systems b) Technologies. In the Technologies stream, in addition to reviewing specific innovations, additional topic areas that have perceived innovation needs were also identified. A broad assessment of potential for the outputs was also compiled, based on a group assessment of benefits and areas of impact/ applicability.		
Collaborative Partners	None		

Project Title	Biomethane Blending and / or Co-mingling at Virtual Pipeline Connection Facilities		
Description of project	To carry out a Feasibility Study into a proposed biomethane injection facility in the South of England network within viable transportable range from the remote biogas production facilities.		
Expenditure for financial year: **2012/13**	Internal £9,751 External £55,244 **Total £64,995** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£64,995**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Biomethane to grid efficiency is at least 50% more favourable than electricity only applications, this will support the UK government to meet and exceed its 2020 carbon emission targets.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving Utilise the network and network assets to obviate the need to supplement Biomethane injection with fossil fuel additives (propane)		
	Ensuring a secure and reliable gas and electricity supply: By displacing fossil fuel imported 'natural gas' within our gas distribution, biomethane derived from organic waste streams within the UK provides an alternative secure and reliable gas supply. By continuously looking at areas to improve the equipment used for biomethane entry to the Grid, we are looking at ways to bring more biogas production facilities to market and directly onto the gas grid providing the end user with greater security and reliability in UK gas supply.		
	Supporting improvement in all aspects of the environment This project will enhance the use of sustainable alternatives to natural gas, thereby contributing to the low carbon environment and reducing UK carbon emissions.		
Technological area and / or issue addressed by project	Crouchlands Farm is a 25,000 tonnes per annum AD plant near Billingshurst, West Sussex taking in secure feedstocks such as cattle manure, maize and grass silage, and is currently exporting 1MW of electricity to the grid. Due to the favourable outcome of the RHI for biomethane injection (currently 6.8p per kWh), there is a proposal to increase the capacity of the plant and produce 1,000m3h of GS(M)R compliant biomethane by the end of 2012. Further additional feedstock to supplement this increase in capacity will be provided by a 10 year food waste contract from the London area. As there are no viable connection facilities for the plant, the developer's proposal is to establish an on-site biogas clean-up facility to produce GSMR compliant Biomethane and then compress the product to 250bar for transportation by a Virtual Gas Pipeline to a viable Injection Point within the South of England. Subject to the success of this investment the developer is proposing to invest in a further four facilities of this type in the South of England and therefore this feasibility study will inform network for future network connections of this type.		
Type(s) of innovation involved	Incremental		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
20	-8	28

Expected Benefits of Project	• Develop a technical design and specification for injection facilities to support virtual pipeline transmission. • Develop criteria and specifications for biomethane blending and/or co-mingling with natural gas. • Establish appropriate risk assessments and network validation requirements for biomethane blending and/or co-mingling. • Establish criteria to enable site selection for blending and/or co-mingling in association with virtual pipelines.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£64,995)
Potential for achieving expected benefits	The expected benefits of this project will be achieved if the feasibility study is completed and provides comprehensive conclusions and recommendations.		
Project Progress	The feasibility study was completed in July 2012. This study has advised us on the following: • Viability of virtual pipeline facilities and the interface with the network assets for biomethane injection, • Preferences for blending or co-mingling, including potential dilution ratios, and the impact on the existing network infrastructure. • Identifies a viable injection point with suitable space requirements to support the pressure let down and associated virtual pipeline plant and equipment • Undertakes a risk assessment for this type of network entry connection • Determines the scope ,specifications and operating parameters for co-mingling and/or blending biomethane with natural gas at grid connection • Provides advice on the capacity of the proposed biomethane injection point and associated land / legal matters. • Cost and timescales, along with guidance on the IFI eligibility prior to proceeding to construction.		
Collaborative Partners	None		
Service Provider	Gas Fuelling Technology / Capita Symonds		

Project Title	Improvements to the MRPS (Stage 5)		
Description of project	The objective of the project is to improve the way we manage risk in relation to distribution mains.		
Expenditure for financial year: **2012/13**	Internal £2,758 External £15,625 **Total £18,383**	**Expenditure in previous financial years**	Internal £26,844 External £157,029 **Total £183,873**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£751,078**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: This project will investigate enhancements to our current iron mains risk management methodology. This will include the consideration of age as a factor with the CI model, and the inclusion of corrosion information in the spun cast (SI) model to take account of fissure corrosion. The project will also examine the impact of any changes in terms of risk profile and the potential to increase the rate of reduction of risk and leakage from current levels. The outputs of the project will contribute towards reliability of the network.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	The GDN's are all subject to a mains replacement policy which dictates that all ferrous distribution gas mains within 30m of a property are replaced by 2032. The overall cost of this programme is in excess of £10 billion. The current means of prioritising mains to deliver this programme is to use MRPS which estimates the risk of incident associated with each mains unit. The methodology used within MRPS was developed by GL Noble Denton and the weightings have been updated regularly. However, the basic methodology has not changed for several years. This project will investigate enhancements to the methodology including the consideration of age as a factor with the CI model, and the inclusion of corrosion information in the spun cast model to take account of fissure corrosion. The project will also examine the impact of any changes in terms of risk profile and the potential to increase the rate of reduction of risk and leakage from current levels. The cost of the work proposed has been calculated over a five year period.		
Type(s) of innovation involved	Incremental		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
20	-4	24

Expected Benefits of Project	This project will provide a trend analysis segment of work that aims to examine trends in fractures, corrosions, gas in building occurrences and incidents to determine if the system is exhibiting any obvious signs of deterioration. The examination of the results of the trend analysis will create a decision point for determining if a coefficient update is required. In previous stages the trend analysis has looked at high level trends on a year by year basis. However, the learning from issues experienced following stage 4 has indicated that an enhanced version of the trend analysis in stage 5 would provide additional benefits. Furthermore, stage 5 will look to break down the analysis by pipe material, tier, and look at trends on a monthly (as opposed to yearly) basis. The following will be included: • Data validation and preparation; • Data Analysis; • Draft report on the findings and; • Incorporation of feedback and production of the final report.		
Expected Timescale to adoption	4 Years	**Duration of benefit once achieved**	10 Years
Probability of Success	50%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£600,528)
Potential for achieving expected benefits	• MRPS has been endorsed by HSE as a method to allow for prioritisation of mains replacement that effectively reduces the risk of incident. However MRPS must be continuously developed using the most recently available data to ensure that the models reflect recent leakage activity. This project enables us to demonstrate compliance with safety legislation in this respect. • Stage 5 of this project has successfully provided an updated trend analysis, both in terms of overall trends and in significantly more detail by month, leak type and GDN. This has provided us with a wealth of information relating to our own data and has highlighted clearly where changes in data collection or definition have impacted upon our own figures and the scale of the changes. • The results of carrying out the impact analysis on an alternative methodology for assessing services has indicted that a significant number of services will be affected by the alternative approach and hence the priority for replacement is likely to change. This should improve the correct identification of ferrous services for replacement. • The GDN's remain committed to the ongoing development and improvements to the MRPS model.		
Project Progress	The more detailed analysis carried out this year identified some anomalies in the trends in failures, which were attributed to specific GDN's over particular time periods. The impact analysis of applying an alternative methodology for calculating the risk from services has shown that the risk from the first 30m of a long service is diluted by the current methodology and would be captured more accurately by the alternative methodology. The results of applying this known change to the real population of services has indicted that a significant number of services will be affected by the alternative approach and hence the priority for replacement is likely to change. This should improve the correct identification of ferrous services for replacement.		
Collaborative Partners	National Grid, Northern Gas Networks, Wales & West Utilities		
Service Provider	GL Noble Denton and Jacobs		

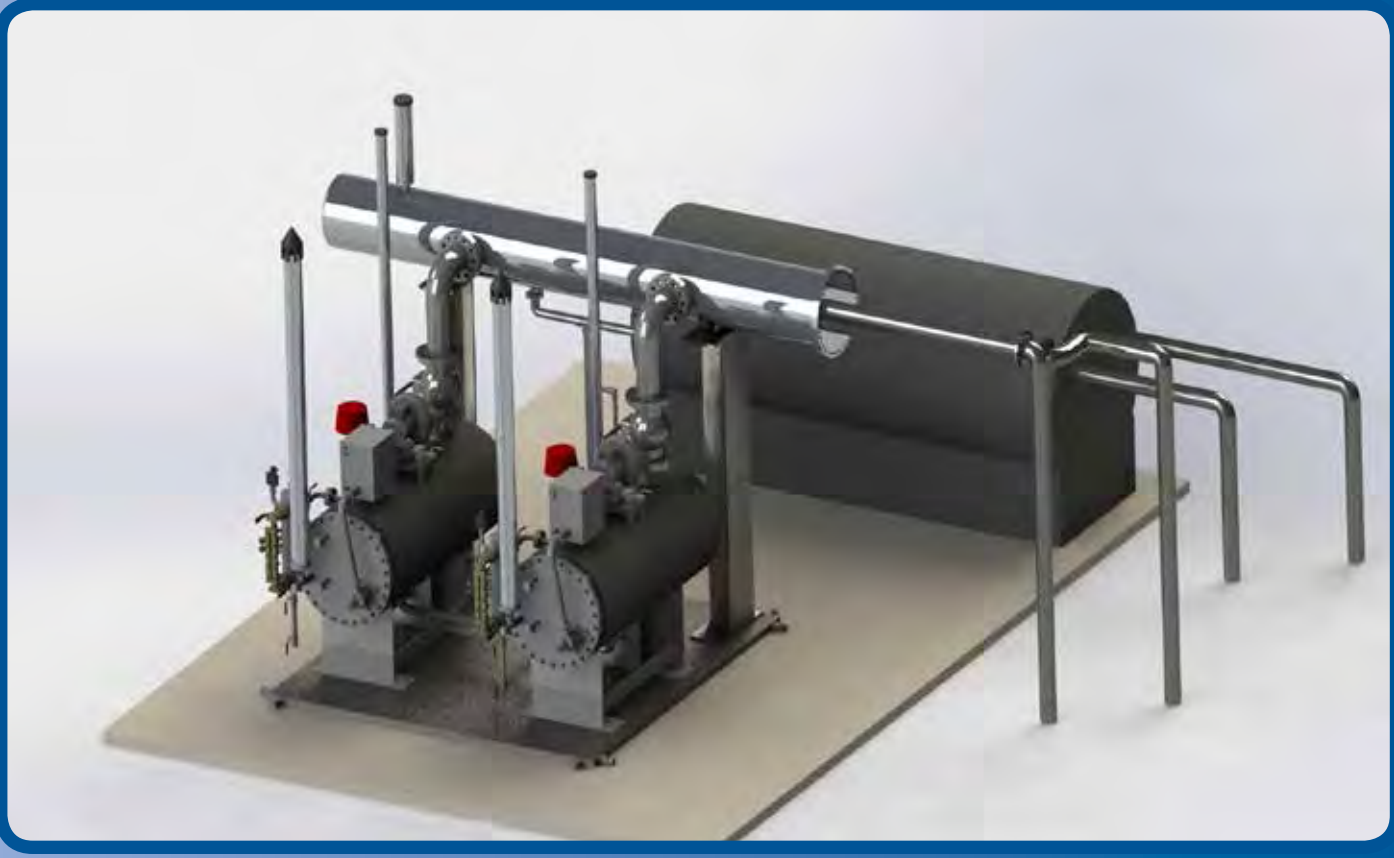
Project Title	Immersion Tube Preheating Modifications / Field Trials		
Description of project	This project is to support the technical development of a new concept in gas pre-heating at pressure reduction sites called Immersion Tube Pre-heating and to carry out field trials to assess its viability.		
Expenditure for financial year: **2012/13**	Internal £27,322 External £154,800 **Total £182,122** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£882,214**	**Projected 2013/14 costs for SGN**	Internal £174,892 External £525,200 **Total £700,092**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy This system will produce less carbon emissions than traditional pre-heating systems.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving This system will consume less energy than traditional pre-heating systems.		
	Ensuring a secure and reliable gas and electricity supply: N/A		
	Supporting improvement in all aspects of the environment The combination of reduced carbon emissions and reduced energy consumption will make the new system more environmentally friendly than traditional pre-heating systems.		
Technological area and / or issue addressed by project	Natural gas needs to be pre-heated at pressure reduction stations to overcome the Joules-Thomson Effect which occurs as gas expands and which would otherwise lead to ice formation on the downstream system. Conventional methods for achieving this include using water bath heaters (WBH) or modular boiler heating systems (MBH), both of which are inefficient and often unreliable.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
21	1	20

Expected Benefits of Project	• Improvement in efficiency compared to WBH (50%) • Improvement in efficiency compared to MBH (15%) • Reduction in installation cost compared to MBH (30%) • Reductions in failures/unplanned maintenance (75%) • Elimination of third party maintenance (100%)		
Expected Timescale to adoption	1 Years	**Duration of benefit once achieved**	5 Years
Probability of Success	80%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£116,663

continued

Potential for achieving expected benefits	Similar immersion tube preheating units have been installed in the USA with proven success. These new systems propose using a heat driven loop and thermosyphon technology with no moving parts or pumps. The system will operate in a vacuum meaning that boiling point will be achieved at around 40oC instead of 100oC. Furthermore an innovative burner design will be utilised to further enhance efficiencies. It is our intention to carry out field trials of this system and yield comparable positive results to those proven within the USA.
Project Progress	The focus throughout 2012/13 was to design and build two preheat units that will be used for the field trials. We have been working in close partnership with mechanical and electrical design consultants, who are working on behalf of Proheat Systems Limited to ensure that the proposed design complies with all relevant specifications and is suitable for on-site installation. Throughout the last year monthly meetings have taken place between ourselves and Proheat Systems to discuss the iterative process in which the design has been revised and tweaked many times in order to find the optimum solution. The design of the units is almost complete, subject to a final mechanical and electrical design appraisal. The fabrication of the two units has started, specifically for the evaporators and condensers. The fabrication will be completed upon receipt of the approved final designs. This project continues and will transition from IFI to NIA in 2013/14.
Collaborative Partners	None
Service Provider	Proheat Systems Limited



Project Title	Domestic Heating Project		
Description of project	The objective of this project was to provide a bottom up study on the optimal appliance technology pathways, by property type, based on known and emerging heating technology, required to meet carbon and renewable targets, highlighting the impact on consumers and the impact on the gas and electricity distribution networks out to 2050.		
Expenditure for financial year: **2012/13**	Internal £2,942 External £16,670 **Total £19,612** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£19,612**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Good Alignment. Research to better understand future the uptake of various residential appliances that may develop in a low carbon economy.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: N/A		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	Residential heating accounts for around half of UK carbon emissions, and over half of household energy bills. However the sector is often overlooked, by industry and government, in favour of electricity generation when considering carbon emissions and energy bills. On one hand the residential heating market is relatively straightforward with gas dominating – over 80% of households using gas as their main heating fuel, and virtually all replacement systems or new-build houses now install condensing boilers, a relatively low cost and reliable product. There are few easy options to reduce carbon emissions from this sector. The options can be grouped into: • Reducing heat demand by better insulating homes. • More efficient / lower carbon heating systems. The potential for more efficient / lower carbon heating systems is, generally, poorly understood by much of the energy industry and the government. Recent policy making and interest over the RHI reflects this, as does the recent tempering of government enthusiasm to electrify heat as a solution to decarbonising heat. There are strongly differing opinions on micro-CHP amongst policy makers and influencers, and little knowledge about the potential for gas heat pumps in the UK. The Energy Network Association (ENA) Gas Futures Group has a strong opportunity to influence and shape the debate over residential heat, with this research will provide robust, evidence-based analysis on the options to decarbonise heat and the future role of gas in meeting UK residential heat demand.		
Type(s) of innovation involved	Incremental		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
8	-5	13

Expected Benefits of Project	• Transfer of key information from modelling related to the longevity of network assets, which can be utilised to identify business requirements i.e. asset depreciation, regulatory submissions and reputation. • Identifies the market segments for gas into the future and specifies the market intervention risks so business impacts can be assessed and strategies formulated. • Will assist when entering into dialogue with the Department of Energy and Climate Change (DECC) regarding long term views concerning the delivery of heat in a low carbon economy. • Reputational benefits for all participants as the output will input inform the DECC Heat Strategy. • Good leverage benefits for all funding participants.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£19,612)
Potential for achieving expected benefits	In order to achieve the expected benefits the service provider will provide a bottom up study on the optimal appliance choices based on known and emerging heating technology, highlighting the impact on the consumer (cost to change and behavioural) and the impact of that on energy demand and gas and electric distribution networks taking into account the various types of property. The likelihood that this project will deliver the anticipated benefits is high, largely due to the fact that each of the GDN's will work in close collaboration with each other and offer the service provider whatever they require in order to complete this project to the expected high standard.		
Project Progress	The project was agreed via the ENA Futures Group. The Research and Development (R&D) Sub-Group were notified late of the intention to commission the work and it was identified that more work is required to ensure that any intention to agree collaborative projects via ENA working groups is channelled via the R&D Sub-group so that it can be commissioned correctly and to standards agreed between GDN's. Nevertheless a published report has been written that provides a series of scenarios outlining the implications upon customers and upstream energy providers of the potential technology options that could lead to the UK achieving its 2050 renewable targets. The report was produced in line with the expected timescales and was shared with the wider industry as part of the ongoing UK energy debate. The report can be accessed via the ENA website. In order to review the options within the report a model was produced to analyse the scenarios. This was warmly received by the wider energy industry and the funding participants will be able to use the model going forward as a tool in deciding what technologies to pursue in meeting their own renewable targets. Overall this project was a success and was delivered on time and to the costs identified at the start of the project under IFI.		
Collaborative Partners	National Grid, Northern Gas Networks, Wales & West Utilities		
Service Provider	Delta		

continued

Project Title	Wireless Water Detection and Level Sensor		
Description of project	The basis of this project was to fund a Feasibility Study that assesses the development and application of a wireless water detection and location sensor that can identify the exact location and/or narrow the location where water is entering the gas network.		
Expenditure for financial year: **2012/13**	Internal £6,442 External £36,500 **Total £42,942** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£42,942**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: By constantly monitoring the status of the humidity levels, water ingress and gas pressure remotely to ensure adequate gas supplies are maintained within the network.		
	Supporting improvement in all aspects of the environment Minimise the unnecessary travel of operatives to check for water ingress within the network, therefore reducing carbon emissions from vehicles.		
Technological area and / or issue addressed by project	When water leaks into a gas main, it accumulates at the nadir until it reaches the point where the pipe begins to ascend. Over time the volume of water contained within the pipe will begin to rise and eventually the water will extend along the pipe, mixing with the gas and disrupting the supply of gas, or the quality of gas supplied to our customers. There are a number of simple techniques that exist to find these build up points, but to date, the gas industry has no method for identifying the precise location of the water ingress.		
Type(s) of innovation involved	Significant		

Project Benefits Rating	Project Residual Risk	Overall Project Score
22	-5	27

Expected Benefits of Project	• Accurate detection of water in gas mains through the use of electronic sensors and wireless communications. • Detector will be low maintenance and have low running costs because it has a long battery life. • Avoids unnecessary travel to site. • Quickly identifies potential water ingress areas. • Proactive approach to water ingress.

continued

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£42,942)
Potential for achieving expected benefits	D4 Technology will provide us with a complete report providing conclusions and recommendations for potential future stages in the development of this project.		
Project Progress	Through close communication and monthly meetings with the research group this project has delivered a proof of concept study of a wireless sensor system that detects the presence and level of water at the location of the installation. Throughout this project there were no changes to the project deliverables set out at the start and project timescales were achieved. In conclusion, a number of recommendations to improve the design and functionality of the equipment have been suggested. We intend to progress this project further to develop a ruggedized solution under the NIA.		
Collaborative Partners	None		
Service Provider	D4 Technology		

Project Title	Vertical Insertion Head		
Description of project	This project supports the technical development of a new innovative insertion tube for use with 4" BSP metallic gas mains, gaining access through a 1" and 1 ¼" BSP diameter tapping. This project directly relates to the 29mm mains inspection camera project (discussed later) as the development of the insertion tube will allow the new cameras to be effectively deployed into the metallic gas mains to carry out inspection surveys.		
Expenditure for financial year: **2012/13**	Internal £2,312 External £13,100 **Total £15,412**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£15,412**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: Reduces time that customers are without gas.		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: Reduction in the risk of over drilling 4" BSP metallic gas mains. Supports the method of Closed Circuit Television (CCTV) inspection of pipelines, ensuring there are no surprises during insertion works and therefore minimises unplanned interruption.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	There have been a number of issues within construction work on the UK gas distribution networks where over drilling of a 4" BSP metallic mains with 2" BSP holes as well as not using clips. This significantly increases the likelihood of premature metallic pipe fracture due to secondary loading.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
21	-7	28

Expected Benefits of Project	• Clarify D7 Working procedure for the use of CCTV inside live gas mains, and confirm the use the LC8-4 approved stainless steel wrap around clamps for over drilling 4" mains 1 ½" BSP and use the 35mm diameter camera as standard. • Restrict the drilling to 1" BSP tapping inside a 4" main. • Increase the diameter that is allowed to be drilled inside a 4" BSP metallic main from 1" to a 1 ¼" BSP diameter tapping. • Reduction in excavated material. • Develop a vertical insertion tube with articulation to an angled insertion to allow access for the larger diameter camera into a 1" BSP tapping.

continued

Expected Timescale to adoption	2 Years	**Duration of benefit once achieved**	8 Years
Probability of Success	50%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£351,505
Potential for achieving expected benefits	This project is designed to meet the following criteria: • Develop an appropriate specification for the new insertion system. • Design a new innovative technology to maximize the available access from within all 1" BSP and 1 ¼" BSP tapping inside 4" metallic pipes. • Develop a new pressure rated insertion system for articulation. • Carry out performance testing to demonstrate and prove acceptability. • Undertake on-site field testing and approval supported by a data folder of evidence of compliance with all relevant Gas Standards and Specifications. This project is a separate project from the Synthotech 29mm Mains Insertion Camera project, as each has its own specific benefits.		
Project Progress	Throughout the last year Synthotech have developed a new insertion tube to maximize the available access from within all 1" BSP and 1 ¼" BSP tapping inside 4" metallic pipes. Following completion of a feasibility study and acceptance testing of the equipment we have conducted a number of field trials across our Southern network. These trials comprised of using the new vertical insertion equipment for the following purposes in a 4" main: 1. Determine the quality of lighting available from the 3 new camera designs. 2. Determine the quality of vision available from the 3 new camera designs. 3. Ensure each design can be inserted through the new launch head. 4. Ensure the new vertical/angled launch head operates correctly under 'live gas' conditions. 5. Determine the maximum push distance. A total of 22 surveys were undertaken on 4" and 8" mains It was identified that the launch head enabled a camera to be inserted vertically and then angled back. This enabled the largest payload to be delivered through a 1 ¼" hole. The angle then enabled a greater push distance to be achieved. It is recommended that the system needs to be tested on a 6" main to determine its suitability for use and push distance available. In summary, the maximum push distance that was achieved was 96m with a 9mm rod in 4" main and the 30mm camera provided good vision inside the main. Using a 9mm rod in an 8" main we have managed to push a distance of 55m. Therefore, proving that a longer push was possible in a 4" main without damage to the cobra during the process. However, some improvements are required to the cameras to enable a full comparison to be drawn on the best solution. Throughout these trials we have built up sufficient knowledge of the equipment and has led to a documented traffic light criterion being produced that indicates the project status i.e. objective is met, where further work is required and also where work needs to be undertaken. Following the success of this project, we have purchased 50 camera units. Synthotech have also provided us with further recommendations when using the equipment on 4", 6" and 8" mains in the future.		
Collaborative Partners	None		
Service Provider	Synthotech Limited		

Project Title	Self Amalgamating Tape		
Description of project	This project has provided us with a technical assessment of self amalgamating tape as a potential repair technique for leaks from network risers.		
Expenditure for financial year: **2012/13**	Internal £5,154 External £29,200 **Total £34,354**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£34,354**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: The repair method will ensure the continued safety and security of network risers, minimising customer disruption.		
	Supporting improvement in all aspects of the environment The repair method would eliminate a small level of leakage through a more efficient means of repair.		
Technological area and / or issue addressed by project	We permit a number of different repair techniques and products in accordance with SGN/PR/EM/74 Part B, Work Procedure for Locating and Repairing Gas Escapes on the Network Operating at Pressures Not Exceeding 7 bar - Repair Techniques. These repair methods are assessed as either: temporary; interim; or permanent. At present as a temporary repair, denso tape is wrapped around leaking network risers and as an interim repair a heat shrink is applied to network risers. The application of denso is not generally welcomed by residents as is unsightly and difficult to apply. A heat shrink repair is only suitable under certain conditions and often requires sections of masonry to be chipped out to allow installation. Therefore, the application of self amalgamating tape would generally eliminate both issues and could be quickly and effectively applied.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
25	-5	30

Expected Benefits of Project	• Identify the relevant requirements of our own specifications, British, European and Industry Standards. • Identify key gaps in compliance with the specifications and risks assess gaps. • Review of self amalgamating tape products. • Develop and agree a test programme to assess the ability of the self amalgamating tape to repair leaks in network risers and lateral pipework.

continued

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£34,354)
Potential for achieving expected benefits	To achieve the anticipated benefits highlighted, a literature review and a small testing programme will be completed by the service provider. The review will provide conclusions on the suitability of self-amalgamating tape for the repair of leaks from network risers and lateral pipework and, if appropriate, recommendations for any additional work required to establish / confirm long term service life.		
Project Progress	We have been provided with a final technical report. This report offers a number of valuable conclusions, but ultimately indicated that self amalgamating tape could provide an appropriate repair solution for gas leaks on threaded risers and laterals. Following review of this report and the recommendations provided, we are now developing a field trial programme funded through the NIA in 2013/14 for the use of the two part self amalgamating tape repair to: • Demonstrate onsite suitability as a temporary repair technique. • Provide an in service track record which can be used as justification to increase inspection intervals and classify self amalgamating tape as an interim repair. • Demonstrate repair longevity. In addition, future work will involve accelerated aging tests to define the repair design life as an interim or permanent repair and also develop a standard to qualify self amalgamating tape repairs to be suitable for use as a permanent repair and also perform qualification tests.		
Collaborative Partners	None		
Service Provider	MACAWS Engineering Limited		

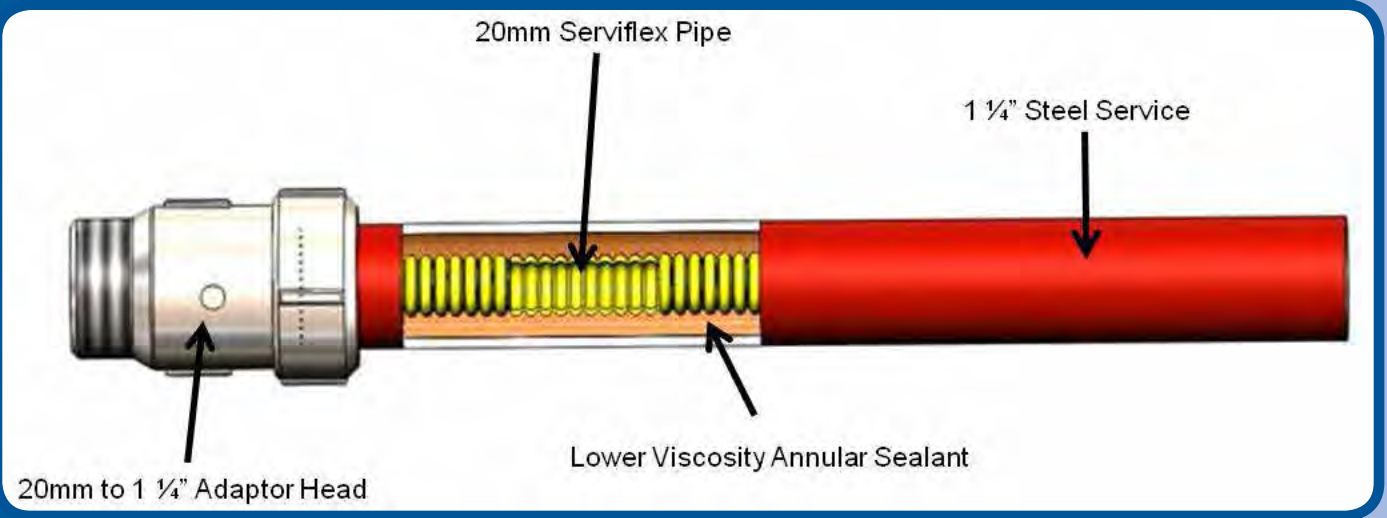
Project Title	20mm Serviflex Pipe in 1 ¼" Metallic Service		
Description of project	The purpose of this project was to support the technical development of new tooling, fittings and sealant, develop an installation methodology and carry out field trials to assess the viability of installing 20mm serviflex pipe in 1 ¼ " steel.		
Expenditure for financial year: **2012/13**	Internal £12,254 External £69,425 **Total £81,679**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£81,679**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Reduction in the number of excavations required, therefore reducing impact on the environment. In addition this process will reduce the amount of materials required to relay a service and also emissions generated from the equipment used.		
	Eradicating fuel poverty and protecting vulnerable customers: Reduces the time vulnerable customers are without gas.		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: Reduce the length of time for interruption required and thus improve the productivity and efficiency.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	Throughout the UK the general population of metallic service are 1" or 1 ¼"Steel. While a solution for replacement by insertion of serviflex back to the original meter position exists for 1", the available method, tooling, fittings and annular sealants do not extend to 1 ¼"ST. As a result, the costly process of supplying an external meter box and rerunning the service back to the original meter position by open cut techniques is required. This project offers a new innovative solution that is more cost effective and efficient to the method currently being adopted through design of new tooling, a lower viscosity annular sealant and reduced pressure injection system.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
24	-8	32

Expected Benefits of Project	This project was designed: • To develop appropriate fittings and installation methodology. • To develop a sealant. • To decrease the number of service renewals requiring the meter to be repositioned with the associated costs. • To reduce excavation and reinstatement requirements within private ground and therefore costs associated with service renewals. • To minimise customer disruption.

continued

Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	8 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£18,395,795
Potential for achieving expected benefits	In order to achieve the expected benefits of this project a number of simulations need to firstly be completed to test the pipe to its limits, to compare the 'crush' point from an injection perspective and to analyze the effect that insertion and sealant injection within a 1 ¼" metallic service has. All testing will be undertaken and reviewed against the relevant specifications. Following these tests it is vital that we confirm that the installation methodology is acceptable for the insertion of 20mm Serviflex pipe into a 1 ¼" BSP metallic service pipe over an insertion distance of 16.5meters with up to two 90 degree short radius elbows with a 1 to 1.5meter riser. Furthermore, it is essential to compare all available sealants. After successfully trialing the product and process it is anticipated that a series of field trials will need to be carried out to ensure that the product can be installed by the end users in operational conditions, ensuring that all variables have been reviewed. It is anticipated that two installation kits will be required by the installers to carry out all of the testing requirements. It is anticipated that a 20 days of service installation review would be acceptable for us to gain confidence in and accept the methodology of installing 20mm Serviflex into 1 ¼" metallic service.		
Project Progress	Initial field trials were carried out in early 2013, which led to the approval of SGN/PM/G/23 Management Procedure For The Approval Of Products, Equipment And Techniques Applied To The Gas Supply Network. Trials were successfully completed in Scotland using two different annular sealants. There were no major comparative differences with these sealants therefore; decisions are to be based on the cost benefit. Final reports are currently being drafted for submission for approval by Engineering Policy prior to full implementation.		
Collaborative Partners	None		
Service Provider	Synthotech Limited		



Project Title	29mm Mains Inspection Camera		
Description of project	The purpose of this project was to support the technical development of a new camera solution for a 1 ¼" BSP diameter tapping. This project has been developed in parallel with the vertical insertion head project (introduced previously). These two projects are linked together in order to allow the new camera solutions to be deployed into the metallic gas mains to carry out inspection surveys.		
Expenditure for financial year: **2012/13**	Internal £5,101 External £28,900 **Total £34,001** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£34,001**	**Projected 2013/14 costs for SGN**	Internal £0 External £0 **Total £0**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Equipment is 90% recyclable, with the weight and energy consumption required significantly reducing.		
	Eradicating fuel poverty and protecting vulnerable customers: Reduces time that customers are without gas.		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: CCTV inspection of pipelines ensures no surprises during insertion works and therefore minimises unplanned interruption.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	There have been a number of issues with construction work on across the UK networks where over drilling of a 4" BSP metallic mains with 2" BSP holes as well as not using clips. This significantly increases the likelihood of premature metallic pipe fracture due to secondary loading.		
Type(s) of innovation involved	Incremental		

Project Benefits Rating	Project Residual Risk	Overall Project Score
21	-6	27

Expected Benefits of Project	• Clarify D7 Working procedure for the use of CCTV inside live gas mains, and confirm the use the LC8-4 approved stainless steel wrap around clamps for over drilling 4" mains 1 ½" BSP and use the 35mm diameter camera as standard. • Develop a camera for angled insertion into a 1 ¼" BSP tapping. • Improves the vision and focus of the camera system.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	8 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£335,702

continued

Potential for achieving expected benefits	If the project is to achieve the anticipated benefits it must meet the following criteria: 1. Develop an appropriate specification for the new camera. 2. Develop an appropriate working Practice for use on our distribution network, based on work procedure SGN/PR/D/7. 3. Design a new innovative technology to maximize the available vision within all 4" metallic pipes. 4. Develop a new camera to deliver the maximum vision in a 4" BSP metallic pipe accessed through a 1 ¼" BSP metallic pipe. 5. Carry out performance testing to demonstrate and prove acceptability 6. Undertake on-site field testing and approval supported by a data folder of evidence of compliance with all relevant Gas Standards and Specifications.
Project Progress	Throughout the last year we have worked with Synthotech in the technical development of a new camera solution for a 1 ¼" BSP diameter tapping. Upon completion of a feasibility study and acceptance testing of the equipment we conducted a number of field trials across our Southern network on 4" and 8" mains. These trials proved to be very successful and provided us with valuable information with regards to the quality of lighting available from the new camera designs and how effectively these cameras could be deployed through the new vertical insertion head that was also being developed. While the 29mm camera was successfully design, the learning from this project was that it could be even smaller and achieve the same benefits. Following completion of the trials, a decision has been made to fully implement this new technology throughout our operational business to allow us to survey small diameter mains more efficiently in the future. As a result, we have purchased a total of 50 camera units that shall be distributed across our regional networks throughout 2013/14.
Collaborative Partners	None
Service Provider	Synthotech Limited

Project Title	Service Pipe Replacement Matrix		
Description of project	The development of a matrix of service pipe diameters and associated fittings cross referenced with existing and new technology replacement techniques from main to meter, a gap analysis and proposed work to address the identified gaps.		
Expenditure for financial year: **2012/13**	Internal £1,147 External £6,500 **Total £7,647**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£7,647**	**Projected 2013/14 costs for SGN**	Internal £45,421 External £136,399 **Total £181,820**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Reduces the number of excavations required to effectively replace services, therefore reducing the amount of virgin backfill material and spoil to landfill.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: It minimises the duration of the disruption to customers gas supply.		
	Supporting improvement in all aspects of the environment Reduces the number of excavations required to effectively replace services, therefore reducing the amount of virgin backfill material and spoil to landfill.		
Technological area and / or issue addressed by project	We are committed to reducing customer disruption and maximising cost effectiveness when undertaking gas service pipe replacement from the distribution main to the consumers emergency control valve. This programme of work is currently undertaken in accordance with the Ofgem 30/30 program and, will continue into the next 8-year RIIO regulatory period. Historically several techniques have been adopted and are used on a day to day basis. However, for certain service pipe configurations these techniques cannot be used. New lay techniques are currently used where the existing footprint cannot be adopted and these are typically linked to the additional cost of new external meter boxes.		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
19	-10	29

Expected Benefits of Project	• Highlight both current and new techniques. • Identify the main inhibitors for insertion replacement back to the main. • Provide a gap analysis review for the development of a matrix of service pipe diameters and associated fittings cross referenced with existing and new technology replacement techniques from main to meter. • Recommendations on part solutions to ensure insertion back to the original meter position. • Produce a compatibility matrix and decision tree to advise the most appropriate techniques to be used. • Reduce the disruption caused in replacing or relining the existing service back to the original meter position using the original service pipe footprint.		
Expected Timescale to adoption	Complete	**Duration of benefit once achieved**	10 Years
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£7,647)
Potential for achieving expected benefits	To achieve the expected benefits a report must be written that aims to identify the possible pipe and fitting combinations as well as the current pipe renovation techniques. These must be quantified against the current engineering procedures, T/PR/SL/1 Work procedure for Service laying up to and including 63mm diameter at pressures up to and including 2bar. In addition, a constant review of the data in relation to possible pipe renovation solutions and a gap analysis between what can be currently done, what is currently done, and what can be done must also be achieved. The following information outlines the specified parameters for the work undertaken and the work must be carried out and linked to but not limited to our current procedures: • Pipe Specification – Steel Services ¾", 1", 1 ¼", 1 ½", 2". • Pressure rating – Maximum Operating Pressure - 75mbar • Inserted Pipe Specification – Polyethylene pipe 16mm, 17.5mm, and 20mm, 20mm Serviflex, 25mm and 32mm.		
Project Progress	This project is now complete following the delivery of report that looks to review service pipe renovation techniques against the pipe work configurations and permutations. The report has identified the possible pipe and fitting combinations as well as the current pipe renovation techniques. These have been quantified against our current engineering procedures, T/PR/SL/1 Work procedure for Service laying up to and including 63mm diameter at pressures up to and including 2 bar, for background. The planned work prepared a service replacement flow chart for both current techniques and new techniques currently under development. The report has identified the main inhibitors for insertion replacement back to the main. These cause difficulty on-site as they are not always known, when trying to work remotely.		

continued

Project Progress continued	 The factors affecting insertion include; pipe length, location, diameter, wall thickness, combination, assembly method and internal environment, fitting type, location, manufacturing tolerance, combination, assembly method, internal environment and accessibility. In conclusion, this report has made eight recommendations to inserting back to the original meter position. 1. Update the main service laying document SL1 to include an active decision making tool for service pipe replacement 2. Identify and confirm the relevant costs of labour and pipe replacement techniques compared to time and cost against the total programme. Use this information to confirm the best practice for maximum cost benefit on each service replacement. 3. Develop an acceptable methodology and acceptable products for changing accessible pipe work systems to insertable pipe work systems. 4. Continue with existing developments that meet an operational requirement 5. Make contact with other development products for potential inclusion within our product portfolio. 6. Review the active management of pressure increases in bulk replacement areas. 7. Develop a project to actively identify data from pipe replacement projects to confirm the likely permutations where investment would benefit. 8. Investigate the development of a service survey tool for best cost replacement methods.
Collaborative Partners	None
Service Provider	Synthotech Limited

Project Title	Orpheus Valve Corrosion Mapping System		
Description of project	This project aims to design and develop a system that can be deployed to carry out Orpheus Valve Corrosion Mapping without having to excavate or grit blast the pipework.		
Expenditure for financial year: **2012/13**	Internal £4,166 External £23,601 **Total £27,767** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£209,587**	**Projected 2013/14 costs for SGN**	Internal £45,421 External £136,399 **Total £181,820**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Reduction in the number of excavations required and as a result reducing the impact on the environment. In addition this process will reduce the amount of pneumatic required to perform the operation, thus reducing the emissions generated from the equipment used. Eradicating fuel poverty and protecting vulnerable customers: N/A Promoting energy saving N/A Ensuring a secure and reliable gas and electricity supply: If adopted this methodology will ensure no interruption to customers' supply, therefore improving the efficiency and increasing customer satisfaction. Supporting improvement in all aspects of the environment Eliminates the need to excavate and as a result eliminates the amount of excavated material sent to landfill. It also eliminates the hazardous operation of grit blasting, along with the safety and environmental impact associated with painting the pipework.		
Technological area and / or issue addressed by project	In order to maintain the integrity of buried regulator modules that fall within the scope of the regulations it is essential that they are CP with monitoring being undertaken. Where CP has not been applied or has failed, a detailed ultrasonic inspection should be carried out at a frequency not exceeding 6 years. This work is covered by our Management Procedure for ensuring compliance with the PSSR 2000:- SGN/PM/PS/3, Appendix H, Examination Specification ES/94/10 Part 2. Buried Orpheus modules have a history of failed CP and where appropriate, must therefore be subjected to conventional NDT. The installation must be carefully excavated, the vessel and associated pipework will then be grit blasted and inspected and assessed for corrosion prior to being repaired (if necessary) and re-painted with the excavation being reinstated at a later date. In specific circumstances this maintenance operation may require road closure notices and lane rental payments to be agreed with the local road authorities. The time associative with carrying out this particular maintenance inspection on the buried Orpheus module is approximately 3 weeks. Therefore, in order to minimise the completion time and the operational activities associated with this process, the development of a technique that requires no excavations or grit blasting and can carry out internal long range NDT inspection of affected Orpheus modules is advantageous to GDN's throughout the UK.		
Type(s) of innovation involved	Significant		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
30	-4	34

Expected Benefits of Project	The following expected benefits are envisaged to arise from the development of the Orpheus Valve/Filter Corrosion Mapping project: • Considerable reduction in cost against traditional method. • Reduce the average completion time per governor from 3 weeks down to a maximum of 5 working days. • Reduce the time customers are without gas. • Eliminate excavations, grit blasting and painting. • The opportunity to cut down on carbon footprint and assist in reducing waste material sent to land fill and eliminate the need to import virgin material. • 95% corrosion scanning of Orpheus 10 governor.		
Expected Timescale to adoption	1 Year	**Duration of benefit once achieved**	10 Years
Probability of Success	75%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£546,874
Potential for achieving expected benefits	Whilst, it is difficult to quantify the exact benefits until initial testing and field trials take place, early indications from James Fisher Nuclear Limited (JFN), the service provider for this project are positive and expectations are high. Based upon the data gathered with regards to the number of Orpheus 10 governors across our North and South networks, it is anticipated that large financial savings can be made as opposed to traditional methods and these will ultimately occur every 6 years. However, it must be noted that all the expected benefits highlighted are based on averages and the complexity of Orpheus 10 governors will vary from site to site as each one is unique. In addition, it is also assumed that in order to meet the expected benefits the design solution must comply with all Orpheus Valves regardless of differing sizes.		
Project Progress	This project has been broken down by JFN into five discrete sections of work, comprising of: • Concept Design • Detail Design • Procurement and Assembly • Testing and Commissioning • Reporting and Delivery To date, we have provided JFN with an old Orpheus Valve installation, which they have located in their research facilities at Egremont, Cumbria. This provided JFN with the basis they required in order to begin the Concept Design stage and produce initial mock up tooling demonstrations. Throughout these early stages of the project, JFN, Gas and Utility Technology Limited and ourselves have been in close contact with each other. There have already been several progress meetings and site visits undertaken in line with the project programme. At the end of March 2013 JFN completed Milestone 1, which included a detailed design report of the Orpheus Valve. Upon completion of this milestone it was accepted that the network may have varying sizes of Orpheus Valves and the solution designed for this application may not work for differing sizes. However, this will not be known until a trial is carried out on our network. This project will transition from IFI to NIA and is due for completion in 2013/14.		
Collaborative Partners	None		
Service Provider	James Fisher Nuclear Limited and Gas and Utility Technology Limited		

continued

Project Title	SynthoTrax I-Seal Robot		
Description of project	The Feasibility Study evaluates the possibility of developing a robotic system that can remediate potentially leaking gas joints, under live conditions, up to a distance of 200 metres from a single live access point.		
Expenditure for financial year: **2012/13**	Internal £7,943 External £45,000 **Total £52,943** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£71,605**	**Projected 2013/14 costs for SGN**	Internal £4,662 External £14,000 **Total £18,662**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Reduction in the number of excavations required and as a result reducing the impact on the environment. In addition this process will reduce the amount of materials required to relay a service and also the emissions generated from the equipment used. Eradicating fuel poverty and protecting vulnerable customers: Eliminates the time vulnerable customers are without gas. Promoting energy saving N/A Ensuring a secure and reliable gas and electricity supply: If developed further this technology will ensure no interruption to customers supply, therefore improving the efficiency and increasing customer satisfaction. Supporting improvement in all aspects of the environment Significantly reduces excavation, therefore assists in eliminating the amount of excavated material sent to landfill.		
Technological area and / or issue addressed by project	There is focus on maintaining our larger diameter gas networks both North and South. As part of this process we aim to reduce customer dissatisfaction and minimise cost, whilst providing long term integrity to our network. Moving into RIIO-GD1, tier 2 and 3 mains will need to be assessed against risk and costly replacement. It has been identified by Ofgem that larger diameter metallic gas pipes are less likely to fail through cracks and fractures, and more likely to fail due to leaks within the existing joints. At present repair techniques include, mechanical joint clamps, encapsulants and more recently the gas industry have inject anaerobic sealant into the jute packing. However, these repair techniques generate a number of disadvantages such as large costs, through significant excavation, potential to shut down an entire main as well as the associated restoration work.		
Type(s) of innovation involved	Significant		

Project Benefits Rating	Project Residual Risk	Overall Project Score
27	-6	33

Expected Benefits of Project	The expected benefits of this feasibility study are to investigate the potential to extend the capability of the SynthoTrax architecture to enable: 1. A robot to be inserted into a gas main and perform a technical operation under live conditions. 2. Highlight conformance to RIIO within Tier 3 (18-48") mains. 3. Manage risk associated with leaking Tier 3 mains through joints. 4. Offer improved efficiency over classical sealing methods i.e. mainspray, encapsulation etc. 5. Can remediate up to 400m of main from one excavation.

continued

Expected Timescale to adoption	0.5 Year	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£71,605)
Potential for achieving expected benefits	In order to produce a system capable of meeting the above requirements and anticipated benefits there will be a number of development areas undertaken throughout this project. These are as follows: • The vehicle; • The vision system; • The live access system; • The application system; • The sealant delivery system; • The control system; • The interface. All parts of the developments will require specifications and work procedures. To ensure that this project meets the success criteria, regular meetings have also been set up between our nominated project contact and the service provider. In these meetings project progress will be discussed and feedback in relation to the feasibility study will be frequently provided.		
Project Progress	To date Synthotech Limited have carried out a Feasibility Study that has looked into the following individual system components, providing possible solutions to each: • Access Fitting; • Access System; • In-pipe robotic platform; • Sealant Application System; • In-pipe CCTV; • External Support Systems. This report has shown that there are feasible, developmental solutions available that can meet some elements of the complete performance specification. The report has highlighted the requirements of three such devices that could meet the requirements in their entirety, based on three sealing methodologies; 1. Directional spraying 2. Contact injection 3. Drilled Injection These methodologies are listed in increasing complexity. Development and testing work is required to determine the effectiveness and suitability of each approach. If a more focused contact injection or drilled injection is required, then the complexity of the propulsion (locomotion) system and sealant delivery system increases significantly - requiring more resource to complete. In conclusion, the development of a robotic sealant application system based on the SynthoTrax platform for live access through 160mm diameter access holes (ALH System Three Valve) is possible, however, not as advanced as other pipeline robotics solutions. The intended outputs from the system were to; 1. Highlight conformance to RIIO within Tier 3 (18-48”) mains. 2. Manage risk associated with leaking Tier 3 mains through joints 3. Offer improved efficiency over classical sealing methods* (Mainspray, encapsulation etc.) This project will transition from IFI to NIA and is due to be completed in 2013/14.		
Collaborative Partners	None		
Service Provider	Synthotech Limited		

Project Title	OptoMole		
Description of project	This project is to support Stage 1 in the technical development of a mobile, optical methane sensing system for operational teams to use in urban areas for the early detection of gas escapes in cable ducts and other ducting systems.		
Expenditure for financial year: **2012/13**	Internal £1,258 External £7,128 **Total £8,386** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£192,896**	**Projected 2013/14 costs for SGN**	Internal £15,979 External £47,985 **Total £63,964**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving Rapid leak location and reduced repair time minimises gas losses from the distribution grid ensuring that more gas is then available for power generation.		
	Ensuring a secure and reliable gas and electricity supply: Substantially improve the gas leak identification process and hence the integrity, safety and reliability of the gas network. Significantly reduce the gas leak identification and repair time. Decrease the overall cost of leak identification and repair cost for the gas distributor.		
	Supporting improvement in all aspects of the environment Deliver faster gas leak location reduces fugitive methane emissions to the atmosphere. Reduce fugitive gas emissions and all optical sensing technique with no spark risk makes it inherently safer for the workforce and public. Result in no major excavation work required prior to locating the gas leak, hence minimising transport disruption.		
Technological area and / or issue addressed by project	GDN's are under considerable pressure to deal with ten's of thousands of gas escapes every year. It has been estimated that 80% of these are initially detected from the local access points i.e. ducts. Currently we locate gas leaks by drilling holes through the road surface at 1m intervals between the two nearest access points (usually via manholes some 30m apart) and perform a point detection until the gas leak location is found. In some instances they may even have to excavate down to the duct and detect from there. This can take several days, causing significant transport disruptions and ultimately resulting in labour intensive operations with high associated costs. Through horizon-scanning activities, we have identified a potential technological method proposed by the company OptoSci, which could provide an elegant and cost effective solution to this problem. This is an all optical Tuneable Diode Laser Spectroscopy (TDLS) based methane sensing system. This method would substantially decrease the gas leak location and reinstatement costs and time, thus reducing the overall service cost for the gas distributor, as well as limiting the associated fugitive greenhouse gas emissions to the atmosphere.		

continued

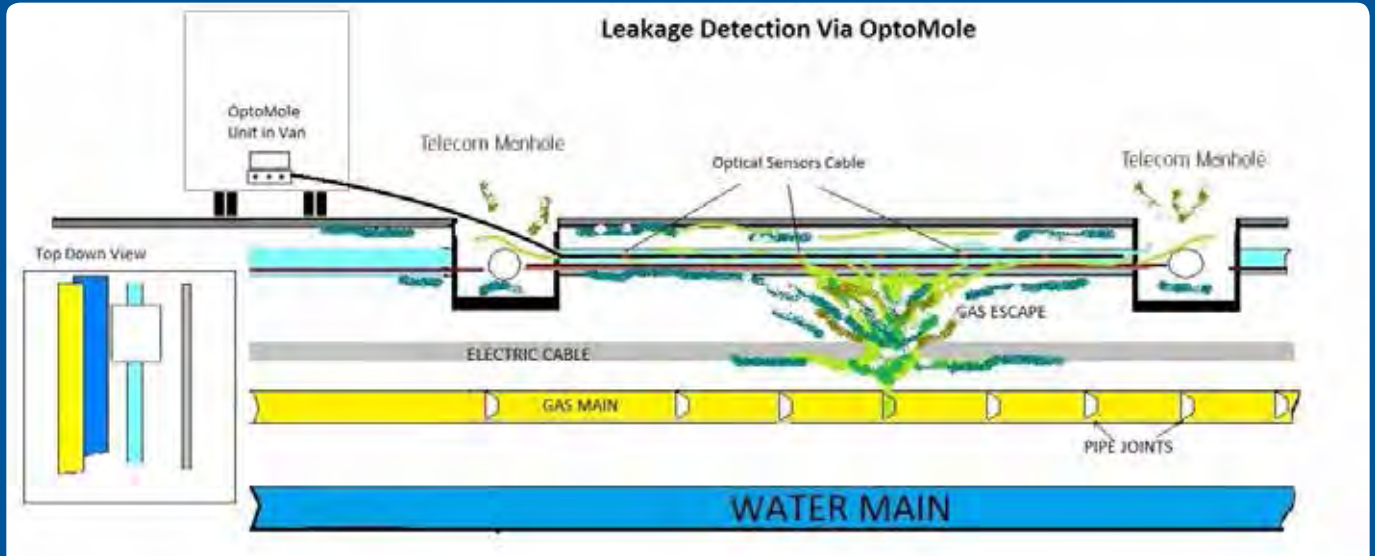
Technological area and / or issue addressed by project	The system would consist of an instrumentation and control unit which would be portable and robust enough to be moved from depot to van. A fibre optic cable bundle would connect to this unit and then be "rodded" down the length of the ducting, approximately 30m. Robustness of the cable would be key for the sensor cable design. Initially 6 sensors could be set at equidistant intervals in the cable which would detect the concentration of methane along its length, indicating on the control unit where the highest concentration of methane exists. Further fine tuning detection by small incremental movements could locate the exact leak entry point. Other attempts to solve this problem have failed mainly due to the small space available in the ducting, the ambient environment (the ducting often has water and mud in it), and the potential spark / explosion risk from electrical sensors operating in a methane/air mixture. OptoSci's solution to this problem would be to develop a portable TDLS based central control instrument provisionally called 'Optomole' that could be operated from a vehicle, as well as an innovative thin, all-optical sensing cable to be used to locate the leak in the duct. The portable central control instrument would house the laser, receiver, electronic control and display optics and electronics. Attaching the "sensing cable" to the front of the control instrument and feeding it down between two duct access points (usually via manholes) would quickly establish the position of the highest concentration of methane along the duct (visible on the control unit liquefied crystal display (LCD) screen) and consequently indicate to the operator where the leak is entering the ducting.
Type(s) of innovation involved	Significant

Project Benefits Rating	Project Residual Risk	Overall Project Score
31	-6	37

Expected Benefits of Project	The anticipated technical benefits of OptoMole are: • Self-referencing TDLS technology means no calibration drift and no requirement for re-calibration. • Zero gas cross-sensitivity as laser tuned to only detect methane. • No high concentration gas level measurement saturation, as system can reliably detect up to 100%v/v methane. • All optical sensing in duct so sensor is intrinsically safe with no spark risk or possibility of electrical interference. • Methane measurement made in the service duct, so no data update delays caused by the need to extract gas and hence disrupt the local concentration at the measurement point in the duct. • Actual gas concentration distribution along duct measured at several points and displayed in real-time on the remote instrument, assisting rapid identification of the gas leak location. Successful trials of a prototype system of both control unit and sensing cable would deliver the following benefits: • No major excavation work required prior to locating the leak. • Quick leak location yields large time savings and reduces greenhouse gas emissions to the atmosphere. • Manpower and valuable resources can be deployed elsewhere. • Transport disruption is drastically reduced. • All optical sensing technique with no spark risk makes it inherently safe for the workforce and public. • Repair costs could be reduced significantly offering rapid return on investment for the gas distributor.

continued

Expected Timescale to adoption	1.5 Years	**Duration of benefit once achieved**	8 years
Probability of Success	40%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£443,522
Potential for achieving expected benefits	This project is to be managed via the Energy Innovation Centre and will be carried out in collaboration with the other GDN's. To ensure that the benefits are met the project will be delivered in the following 3 stages: Stage 1 - Technology development for gas leak location in ducts. Proof of concept for basic single sensor cable manufacture, performance and operation in sample duct (laboratory environment). Stage 2 - Design and production of a prototype 6-point sensor cable and benchtop control instrument for gas leak detection in ducts. Evaluation of system's performance and operation on designated GDN trial site. Stage 3 - Final design, production and GDN operational tests of a compact, portable CCU instrument with 6-point sensor cable for gas leak detection in ducts. To ensure that the likelihood of success remains high, each GDN will be working in close collaboration with each other and also the service provider to ensure that they have access to all the relevant data they require in order to progress this project forward and meet the anticipated benefits.		
Project Progress	The first Steering Group meeting was held in April 2013. Introductions were made between the collaborative partners in attendance (ourselves and Northern Gas Networks) and the service provider, Optosci. Discussion then took place around project timescales and deliverables. It was then identified that initial research work had started at OptoSci labs, and Optosci requested an operational site visit to understand how we deal with emergency works. We agreed to arrange this visit, which is planned to take place on site in June 2013. This is an ongoing project that will transition from IFI to NIA. As a result, all future work will be funded under the new funding mechanism in 2013/14 and the EIC will work closely with us as the lead GDN to complete the registration before submitting to Ofgem on behalf ourselves and the other GDN's.		
Collaborative Partners	National Grid and Northern Gas Networks		
Service Provider	Optosci Limited and Energy Innovation Centre		



Project Title	Internal Stress Corrosion Cracking		
Description of project	This is a collaborative project between the GDN's to develop a method of assessing the threat of internal stress corrosion cracking (ISCC) in pipelines previously used to transport manufactured gas. This project is being managed by the EIC and National Grid is the lead GDN.		
Expenditure for financial year: **2012/13**	Internal £860 External £4,875 **Total £5,735**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£78,000**	**Projected 2013/14 costs for SGN**	Internal £4,870 External £14,625 **Total £19,495**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: Understanding where ISCC occurs to allow a repair to be made prior to an incident.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	ISCC may be present in pipelines that have transported manufactured gas i.e. towns gas or reformer gas. Although ISCC is no longer an active cracking mechanism since the conversion to natural gas in the mid 1970's, any cracking already present will reduce the safety margin against failure of the pipeline due to, for example, static internal pressure and/or external pipeline loading. Moreover, although crack growth due to ISCC is no longer a threat, the cracks may continue to grow due to fatigue induced by pressure cycling.		
Type(s) of innovation involved	Substitution		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
30	-6	36

Expected Benefits of Project	This project will summarise the different gas manufacturing processes used historically in the UK, from 1950 up to conversion to natural gas. In addition, where possible, the project will identify which transmission pipelines were fed by which gas manufacturing process. The deliverables from this work will be one report and an interim technical note. The interim technical note will present results of the inspections undertaken on six off the selected pipe samples retrieved from Lamesley, a village in the Metropolitan Borough of Gateshead, Tyne and Wear, England. The report will present a methodology to identify whether a pipe has the potential to contain ISCC and provide information on the different types of manufactured gas and identify, where possible, which areas manufactured what type of gas in the UK. All sections are to be tested and fit for purpose. This project will develop an ISCC threat assessment algorithm, and provide guidelines to identify the positions along the pipeline route where ISCC is most likely.		
Expected Timescale to adoption	0.5 Years	**Duration of benefit once achieved**	N/A
Probability of Success	100%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-25,230)
Potential for achieving expected benefits	This project will be managed by the EIC, with close network collaboration between us and the other GDN's. Through continual communication and sharing of data and information the likelihood of this project succeeding and achieving its anticipated benefits is high.		
Project Progress	The first Steering Group meeting was held in April 2013. Introductions were made between the EIC, collaborative partners in attendance and the service provider, GL Noble Denton. Discussion then took place around project timescales and deliverables. It was then agreed that each GDN would interrogate their own networks and aim to locate old gas plants for the purposes of the scope. This is an ongoing project that will transition from IFI to NIA. As a result, all future work will be funded under the new funding mechanism in 2013/14 and the EIC will register the project with Ofgem on behalf us and the collaborating GDN's.		
Collaborative Partners	National Grid, Northern Gas Networks, Wales & West Utilities		

Project Title	Fracture Monitoring Using Acoustics		
Description of project	This is a collaborative project between the GDN's co-ordinated by the EIC. The project aims to carry out research, testing and development of an automated acoustic monitoring/alert system that will detect fractures in CI gas mains (diameter range 18-48"), and report them automatically to the pipeline operator.		
Expenditure for financial year: **2012/13**	Internal £3,530 External £20,000 **Total £23,530** Materials Expenditure £0	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0** Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£299,500**	**Projected 2013/14 costs for SGN**	Internal £22,327 External £67,047 **Total £89,374**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Reduced excavation through the use of remote monitoring.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: 24/7 monitoring system that ensures an immediate notification of a fracture event to the pipe line operator enabling a much improved response time. The ability to locate the fracture event (assuming it falls between monitor stations) Potentially the opportunity to detect the onset of a fracture event if pre-failure signals are generated (this is unknown at this time). Potential amendment to risk modelling systems.		
	Supporting improvement in all aspects of the environment Reduced excavation through improved risk management so reducing reinstatement, landfill and natural resources.		
Technological area and / or issue addressed by project	The most significant technical challenge is that a practical multipoint optical sensor cable cannot be designed to fit the stringent operational requirements for the utility duct gas leak detection application. Producing a practical, compact optical sensing element that can be integrated multiple times into a single thin optical cable suitable for utility duct monitoring will require particular optical and cable design ingenuity, knowledge of the environmental performance of specialised engineering materials and experience of optical cable fabrication techniques. This will be extremely challenging. However, this element of risk in the project will aim to be mitigated by OptoSci's high level of experience and expertise in fibre optics and optical fibre based gas sensor design for use in harsh environments.		
Type(s) of innovation involved	Significant		

Project Benefits Rating	Project Residual Risk	Overall Project Score
30	-1	32

Expected Benefits of Project	It is anticipated that this project would provide us with a unique acoustic monitoring system that operates all year round in locations that are densely populated and risk of failure is high. This system would allow the mains to be monitored at a remote location and would identify any high volume leakage to our emergency service.

continued

Expected Benefits of Project continued	It would also provide us with the justification of not having to replace those mains that are ageing, due to the fact that they are being accurately monitored. The following are some benefits envisaged from this project: Fast • No major excavation work is required prior to leak location hence transport disruption is reduced. • Early leak location reduces repair time and greenhouse gas emissions to the atmosphere. • Manpower and valuable resources can be deployed elsewhere. • Repair costs are reduced significantly offering rapid return on investment. Safe • All optical sensing with no spark risk makes it inherently safe for the workforce and public. • No high gas concentration measurement saturation, as system can detect 100%v/v methane. • 100% optical sensing in the duct so there is no spark risk or electrical interference. • Self-referencing TDLS technology means there is no requirement for re-calibration. Accurate • Zero gas cross-sensitivity as the laser is tuned to detect methane only. • Methane measurement is in the service duct, so there are no data update delays caused by the need to extract gas and hence disrupt the local concentration at the point of measurement. • The actual gas concentration distribution along duct is measured at several points and displayed in real-time on the remote instrument, assisting rapid identification of the gas leak location.		
Expected Timescale to adoption	3 Years	**Duration of benefit once achieved**	8 Years
Probability of Success	25%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£201,818
Potential for achieving expected benefits	This project has been split into three stages and will be managed by the EIC. The initial stage of the project will deliver the following reports: 1. A Fracture Simulation Report 2. Sensor Evaluation Report Following the success of this stage we will work in collaboration with the other GDN's to progress with the following stages: Stage 2 - Development and field trial of prototype sensing cable Stage 3 - Design and Production of 6-point Sensing Cable for Volume Manufacture and System Tests to Required Industrial Standards.		
Project Progress	The initial kick off meeting between the EIC, Syrinix (the service provider), and the other GDN's and ourselves took place in early April 2013. At this meeting all parties were introduced, before the technical content of the project was discussed, including timescales and deliverables. It was agreed that the target area of the project would be Tier 2 Pipelines (8" - 18"inc.). Therefore, to date Syrinix has started some project work and have highlighted actions for the GDN's to ensure timescales do not slip. Each of the GDN's then left the meeting with an action to identify a potential abandoned section of large diameter CI or SI main that could be cut and used for research purposes as part of the project scope. This project is at a very early stage and therefore will transition from IFI to NIA. As a result, all future work will be funded under the new funding mechanism in 2013/14 and the EIC will register the project with Ofgem on behalf of us and the other GDN's.		
Collaborative Partners	National Grid and Northern Gas Networks		
Service Provider	Syrinix, Energy Innovation Centre		

Project Title	Orifice Plate Deformation		
Description of project	Stage 2 of this project is to recommend a reliable and accurate method for calculating orifice plate deformation at typical gas distribution operating conditions. The aim is for this method to become accepted as an Industry Standard.		
Expenditure for financial year: **2012/13**	Internal £1,199 External £6,794 **Total £7,993**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£81,525**	**Projected 2013/14 costs for SGN**	Internal £6,342 External £19.046 **Total £25,388**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy N/A		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: Good alignment. This work will validate whether the current concepts relating to orifice plate deformation built on 1947 data, assumptions and mathematics are robust and fit for purpose leading to accurate and reliable assessment of both plastic and permanent deformation, conformance to International Organisation for Standardisation (ISO) standards and suitable billing for gas transport revenue.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	Orifice-plate meters are used by National Grid Gas Distribution at the majority of its large NTS to LDZ offtakes. In order to conform to the orifice plate metering standard, ISO 5167, the plates need to satisfy numerous criteria such as flatness, edge sharpness, surface finish, thickness, size of orifice bore and bevel angle. Any deviation from ISO 5167 can lead to metering errors which almost always cause under registration of mass flow. During normal operation, orifice-plate meters are subjected to a differential pressure across the plate which is proportional to the square root of the mass flow. Design maximum differential pressures can be up to 1000 mbar and a correctly designed orifice plate will deflect or deform elastically. At higher differential pressures, the plate will reach a point beyond which it will permanently deform – this is known as the yield differential pressure. As an orifice plate deforms elastically, flow errors are introduced which must remain below 0.1% to conform to ISO 5167. The equations and assessment tools used to predict orifice plate deformation are in question and they require further investigation.		
Type(s) of innovation involved	Significant		

continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
10	4	6

Expected Benefits of Project	This work will validate whether the current concepts built on 1947 data, assumptions and mathematics are robust and fit for purpose leading to accurate and reliable assessment of both plastic and permanent deformation, conformance to ISO standards and suitable billing for gas transport revenue. This project will also aim to address the following • Survey of existing technical literature to establish current status of orifice plate deformation calculation. • Establish the causes of the differences between the Jeplast routine and elsewhere. • Use computational fluid dynamics (CFD) to calculate the actual load distribution on the orifice plate. • Use finite element analysis (FEA) to calculate the behaviour of the orifice plate under the load distribution calculated from the CFD. • Repeat the CFD and FEA calculations for a range of plate sizes, beta ratios, seal and mounting types. • Recommend a method of calculating orifice plate deformation that can be implemented.		
Expected Timescale to adoption	3 Years	**Duration of benefit once achieved**	7 Years
Probability of Success	25%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£80,199
Potential for achieving expected benefits	This project will be managed by the EIC, with close network collaboration between us and the other GDN's. In order to mitigate any risk, this project has been split into stages. Through continuous communication and sharing of data and information the likelihood of this project succeeding and achieving its anticipated benefits is high.		
Project Progress	Stage 1 of this project was previously completed by National Grid. The outcomes from this stage have been reviewed by us and Northern Gas prior to commencing with the next stage. The preliminary stage included: • A survey of the existing technical literature to establish the gaps and inconsistencies in orifice plate deformation calculations. • The identification of a suitable selection matrix of orifice plate types and sizes for study; this was achieved by conducting a survey of National Grid orifice plate metering systems. • The identification of existing tools to establish whether these would benefit from modification. • The estimation of the extent and impact of such modifications. • The comparison of the results with those of external auditors Both we and Northern Gas Networks have now decided to join National Grid in collaborating on Stage 2. The first Steering Group meeting between the EIC, GL Noble Denton (the service provider), us and the other GDN's has taken place. At this meeting all parties were introduced, before the technical content of the project was discussed, including timescales and deliverables. This project is at a very early stage and therefore will transition from IFI to NIA. As a result, all future work will be funded under the new funding mechanism in 2013/14 and the EIC will register the project with Ofgem on behalf of us and the other GDN's.		
Collaborative Partners	National Grid and Northern Gas Networks		
Service Provider	GL Noble Denton, Energy Innovation Centre		

Project Title	E-Pipe		
Description of project	This project looks to progress the development of the E-Pipe system to allow the transition of a technology used within the water distribution industry to the gas distribution industry.		
Expenditure for financial year: **2012/13**	Internal £7,817 External £44,290 **Total £52,107**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£403,810**	**Projected 2013/14 costs for SGN**	Internal £18,869 External £56,662.50 **Total £75,532**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy This technology will prevent leaks and thus help to reduce gas usage.		
	Eradicating fuel poverty and protecting vulnerable customers: Many vulnerable customers are housed in buildings that contain gas risers. This system will help to make these environments safer.		
	Promoting energy saving Prevention of gas leaks.		
	Ensuring a secure and reliable gas and electricity supply: After a gas riser has been treated the supply of gas should not be interrupted.		
	Supporting improvement in all aspects of the environment Preventing gas leaks is beneficial to the environment as methane is a potent greenhouse gas.		
Technological area and / or issue addressed by project	GDN's throughout the UK have a number of low and high riser systems, which supply natural gas to multi occupancy buildings. Off those a small percentage are replaced or repaired at a significant cost over a five year period. Using E-Pipe will make it possible and affordable to increase the intervention level and will mean complete systems are sealed rather than the points of repair (sustainable solution).		
Type(s) of innovation involved	Significant		

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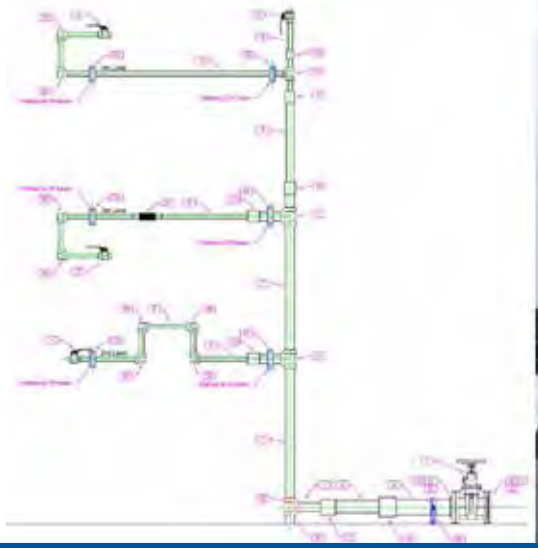


Project Benefits Rating	Project Residual Risk	Overall Project Score
29	-5	34

Expected Benefits of Project	Success of this project would deliver a resin and application process for gas risers that has passed all regulatory tests and would be available for trialling on live customer premises. This project will also improve asset performance, reduce the need to work at heights and extend the asset life.		
Expected Timescale to adoption	3 Years	**Duration of benefit once achieved**	15 Years
Probability of Success	25%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£1,215,470
Potential for achieving expected benefits	This project has been split into 4 stages and will be managed by the EIC. The purpose of the project is to access the existing E-Pipe product and to establish its suitability for use on gas risers. Stage 1 will involve the construction of multi-storey mock risers. It also involves the introduction of leakage paths to represent possible on site leakage. Stage 1 is a critical stage and will influence the outcomes of this project. Provided it is a success the following stages will be completed: Stage 2 - Specification and product development to achieve an acceptable specification for a final product that satisfies policy requirements for all GDN's and develops a thermo-set resin to meet that specification. Stage 3 - Testing of final product(s) in accordance with draft code of practice on a 3 storey riser. The test sites will not be in a live customer environment. Additional laboratory tests to be conducted. Stage 4 - Consultation on regulation and approval to develop a recognised "Code of Practice" or "Standard".		
Project Progress	The first Steering Group meeting between the EIC, Pipe Restoration Services (the service provider), us and the other GDN's has taken place. At this meeting all parties were introduced and timescales and deliverables presented. Technical discussions then took place and the GDN's agreed on initial test locations and designs, with the support of Pipe Restoration Services who are undertaking off site trials to confirm the process. This project is at a very early stage and therefore will transition from IFI to NIA. As a result, all future work will be funded under the new funding mechanism in 2013/14 and the EIC will register the project with Ofgem on behalf of us and the other GDN's.		
Collaborative Partners	National Grid, Northern Gas Networks, Wales & West Utilities		
Service Provider	Pipe Restoration Services, Energy Innovation Centre		

Project Title	Biomethane Import and Blending Station		
Description of project	The development and installation of a new biomethane import and network gas blending facility at Portsdown Hill, Portsmouth, Hants. This project is the first of its kind within the UK and will enable compressed biomethane produced at remote AD sites to be conveyed to the pressure reduction installation at Portsdown Hill by tanker and blended with indigenous natural gas within the network. This will remove the need to add fossil fuels to enrich the biomethane prior to its entry into the gas distribution network, providing enhanced low carbon benefits to homes and businesses within the Southern LDZ footprint.		
Expenditure for financial year: **2012/13**	Internal £411,510 External £2,331,499 **Total £2,743,009**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£2,743,009**	**Projected 2013/14 costs for SGN**	Internal £0 External £0
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy Biomethane to grid efficiency is at least 50% more favourable than electricity only applications, this will support the UK government to meet and exceed its 2020 carbon emission targets.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving Utilise the network and network assets to obviate the need to supplement bio-methane injection with fossil fuel additives (propane)		
	Ensuring a secure and reliable gas and electricity supply: By displacing fossil fuel imported 'natural gas' within our gas distribution, biomethane derived from organic waste streams within the UK provides an alternative secure and reliable gas supply. By continuously looking at areas to improve the equipment used for biomethane entry to the grid, we are looking at ways to bring more biogas production facilities to market and directly onto the gas grid providing the end user with greater security and reliability in UK gas supply.		
	Supporting improvement in all aspects of the environment This project will enhance the use of sustainable alternatives to natural gas. Thereby contributing to the low carbon environment and reducing UK emissions.		
Technological area and / or issue addressed by project	As a result of our involvement in both the Didcot and Poundbury projects, a number of challenges for biomethane injection into the network have been identified. These challenges are principally: • Operating pressures at connections are to low. • Proximity of the connection from biogas production facilities is limited. • Available network capacity at these points of connection is to low. • Planning constraints associated with locating AD facilities close to suitable network systems. The challenges identified currently result in development constraints and connection costs that are not economic for biomethane producers when considered against the relative costs for generating electricity from our biogas. This project aims to provide an innovative solution centred on optimum network flexibility, enabling an economic and expedient biomethane connection to biomethane producers.		
Type(s) of innovation involved	Incremental		

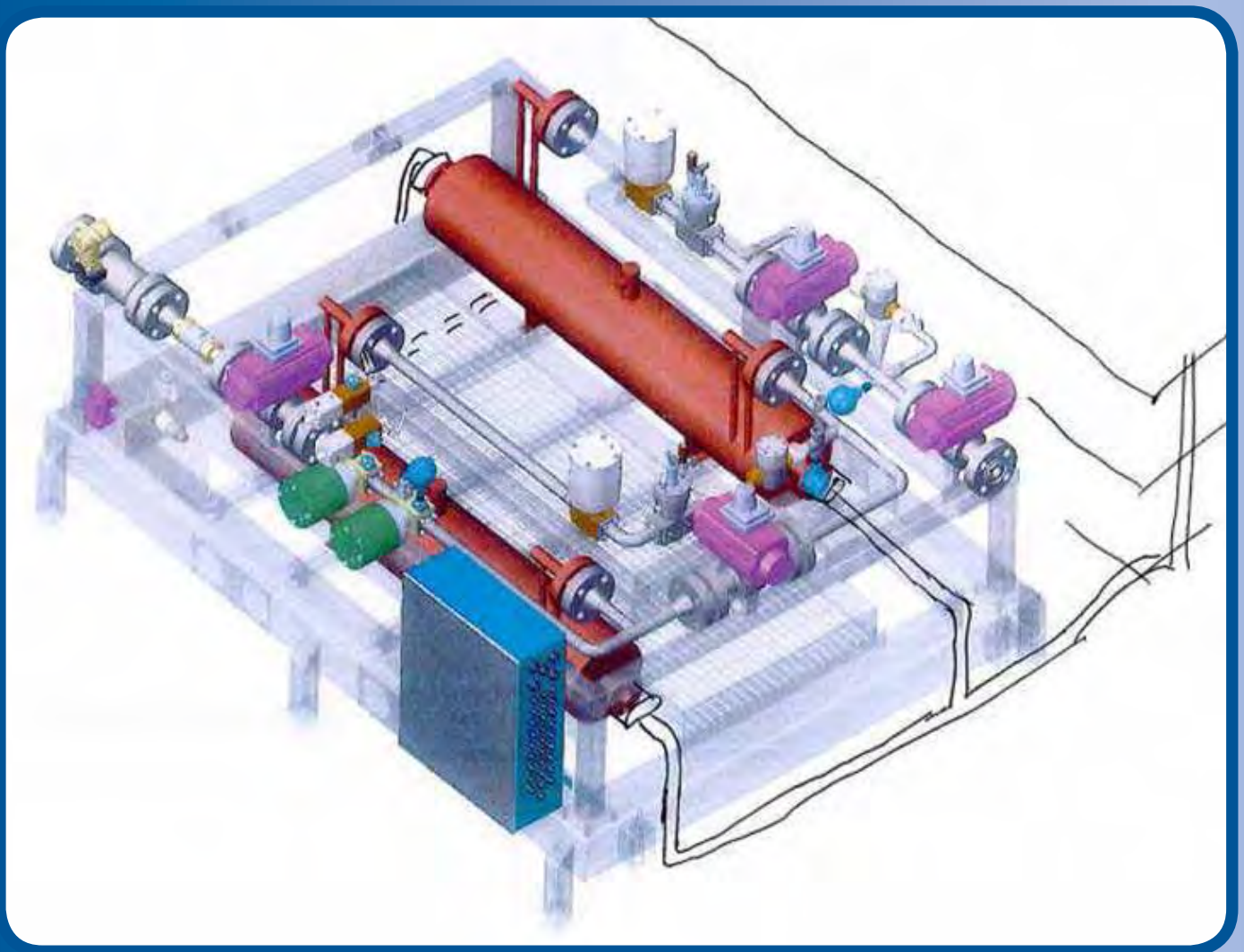
continued

Project Benefits Rating	Project Residual Risk	Overall Project Score
23	-7	30

Expected Benefits of Project	• Deliver a technical design and specification for injection facilities to support virtual pipeline transmission and provide a model for Biomethane off loading and delivery facilities that are integrated within the network infrastructure. This will optimise gas network availability for AD projects. • Deliver criteria and specifications for biomethane blending and/or co-mingling with natural gas. • Establish appropriate risk assessments and network validation requirements for biomethane blending and/or co-mingling. • Establish criteria to enable site selection for blending and/or co-mingling in association with virtual pipelines. • Provide readily accessible and compliant Ofgem approved network entry points, reducing network connection costs and associated timescales for biomethane projects. • Expedite the transition towards the low carbon economy by removing barriers associated with 'off-grid' AD projects. • Promote the diversification of UK gas supply by facilitating 'ease of entry' to the network of enabling the injection of 'off-grid' biomethane sources.		
Expected Timescale to adoption	1.5 Years	**Duration of benefit once achieved**	20 Years
Probability of Success	70%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	(-£2,743,009)
Potential for achieving expected benefits	A feasibility study was undertaken in support of this investment and confirmed its technical viability. The study considered viable options for blending a high quality biomethane into the network at a location remote from the production source. The clean gas would be delivered to site by 3rd party Class 1 high pressure trailers, which would transport the methane gas at 250bar and then offload the gas into the network at 28bar. The following areas were considered in the study: • Project scope and requirement; • Site selection; • Flows through the trial site – Portsdown Hill; • Capital, Operational and Maintenance costs for the facility; • Programme and Timescales Involved; • Preliminary Works Identification; • Land ownership and availability; • CNG and LNG delivery options. The report that was prepared for us identified a number of issues that needed to be addressed, most notably was the delivery pressure of 250bar, which raised several technical issues surrounding appropriate design code as gas networks are not used to dealing with entry pressures outside the upper limit set by IGEM/TD/13 edition 2 of 100bar. The full report has been reviewed prior to undertaking this project and all technical specialists were engaged to look at the issues separately prior to construction commencing on site.		

continued

Project Progress	Technical standards and design codes were identified and agreed, following G17 best practice approvals process. Works associated with site requirements, network modelling and operational, together with risk assessments and methodology are all complete. With completion of the above works it is established that this site can import up to 5,000 scm/h of biomethane from various network remote or connection constrained AD sites, enough to supply up to 30,000 homes in Portsmouth and surrounding conurbations. This marks the completion of the site injection and gas blending design, together with all associated plant and equipment procurement. The latter next stages of this project aim to progress discussions with Ofgem with regards to RHI and FWACV metering, with the next meeting scheduled for the 10th June 2014. In addition, site construction activities are currently at the tender stage and due to commence, end of June 2014. Equipment installation and completion due end of September 2014. Followed by station testing and commissioning activities scheduled for completion November 2014. Acceptance of GS(M)R compliant biomethane and blending operations on target for completion by December 2014.
Collaborative Partners	None
Service Provider	Gas Fuelling Technology / Capita Symonds / Elster / Hale Hamilton / Armstrong Heating



Project Title	PE Asset Life Research (Stage 3)		
Description of project	This project looks to continue the final stage of a three year collaborative IFI project with National Grid to develop methodologies, techniques and support tools that establish the current condition of the existing PE network, identify and quantify potential threats to the integrity of PE pipes and joints, assess the estimated residual life of the PE network and develop best practice for managing the on going and future integrity of ageing PE assets.		
Expenditure for financial year: **2012/13**	Internal £16,583 External £93,956 **Total £110,539**	**Expenditure in previous financial years**	Internal £0 External £0 **Total £0**
	Materials Expenditure £0		Materials Expenditure £0
Total Project Costs Identified (Collaborative + external + SGN)	**£704,670**	**Projected 2013/14 costs for SGN**	Internal £46,931 External £140,934 **Total £187,865**
Alignment with Sustainable Development Themes (Identify and justify for all those that apply)	Managing the transition to a low carbon economy The avoidance of large scale planned PE pipe replacement in future years based on the original design life of 50 years. The work is expected to allow asset life to be extended for a significant period thereby avoiding major construction activity. The project may also contribute towards interim and permanent PE pipe repair and non-destructive testing techniques being introduced avoiding the need to cut out damaged and leaking PE pipes.		
	Eradicating fuel poverty and protecting vulnerable customers: N/A		
	Promoting energy saving N/A		
	Ensuring a secure and reliable gas and electricity supply: The principal objectives of this work are to provide tools and methodologies to allow condition assessment and risk management of PE mains and service assets to be undertaken. This may lead to targeted replacement where risk dictates and/or additional controls concerning poorer performing pipes.		
	Supporting improvement in all aspects of the environment N/A		
Technological area and / or issue addressed by project	PE pipes have been installed within UK gas distribution since the late 1960s. The long term integrity of this asset which now comprises 63% of our mains networks, has been proven. However it is necessary to undertake some fundamental research to confirm continued use, so that we have confidence in its performance up to and beyond the nominal 50 years life in situ. It is known that early PE generation materials installed in the UK have lower cracking resistance than current materials in use. Similar materials installed in US and Europe have suffered a number of failures and recently both National Grid and ourselves have experienced pipe failures on networks arising from stress cracking in early generation PE-A materials. Although all former British Gas Regions have a population of PE-A, four, which were supplied post 1976 by supplier Dupont, have extensive populations. These include both our South East and Southern Regions and North Western and East Midlands within the National Grid network.		
Type(s) of innovation involved	Significant		

Project Benefits Rating	Project Residual Risk	Overall Project Score
24	-1	25

continued

Expected Benefits of Project	• Confirmation that the majority of materials used in the PE network are not showing evidence of significant deterioration and continue to be fit for purpose. • Identification of suspect materials that exhibit relatively poor performance and should be managed accordingly. • A means of assessing and ranking the risk of failure of PE assets and ranking these risks against the risk of failure of other materials used in the gas distribution network. • A methodology for monitoring future performance of the PE network to give an early warning of changing trends that may indicate the onset of deterioration and a means of demonstrating that the integrity of PE assets is under control. • Guidance on the actions to be taken during investigation of a reported PE failure (leak) and any subsequent repair; including the actions and analysis required to demonstrate fitness for purpose of adjacent elements of the network.		
Expected Timescale to adoption	1 Year	**Duration of benefit once achieved**	10 Years
Probability of Success	85%	**Project NPV = (PV Benefits – PV Costs) x Probability of Success**	£1,524,941
Potential for achieving expected benefits	In March 2011 approval was obtained for us to join an ongoing three stage IFI research project with National Grid. Collaboration in this final stage of the project will assist us in achieving the anticipated benefits of this project. The project is a proactive approach to understand the current condition of the PE network, identifying potential threats and assessing residual service life with the objectives of: • Providing a scheme for ranking and managing risks to the PE distribution net work to demonstrate to regulatory authorities and other stakeholders that the control of PE assets is being maintained in a safe and planned manner. • Devising condition assessment methods for PE pipes and fittings. • Develop methodologies to estimate residual service life of PE pipes and fittings based on an assessment of samples from the network • Develop best practice for managing the on-going and future integrity of ageing PE assets in a safe and planned manner.		
Project Progress	Stage 3 of this project commenced in January 2013. The initial 2012/13 elements of work have been focused on obtaining pipe samples to complete compatibility and squeeze testing and to resolve a number of test anomalies which arose during Stage 2 which warrant further investigation. Work on most of the deliverables is underway but not scheduled for completion until towards the end of 2013. Therefore, this is a project that will transition from IFI to NIA. As a result, all future work will be funded under the new funding mechanism in 2013/14 and National Grid as the lead network will register the project with Ofgem on our behalf.		
Collaborative Partners	National Grid		
Service Provider	MACAWS Engineering Limited		

Appendix

2012/2013

Appendix 1 – Project Cost Adjustments

Following the completion of IFI, project cost adjustments have been made in the final close-down of a small number of projects to reflect the resolution of disputed invoices, delayed invoices, terminated projects and invoicing error. This appendix details the project cost adjustments and provides commentary.

Project Title	Hydrogen Demonstrator Step 1
Description of project	This project involves the development, build and operation of a proof of concept demonstration prototype for the reformation of natural gas into hydrogen.
Expenditure for financial year 2012/13	Internal -£28,593 External -£162,000 **Total -£190,593**
Justification of Financial Position	Invoices were received for work that had not yet been carried out and therefore no payment was made. Following review of the project outputs a decision was made to terminate this project under IFI as detailed below.
Project Progress Summary	Throughout 2012/13 regular project meetings have taken place leading to the successful completion of the deliverables of this project, including: • CHP system requirements document specifying objectives for the fuelling demonstration and technical performance requirements for the system. • Demonstration installation of model(s) showing one or more options for how the installation can be configured. • Specifications for a hydrogen compressor, hydrogen storage and dispensing system suitable for the demonstration. • Codes and Standards report identifying relevant references and recommending compliance approach for a concept demonstration with a prototype CHP system in the UK. • Successful witness test demonstrating capability of generating synthesis gas from IE steam methane reformer to established requirements. • CHP design package including piping and instrumentation diagrams (P&ID), electrical schematics, automated control architecture diagrams and bill of materials. • Successful witness test demonstrating capability of producing pure hydrogen to international standards for fuel cell vehicle fuel. This project is now closed. It was felt that the technology was some way off and until there is evidence of advancements in the Hydrogen sector, the project will not be viable. Any further project information can be obtained from our 2012/13 IFI Annual Report.

Project Title	CHP Field Trial
Description of project	This project involves carrying out a number of field trials to explore the viability of using high efficiency residential hydrogen-based technologies to support the development of the gas distribution network. Specifically the field trials will be in the areas of domestic Hydrogen Fuel Cell CHP and Hydrogen Reforming for transport or direct injection to the network.
Expenditure for financial year 2012/13	Internal -£9,002 External -£51,000 **Total -£60,002**
Justification of Financial Position	Disputed invoice. Project accrual from previous year, no further expenditure incurred. As there has been no technical learning from this project, all costs associated with this project have been borne by us, resulting in a zero spend.
Project Progress Summary	The CHP supplier subsequently informed us that they would not be able to provide the equipment until 2014 at the earliest and that the scope of the project would need to be re-evaluated. At this point the decision was made not to continue with this project and it was cancelled.

Project Title	Development of DANINT FWAVC Software for New Gas Chromatograph
Description of project	This is a UK GDN collaboration project to develop a test facility that replicates the installation in the field such that the current versions of Danint and future software and hardware developments can be subject to approval and long term testing.
Expenditure for financial year 2012/13	Internal -£2,736 External -£15,500 **Total -£18,236**
Justification of Financial Position	This project was a collaboration project with the other GDNs. The financial adjustments are due to invoicing errors following payments from the other GDNs.
Project Progress Summary	This project was completed and closed in 2012/13. Following completion of this project a report has been produced by the service provider that defines the Scope of Development for Stage 2.0 and 2.1. This document has been reviewed by all GDNs and a final document has been issued, which may lead to the commencement of the next stage in the development. If approved by the GDN's Stage 2 will be progressed under the new Network Innovation Allowance (NIA) funding mechanism and the project will be registered with Ofgem in 2013/14. Further information can be obtained from our 2012/13 IFI Annual Report.

Project Title	Customer Risk Assessment Work
Description of project	This project was to develop a risk assessment model that would be included in the gas supply emergency procedures for all GDNs, that would determine the optimal approach to take to customer self isolation and restoration.
Expenditure for financial year **2012/13**	Internal -£695 External -£3,936 **Total -£4,631**
Justification of Financial Position	This project was a collaboration project between us and the other GDNs. The financial adjustments are due to invoicing errors following payments from the other GDNs.
Project Progress Summary	This project was primarily completed and reported in 2012/13. In summary, the thrust of this new approach was to ensure that gas consumers themselves can play a major part in the processes of safely isolating and subsequently restoring their own supply and this project has proved to be a success in achieving this. Work is currently ongoing to integrate this decision support tool into industry emergency procedures and to develop the wider customer self isolation and restoration process. From working in collaboration with the other GDNs a risk model has been developed that determines the conditions where the use of consumer self isolation and restoration is appropriate. For a given supply failure, inputs such as anticipated timescales, weather forecasts and risk probabilities are used to determine whether the holistic risk is reduced when the general public carry out isolation and restoration. The inputs for both graphs allow us to see where the most uncertainty in the data lies. The risk model indicates that adoption of this new approach will significantly reduce the period that consumers are without a gas supply, thereby reducing the overall risk and inconvenience. The project has delivered a safer and more customer focused solution for use by all GDNs to effectively manage a major loss of supply event, providing benefit to gas consumers; should the worst happen. Any further information on this project can be obtained from the 2012/13 IFI Annual Report. The service provider has proposed a further stage to the development of this project, which would be funded collaboratively from the NIA allowance in 2013/14.

Project Title	Gas Escapes CBT (Phase 2)
Description of project	This project was to evaluate a new three dimensional (3D) Computer Based Training (CBT) tool for the management of gas escapes.
Expenditure for financial year **2012/13**	Internal -£496 External -£2,811 **Total -£3,307**
Justification of Financial Position	Project accrual from previous year, no further expenditure incurred. The final project cost was less than the originally invoiced amount.
Project Progress Summary	This project was completed and closed in 2012/13. We have successfully evaluated and piloted the new CBT tool. Early assumptions and feedback on this technology has generated positive results and it is believed that this project will meet the anticipated benefits presented in last year's IFI Annual Report 2012/13. The equipment is now being utilised throughout our training department and looks to increase the competence of our operatives. Feedback is frequently being received and the training department is tracking the procurement and usage of the equipment to deliver better quality. Over the next year the results will be compared against the previous training techniques.

Project Title	HSE Tier 2 Risk Threshold
Description of project	This project will investigate and identify the potential options for defining the Tier 2 risk threshold. It will include a review of the processes that the GDNs have initially designed and utilised to determine potential threshold option(s) which can be applied to Tier 2 pipes.
Expenditure for financial year 2012/13	Internal -£225 External -£1,275 **Total -£1,500**
Justification of Financial Position	Expenditure was embedded into another project as discussed below. No further costs were charged for this project.
Project Progress Summary	This project was incorporated into the Distribution Pipeline Risk Management project presented in our 2012/13 IFI Annual Report.

Project Title	Feasibility Studies for Glenmavis
Description of project	The basis of this project was to undertake a series of feasibility studies to evaluate options for maintaining security of supply for the four Scottish Independent Undertakings (SIU) following the cessation of supply from Glenmavis, a large gas storage facility in the North of Scotland.
Expenditure for financial year 2012/13	Internal -£13 External -£76 **Total -£89**
Justification of Financial Position	Delayed invoice.
Project Progress Summary	This project was completed last year and the study was fully documented in last years IFI Annual Report 2012/13. We have now evaluated each of the feasibility studies and a decision has been made to construct a Liquefied Natural Gas (LNG) storage facility in Provan, Glasgow. LNG will then be transported from Avonmouth to Provan and then transported to the SIU's. The learning from this project will also support any future NIC project submissions.