Northern Gas Networks

31 July 2013

Innovation Funding Incentive for Sustainable Development (IFI/SD) Report

Northern Gas Networks
1st April 2012 to 31st March 2013

Prepared for:
Northern Gas Networks

Prepared by:
Alec Breen
Northern Gas Networks
Asset Risk Management
Moorside
Sunderland
Tyne & Wear
SR3 3XN

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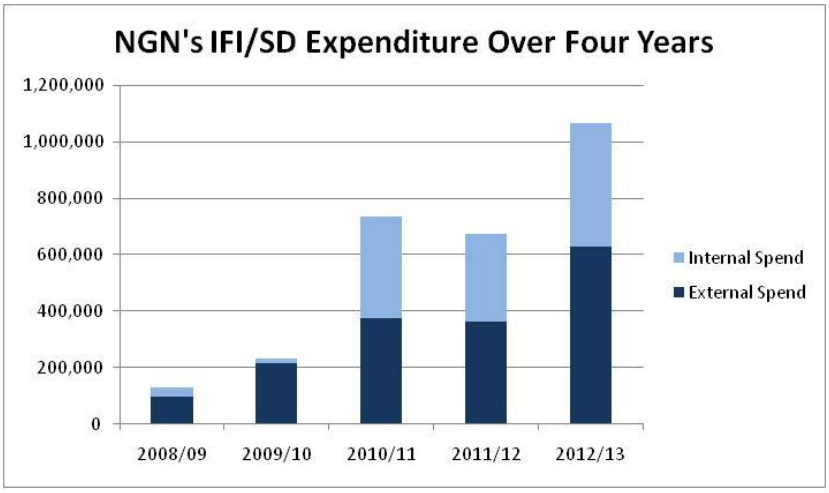
1. Executive Summary

During the period 1st April 2012 – 31st March 2013, Northern Gas Networks Limited (NGN) has incurred expenditure on a total of 26 innovative projects. Of these 15 projects were collaborative, NGN having 11 internal projects. NGN's Distribution Network Transportation Revenue for 2012/13 was £380.3m. The IFI/SD Allowance was £1,900,500 plus carry over from 2011/12 of £650,000.

NGN sponsored collaborative research and development with other organisations through the Gas Networks Collaboration Forum who share common objectives, working with – National Grid, Scotia Gas Networks and Wales & West Utilities. We further developed our partnership, along with the other gas networks, with the Energy Innovation Centre successfully collaborating on six new projects in partnership Small and Medium Sized Enterprises we believe this relationship will strengthen during the coming year.

Over the past five reporting periods NGN has consistently grown the numbers of projects it is involved in and increased its overall project spend. The total expenditure internal and external costs for 2012/13 is **63% increase over the previous reporting period**, reflecting NGN's commitment to innovation this is illustrated in Figure 1 below.

Figure 1: NGN's IFI Expenditure Over Four Years



In the last twelve months we have also significantly grown the number of projects during a transitional period moved towards RIIO-GD1 and Network Innovation Allowance from 17 projects during the period 2011/12 to 26 projects in 2012/13.

NGN contributes to projects with overall spend of £5.55m, demonstrating our commitment to collaborative and internal innovation. See below Table 1, clearly shows our increasing contributions to overall project spend over the last five years.

Table 1: Summary of NGN's Innovation Involvement

Year	Total Allowable Expenditure for Year	Projects	Overall Collaborative & Internal Project Spend	Total NGN Recovered	NGN Benefits
08/09	£1.5m	8	£1.01m	£116k	n/a
09/10	£2.4m (£750K carried from 08-09)	9	£1.08m	£230k	£208k
10/11	£2.4m (£700K carried from 09-10)	10	£2.05m	£487k	£231k
11/12	£2.4m (£690k carried from 10-11)	17	£4.33m	£444k	£279k
12/13	£2,5m (£650k carried from 11-12)	26	£5.55m	£787k	£364k

The IFI/SD projects are:

Table 2: Executive Summary of Internal and External Projects and Spend

Project	Collaborative / Internal	Total Project Cost	NGN External cost	NGN Internal Cost	NGN Total Cost
Alternative Inspection Technique For Buried Pipelines	Collaborative	£108,053	£1,250	£0	£1,250
Improvements to the MRPS Model	Collaborative	£718,288	£0	£7,196	£7,196
DANNIT	Collaborative	£189,400	£21,381	£6,475	£27,856
Virtual Testing Platform of Emergency Scenarios	Internal	£30,600	£0	£1,516	£1,516
Study of Potential Sources & Quantities of Biomethane	Internal	£25,000	£4,554	£8,590	£13,144
Increased Entry Capacity by Compression	Collaborative	£405,590	£94,980	£72,632	£167,612
Investigation of CO Atmospheric Detectors for use by FCO's	Internal	£297,625	£124,176	£36,163	£160,338
CIPPS Linings for >12" Pipes	Collaborative	£1,500,000	£14,743	£9,610	£24,352
Customer Self Isolation & Restoration Risk Assessment R&D	Collaborative	£28,897	£2,259	£6,319	£8,578
Stress Corrosion Crack ISCC	Collaborative	£78,000	£19,500	£0	£19,500
System Control Simulator	Internal	£29,750	£24,000	£5,750	£29,750
Representation of Gas Distribution Networks in key standardisation areas	Collaborative	£31,517	£5,149	£0	£5,149
Orifice Plate Deformation	Collaborative	£81,525	£12,920	£0	£12,920
SR25 IGEM	Collaborative	£31,517	£3,350	£2,073	£5,423
Green Road Installation	Internal	£238,081	£17,500	£141,395	£158,895
Small Distribution Techniques Project	Internal	£26,804	£6,604	£0	£6,604
Cured In Place Spray Linings for Repair of Pipes Below 8" Mains	Internal	£50,000	£34,830	£875	£35,705
Energy Innovation Centre	Collaborative	£339,488	£124,836	£5,905	£130,741
Predictive Analytics	Internal	£176,840	£38,245	£5,065	£43,309
Gas Futures	Collaborative	£77,671	£8,335	£10,670	£19,005
E-Pipe	Collaborative	£403,810	£11,073	£0	£11,073
Renewable Technology used for Pre-Heating Feasibility Study	Internal	£100,000	£16,588	£37,380	£53,968
Fracture Monitoring Using Acoustics - Syrinix	Collaborative	£289,500	£30,333	£0	£30,333
Tuneable Diode Laser (OptoMole)	Collaborative	£192,896	£7,128	£0	£7,128
Local Authority & NPG collaboration on Fuel Poverty & MSB	Internal	£19,500	£3,557	£7,783	£11,339
Innovation Project Management	Internal	£75,000		£75,059	£75,059
		£5,545,352.00	**£627,289.69**	**£440,453.90**	**£1,067,743.59**

2. Introduction

NGN's motivation for having a broad and valuable input into innovation is driven by the challenges set by our stakeholders and the major issue the industry faces in the future regarding:-

- Customer Service
- Safety
- Social Obligations
- Reliability
- Environment
- Connections

Therefore NGN's approach will be to continue to challenge all areas of the business to introduce innovative ideas that address these key areas. Focusing on key areas will ensure innovation investment has clear benefits, fully costed to form part of NGN's corporate culture over a sustained period.

NGN has developed an Innovation Strategy aligned to address RIIO-GD1 ensuring its focus on innovation remains key to how the company operates. IFI/SD projects form a large part of our overall approach.

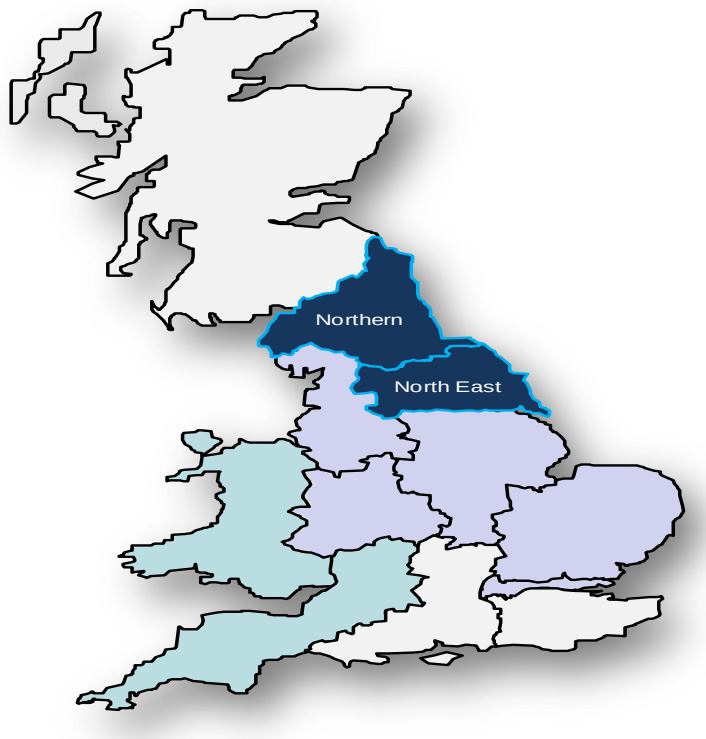
2.1 Northern Gas Networks

NGN are the company responsible for distributing gas to homes and businesses across the north of England, an area covering West, East & North Yorkshire, the North East and northern Cumbria.

Our network comprises of 37,000km of gas pipes, that's enough to travel from Leeds to Sydney, Australia, and back again.

We do not own the gas; we transport it on behalf of the companies who do, delivering it to users 24 hours every day.

Northern Gas Networks is an essential element in the daily heartbeat of the region. We take extremely seriously our responsibilities as the provider of the fuel of choice; we aim to provide the best in customer service and to add value in all our activities. We have strong ownership behind us and aim to become an integral part of the communities we serve.



2.2 IFI/SD Background

Ofgem requires an annual report by 31st July from each Gas Distribution Network (GDN) on its IFI/SD project activity. Each project must satisfy the eligibility criteria of Technical Development, Degree of Innovation and Customer Value and align with one or more of Ofgem's five Sustainable Development Themes :-

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

2.3 A summary of Ofgem's GDN IFI/SD arrangement is:-

- A GDN is allowed to spend up to 0.5% annually of its Distribution Network Transportation Activity Revenue on eligible IFI/SD projects
- All projects should align with one or more of Ofgem's five Sustainable Development Themes.
- GDNs IFI/SD internal expenditure will be allowed as part of the total IFI/SD expenditure up to a maximum level of 15% of project cost
- The GDN is allowed to recover 80% of its eligible project expenditure
- A partial carry-over of up to 50% of unspent eligible IFI/SD expenditure is allowed from one year to the next
- GDNs will have to openly report their IFI/SD activities on an annual basis in accordance with the Good Practice Guide. These reports will be published on the Ofgem website
- Ofgem reserves the right to audit IFI/SD activities

The scheme for GDNs is the Innovation Funding Incentive for Sustainable Development (IFI/SD). The aim of this incentive is to encourage GDNs to apply innovation on technical development of the networks and to deliver value e.g. safety, quality of supply, environmental, financial to end consumers. A Good Practice Guide (Gas Distribution IFI/SD Good Practice Guide August 2010) has been produced, published by the Energy Networks Association.

The Energy Networks Association (ENA) facilitates the Gas Networks Collaboration Forum Research & Development Sub Group which has made some significant steps forward. The group has undertaken industry challenging projects that have involved Gas Distribution Networks (GDNs) working together in the interests of sharing the benefits of jointly developed R&D projects. Importantly, to facilitate this joint-working the group has worked to create a basis for collaborative working going forward.

The particular challenge of which has been to find and understand common ground to allow collaborative working whilst maintaining the individual efficiency / competitiveness of each GDN. The work to find this ground has been well supported throughout 2012/13 by Northern Gas Networks and significant progress has been made in developing a Collaborative R&D Strategy and agreement to allow the GDNs to work together and to ensure effective engagement with external parties.

Open reporting of IFI projects is practiced by Ofgem. In line with this, NGN will publish their IFI/SD report on the Northern Gas Networks website: www.northerngasnetworks.co.uk. The report will also be available on the Energy Networks Association share point website and Ofgem's website: www.ofgem.gov.uk.

NGN welcomes this initiative as a positive measure to further improve customer service and efficiency, and enhance safety management.

2.4 Aim of Strategy

NGN's innovation strategy is a dynamic plan which we constantly add to, test and measure for success, this is not a one off exercise where a plan is created and followed. Industry and network challenges constantly change and projects are regularly reviewed to ensure that they still meet these challenges and the IFI/SD requirements.

NGN has a proven track record of using innovation to address business issues adopting new ideas, technologies and processes to benefit customers and stakeholders. During this year NGN has set out a clear Strategy, Governance, Process and Measurable Outputs that will demonstrate where innovation is being adopted and its benefits. This strategy will enhance our existing management of IFI/SD projects and develop maturity around innovation as we move into the next regulatory framework.

2.5 NGN's Approach to Innovation

This year has seen the introduction of a full time Innovation Team developing the strategy, processes, climate and culture required to sustain business change and quality improvement. Part of the role of this team is to ensure IFI/SD projects are delivered and managed effectively at some cost to the company, but this is seen as critical to successful delivery. Robust governance is seen as key to supporting this team with the introduction of a CEO led group to engender change within the organisation demonstrates the highest level of support.

NGN also adopt large scale innovation such as the Total Network Management approach, reviewing key processes regularly to include industry best practice, implementing new pipe technologies to reduce customer disruption. IFI/SD projects form a large part of NGN approach which it sees as supporting its business strategy.

2.6 Major Successes in the Year

Collaboration
Working in partnership with the Energy Innovation Centre, together with the other three GDN's, we have commissioned six new projects of strategic value to the industry. These projects address industry issues which we believe will benefit UK customers and the environment.

Major projects include:

- **Orifice Plate Deformation**
  Developing 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 the Industry Standard.
- **ePipe**
  Developing an existing technology to cross over from the water distribution industry to the gas distribution industry. To achieve this transition the project must access the existing technology to establish its testing suitability for the application of gas riser repair.
- **Fracture monitoring using Acoustics**
  To provide an Acoustic monitoring system that will monitor the UK Gas Network 24 / 7 and alert Emergency Gas personnel immediately should the Gas main crack or break .

Eradicating Fuel Poor and Protecting Vulnerable Customers
Fuel Poverty within the North East remains a significant issue and with rising fuel prices and the tough economic climate this problem is growing. We are committed to significantly increase our Network Extensions in the future and the work undertaken this year is leading our approach, projects include:

- **Research into sustainable energy and relieving fuel poverty in multi storey buildings**
  Working in collaboration with Northern Power Grid and Leeds City Council on reducing energy costs, de-risking buildings and supporting low carbon alternative energy. Developing a program to understand developments for Multi Storey Buildings as well as owner and occupants requirements.

- **Investigation of CO Atmospheric Detectors for use by FCO's**
  Developing a new device which monitors not only the presence of CO but also the levels uncounted in various rooms, by appliance and customer group. This development is increasing knowledge and awareness of CO within our workforce and vulnerable community groups for example Student, Elderly, Asian and Disadvantaged

Environment and Making the change to Low Carbon Economy
NGN continue to actively participate in the industries push to meet the requirement to feed renewable gas sources into the network.

- **Biomethane Compression**
  During periods of very little demand on the network, it will be necessary to transport gas up the pressure tiers, a safe and secure process needs to be developed before injection can be made. The basic concept will investigate the proposal for compressors to be installed in the Northern Gas Networks Grid that will allow biomethane to be injected all year round at low demand levels.
- **Renewable Technology used for Pre-Heating Feasibility Study**
  Detailed research and analysis of renewable technologies which could be suitable for use across network to pre-heat gas at strategic pressure reduction stations

2.7 Risks and Issues Faced in the Year

This transitional year as we moved towards RIIO-GD1 and prepared innovation to move towards the Network Innovation Allowance,(NIA). Developing our partnership with the Energy Innovation Centre has proved a challenge but one that was overcome in the later part of 2012. Going into the new innovation stimulus regime NGN believe that these issues will be reduced.

Once again, NGN has spent a significant amount of time and effort this year in supporting the IFI/SD process and again has significantly spent more than the 15% internal cap for spend. As one of the smaller networks, programme management forms a significant cost to NGN as the number of projects increases both collaboratively and individually this forms a disproportionate burden. We have gained significant maturity over the past two years around managing innovation projects.

2.8 Focus for the Future

As we enter RIIO-GD1, NGN foresee the transition from IFI/SD to NIA as being time consuming and complex. We will continue to work through ENA Innovation Governance Group, to manage existing projects over into the new incentive mechanisms.

This year we intend to once again significantly increase our collaboration projects with the Energy Innovation Centre, and develop new collaborative approaches that will deliver breakthrough changes that our industry requires.

NGN will also fully participate in greater sharing and learning from all innovation projects across networks and across energy sectors.

3. Innovation Process Management

NGN has continually modifies its business structure to be better prepare for future challenges. The new integrated business will work together to identify best possible ways of completing our objectives and revisiting our investment plans to deliver innovative projects. The review will be managed as part of our business as usual approach with a clear emphasis on measured benefits.

3.1 Process Management

Effectively managed radical innovation over the medium and long term has a great potential to generate beyond incremental innovations. Our intention is to develop a repeatable process that creates a significant difference in the value delivered to customers, stakeholders and the industry, with a lasting legacy.

Our aim is to hold a portfolio of initiatives from across the business that details each stage of development from Idea Investigation, Business Case Development, through to Post Investment Appraisal. Each initiative to be placed into one of the areas below:

Table 3 Incremental Vs Transformational Innovation

	Incremental	Radical
Emphasis	Cost or feature improvements in existing products, services, or processes	Development of new businesses, products and/or processes that transform the economies of a business
Technology	Exploitation of existing technology	Exploration of new technology TRL level 3/4
Prototyping	Ironing out wrinkles near the end of the TRL 7/8	Teaching the market about the new technology and learning from the markets how valuable that technology is in that application arena
Business Case	Detailed plan can be developed at the beginning of the process	Business model and plan evolves through discovery-based learning
Idea Generation & Opportunity Recognition	Occur at the front end; critical events are largely anticipated	Occur sporadically throughout the life cycle, often in response to discontinuities in the project trajectory
Key Players	Formal cross-functional teams, experts in industry, across Networks	Cross industry individuals, informal networks, expertise outside field
Process	Formal, phase-gate model	Informal, flexible model at early stages due to high uncertainties → formal at later stages after uncertainties have been reduced
Organisational Structures	Cross-functional project team operating within a business unit	Project starts in R&D → migrates into an incubating organisation → transitions new project organisation
Resources and competencies	Standard resource allocation; the team has all competencies required to complete the process	Creative acquisition of competencies and resources from a variety of internal and external sources
Operating Unit Involvement	Formal involvement from the very beginning	Informal at early stages → formal at later stages

4. Summary of Benefits Expected from IFI/SD Projects

Table 4 Expected Benefits from IFI/SD Projects

Project	Benefits Expected
Alternative Inspection Technique For Buried Pipelines	**Knowledge** - The technology watch will provide valuable information on whether any new emerging technologies and techniques are fit for purpose for adoption or whether key components can be incorporated into the delivery from stages 1 and 2 **Safety -** Incidents concerning the failure of >7 bar pipelines tend to be catastrophic events. Where such pipelines are located by significant populated areas any such failures expose the risk to staff and the general public **Network Performance** - The new tool will minimise costs for inspecting difficult to inspect areas. The increased understanding of the condition of the asset in these difficult to inspect areas should allow GDNs to take appropriate remedial measures quickly to prevent a major pipeline failure. This will allow pipelines to be operated to the maximum safe level **External Risk** - Incidents concerning the failure of >7 bar pipelines tend to be catastrophic events. Where such pipelines are located by significant populated areas any such failure exposes the risk to staff and the general public. **Other Benefits** - The main financial benefit to accrue from this project is primarily avoiding costs of unexpected failures and subsequent cost penalties due to failure to supply
Improvements to the MRPS Model	**Knowledge** – The knowledge used to analyse the data and produce improvements to MRPS will be communicated in detail to the industry participants. This understanding will assist GDN's in defending the model robustly when challenged by the HSE **Safety** – Any improvement in the way in which mains are prioritised for replacement will affect the UK incident level. This has a direct impact on improving safety but is very difficult to quantify. **Environmental** – The ability of MRPS to identify mains before they leak will have a direct impact on the level of methane emissions from the UK distribution system. In addition, more efficient planning of mains replacement has a direct impact on road closures and traffic congestion **Network Performance** – The MRPS is model is used to effectively replace those pipes with a higher degree of risk. By doing so, the GDN can allocate expenditure accordingly and avoid significant cost if a minor or major incident occurs **External Risk** – The application of a credible methodology for identifying mains at risk will contribute to mitigation measure for any potential litigation arising from fatalities linked to incidents. **Other Benefits** – The research and validation into the model will provide a high level of reassurance for all GDN's and their stakeholders that the associated risk of service and mains pipes is clearly being managed in a professional and consistent manner and thus provide reputational and credibility benefits for all. The output will be of significant value for GDN's as it will be used as part of the next formula review under GDPRC2

Project	Benefits Expected
Development of DANINT FWACV software for New Gas Chromatograph	**Knowledge -** A number of the specialist investigation will establish if it is possible to enhance the technology or software to ensure correct configuration and operations are installed, thus mitigating against any potential issues concerning accurate metering. **Environment -** Less visits to site by operational staff will obviously contribute to less pollution from vehicles however, it is very difficult to quantify the benefit. **Network Performance -** The main benefit of this proposal is in demonstration of regulatory compliance. By providing a robust method of monitoring CV for the billing process and monitoring metering and gas quality data for detection and reconciliation of errors it ensures that there is a reliable gas supply [by being commercially viable] which is in line with one of Ofgem's sustainable development themes. Importantly full resilience testing including simulations will test various scenarios. This will mitigate against errors for custody transfer measurements, avoiding issues of non compliance leading to loss of reputation and possible challenge by third parties which could cost each participant a significant amount of money. For this purpose a conservative £1m (cost avoidance) is assumed. The development of DANINT 12C and 12D will hopefully provide each participant the following efficiency benefit. It is assumed that each operator has at least 20 sites. The average site consumes bottled gas (helium) and requires changing approximately once every 8 weeks. This is a one-day job requiring two members of staff on site. Assuming a day rate of £250, each visit costs £500 in labour and £45 for materials (1 bottle of Helium) resulting in a total cost of £545. Each site will require 6 visits per year costing £3,270 in total. The total cost for 20 sites is £64,400 per annum. The new software and equipment will be more efficient by at least 65%. It is expected that the cost will reduce from £64,400 to £22,540. This solution is expected to last approximately 5 years and therefore the full life cycle savings for each operator is estimated to be £209.3k or £10,465 for each site (based on 20 sites). However, it is assumed that each operator will deploy the solution over 10 sites only during 5 years following project completion. Therefore the saving per operator is £104,650. If this solution is approved by Ofgem there will be two solutions available for Operators to use. This Model 700 solution will be more cost effective that the Model 500, and will also enhance the viability of injecting other gas sources. This software can be pre loaded when a new model 700 analyser is installed. The software is also compatible with existing systems when fitted with the new processor card. These benefits may be enhanced following the completion of stage 2.0 and stage 2.1 Other Benefits - This project is being funded equally between the Gas Distribution operators and National Grid Transmission. This provides a good leverage ratio of 5:1 for each funding participant.
Virtual Testing Platform for Emergency Scenarios	**Knowledge** - This research will bring about a collaborative partnership between Northern Gas Networks and Northumbria University and will realise the development of a virtual tool for enhancing compliance **Safety** - Increases the operational safety of employees, but also of the responding agencies to an incident and to the public at large **Network Performance** - improves testing of emergency plans through table top exercises without the need for engineers to experience actual incidents.

Project	Benefits Expected
Study of Potential Sources & Quantities of Biomethane for Gas	**Knowledge -** Roadmap will provide essential knowledge of all sectors, potential collaboration partners and strategy for future AD plants close to NGN network **Environmental -** Potential to have an impact on the decarbonisation of gas **Network Performance -** Increase in renewable gas volumes and sources into the network **External Risk -** Sustainable increased supply from biogas and gas from biomass **Other Benefits -** External benefits, target 5 new connections to the network over five years benefiting industrial sectors and removing waste for processes
Increased Entry Capacity by Compression	**Knowledge** -The output will provide significant knowledge benefits for the funding parties via firstly the development and testing of the Simulation Model (to be owned by National Grid and NGN) and then subsequently via the design and testing from the field trial installation. **Environmental** -It is estimated that compression could be required in relation to around 40% of potential biomethane injection sites, which would otherwise not connect to the gas network. Additional biomethane injection should enhance the resilience of the gas network, and secure its long-term future in an environment when there will be increasing pressure to reduce the use of fossil gas. It is difficult to quantify the environment benefit here given that installation and injections rates may vary from site to site and it is also difficult to predict the number of connections that may be requested in the future. **Network Performance** - By ensuring that the output is codified and adopted into existing connection processes it will allow the funding to parties to respond accordingly within the appropriate standards of service. **Other Benefits** - The project will provide both NGN and National Grid with significant reputational benefits not just by collaborating together but leading the way in maximising the opportunities for biomethane injection and supporting the low carbon economy. Good leverage will be gained given that the project will be joint funded between NGN and National Grid. However, consideration is required given that part of the costs may be capitalised depending upon the field test site.
Investigation of CO Atmospheric Detectors for use by FCO's	**Knowledge** - NGN - retain report's findings **Safety** - Possible reduction in CO incidents **Environmental** - Every job will have CO detection capability particular societal benefits in GIB and PRE responses plus responding to specific CO request **Network Performance** - Demonstrates businesses approach to deliver beyond GS(M)R **External Risk** - Deliver better confidence in potential CO enriched environments **Other Benefits** - Significant in going over and above regulatory requirements to address a socially sensitive issue. NB may be included in GD1- RIIO
Cured In Place and Polyurethane Spray Linings for >12" Pipes	**Knowledge** - This initial stage of this project is to validate the proof of concept which will also will inform the business of the potential benefits **Network Performance** - Significant. These will be articulated during later stages

Project	Benefits Expected
Customer Self Isolation & Restoration Risk Assessment R&D	**Knowledge** - This will deliver a robust risk assessment module which will enable informed decision making on when it is appropriate to use self isolation and restoration. **Safety -** Incident casualties will be reduced by shortening the duration of the incident. **Environmental** - By reducing the incident duration, fewer (fuel inefficient) electric heaters will need to be issued, and will be in use for a shorter duration **Network Performance** - Supply to the affected customers are restored much quicker and thereby enhancing the performance of the network. **External Risk** - Reduces impact on society in the affected areas e.g. Not overloading the electricity grid with subsequent electrical supply failures. **Other Benefits** - £25/hr X 8hrs + £37.50/hr X 4hrs = £350/day per FCO (Excl overheads and any recharging uplifts). £350 X 200 FCOs in 1 day = £70,000.
Assessing the Threat of Internal Stress Corrosion Cracking (ISCC) on Pipeline Integrity	**Knowledge -** Understanding the extent of the threat of ISCC to the integrity of the gas pipeline networks. **Other Benefits -** Cost avoidance benefit, however this will not be quantified in Stage 1.
System Control Simulator	**Knowledge -** Carry out on-line emergency analysis /Training/Simulation **Safety -** Reduction in Leakage due to 24/7 Pressure Management **Environment -** The simulator could provide the detail to avoid the venting of gas to atmosphere during maintenance such as pipeline depressurisation. It can also reduce the need for some pre-heating and the potential for some removal **Network Performance -** Improved Security of Supply – monitor critical sites/improve site security, Measure & Improve Fault Resolution **External Risks -** Reduce Average & High System Pressures to minimise system leakage
Representation of Gas Distribution Networks in key standardisation areas	**Knowledge -** All knowledge will be transferred in full to the network

Project	Benefits Expected
Orifice Plate Deformation	**Knowledge -** •The main benefit to arise from the initial stage of this work will be ascertaining of crucial knowledge in determining whether the current assessment tools are robust and fit for purpose. This entails work will enable the business to defend outstanding actions and challenges from Ofgem and independent auditors. **Network Performance** Most of the gas going through Network off takes passes though orifice-plate metering systems. The mass flow through the meter is proportional to the square root of the differential pressure across the plate. During normal operation, the plate is deformed elastically but when excessive differential pressures are applied the plate can become permanently deformed. As an orifice plate deforms, metering errors are introduced. A plate that is permanently deformed can lead to:- • Significant metering errors which have a direct impact on transmission and distribution revenue • Potential operational difficulty in orifice plate extraction • Total orifice plate replacement (precision machining) At this stage it is difficult to quantify any financial impact **Other Benefits** There will be reputational benefits to be gained with Ofgem, Shippers and external technical auditors if the work is successful.
SR25 IGEM	**Knowledge -** Transfer the use of the SR 25 model to GDN's **Safety** - Lead to the avoidance of potential LTA's and major injury which can be quantified on a GDN specific basis. **Network Performance** - ensure compliance with adopted IGEM/SR/25 specification and the avoidance of any associated fines. **External Risk** - Mitigate or prevent against minor incidents
Green Road Installation	**Knowledge** - This solution empowers the drivers to manage their own safety and the technology highlights which drivers are at highest risk **Safety** - Increased driver safety that reduces the number of collisions and protects lives **Environmental** - Benefits the environment with decreased fuel consumption by 10% **External risks** - Reduces blameworthy collisions by 30% **Other Benefits** - Decreased fuel consumption by 10%
Small Distribution Techniques Project	**Knowledge** - New skills developed by operational teams **Safety -** Reduction in possible MOP injuries **Environment** - Small number of jobs that resolved escape earlier than without technique **Network Performance** - Small number of jobs **External Risk** - Prevention of minor accident
Cured In Place Spray Lining For Repairs of Pipes below 8" Mains	**Knowledge -** This initial stage of this project is to validate the proof of concept which will also will inform the business of the potential benefits **Safety -** Impact on reducing leakage and possible gas incident **Network Performance -** These will be articulated during later stages

Project	Benefits Expected
Energy Innovation Centre	Minimum of 34 IFI eligible propositions developed and presented to Electricity Network Operators Minimum 12 IFI eligible propositions developed and presented to Gas Network Operators Deliver 10 international referrals 3 Investments per DNO 5 Investments per GNO Minimum £600K IFI investment
Predictive Analytics	**Knowledge -** New knowledge will be fully transferred to NGN **Safety -** Ensuring increased response times to attending escapes by understanding where escapes are likely to occur **Environment -** Preventative maintenance prior to leakage occurrence **Network Performance -** Reduced down time as better resource planning capability **External Risks -** Failure to meeting regulatory and statutory targets
Gas Futures Group – Domestic Heating Project	**Knowledge -** Transfer of key information from modelling related to the longevity of network assets - identification of business requirements / need by 2050 which will support asset depreciation, regulatory submissions and reputation. Identifies the market segments for gas into the future and indicate market intervention risks to such markets so business impacts can be assessed and strategies formulated. The output is seen as necessary to enter into dialogue with DECC regarding long term views concerning the delivery of heat in a low carbon economy. **Other Benefits -** Reputational benefits for all participants as the output will input inform the DECC Heat Strategy. The project also provides good leverage benefits for all funding participants.
E-Pipe	**Knowledge -** Product will be developed with input from GDN's **Safety -** Implementation of system will reduce leaks in risers **Environmental -** Fewer leaks will mean less methane released to atmosphere **Network Performance -** Fewer leaks will enhance network performance **External Risks -** Fewer leaks will mitigate the chance of any fire or explosion **Other Benefits -** A decrease in costs for the GDN and less disruption for the customers
Renewable Technology for Pre-Heating Feasibility Study	**Knowledge -** NGN will be the own all of the research carried out and will be able to use the study to base future pre-heating designs on. **Environment -** Potentially we will be able to roll out renewable technologies applicable to pre-heating across the entire network. **Network Performance -** The recommendations of this report will calculate the benefits in terms of carbon savings per annum. This will reduce the carbon footprint of the company. **External Risk -** Each site where pre-heating systems are upgraded will reduce the number of incidents due to younger equipment and improved controls.
Fracture Monitoring Using Acoustics - Syrinix	**Knowledge -** New working procedures that will benefit the Business **Safety -** 24/7 Constant monitoring of Gas network **Environmental -** No need to carryout un- necessary work replacing pipelines **Network Performance -** Resources can be utilised in other areas to benefit the Network **External Risk -** Allows an immediate response to any major gas escape on these pipelines monitored by Syrinix

Project	Benefits Expected
Tuneable Diode Laser (OptoMole)	**Knowledge -** Essential knowledge transferred to the DNO's as required to operate the system and to realise the benefits **Safety -** Through earlier leak source detection there is a reduction of multiple potential failures. **Environmental -** Environmental benefits to a significant population of affected sites **Network Performance -** Leads to sustainable improvements in regulatory performance targets **External Risk -** Mitigation of multiple major incidents or prevention of one major incident **Other Benefits** - Significant financial savings
Research into sustainable energy and relieving fuel poverty in Multi Storey Building	**Knowledge** - Knowledge is shared across LA, electricity and gas sectors. Combined knowledge is also shared with residents of MSB's. Safety - Opportunity to de-risk MSB's **Environment** - Aim is to provide lower emission heat source
	External Risk - Working in collaboration with Northern Power Grid as the power sector challenge a difficult to reach sector of the community **Other Benefits** - Stakeholder and customer benefits
Innovation Project Management	Effective programme management of IFI/SD projects and development of best practice. Working with external bodies and other GDN's to develop excellent governance.

5. Conclusions

During 2012/13 NGN increased the number of IFI/SD projects from 17 in the previous year to 26 in this period. It is our intention to increase again the number of projects that NGN are investing in over under NIA the coming 12 months, especially with SME's.

Innovation sits in the centre of NGN's approach to business with its strategy of Total Network Management gaining clear trade off's between alternative solutions with investment delivering best value for money on whole life asset management. With the introduction of a dedicated focus innovation team the objective of sustainability and environment will play a central role in these decisions.

This report covers only the IFI/SD elements of NGN's innovation programme and we welcome the changes being implemented for RIIO-GD with regard to incentives. Our portfolio and investment will continue to grow demonstrating our commitment to using innovation to improve our business performance.

6. Summary Report of IFI/SD Project Activities

This information relates to the period 1st April 2012 to 31st March 2013 inclusive.

Table 5 IFI/SD Project Activities Report

Project	*Approval*
Distribution Network Transportation Activity Revenue £(m)	£380.30
IFI/SD Allowance £(m)	£1.90
Carry over from Previous Year £(m)	£0.65
Total Allowable Expenditure for Reporting year £(m)	£2.55
Number of Active IFI/SD Projects	26
Summary of Benefits Anticipated From IFI/SD Projects	Refer to section 4
External Expenditure 2012/2013 on IFI/SD Projects (£k)	£627.3
Total Internal Expenditure 2012/2013 on IFI/SD Projects (Capped at 15%) (£k)	£160.2
Total Expenditure 2012/2013 on IFI/SD Projects (with cap at 15% for internal) (£k)	£787.5
Benefits Achieved From IFI/SD Projects To Date (£k)	£364.3
Total unspent IFI/SD allowance £(m)	£1.76
Unspent Allowance Minus Previous Years Carryover £(m)	£1.11
Unused IFI/SD Carry Forward to 2013/2014 £(m)	£0.56

7. Project Reports

7.1 Alternative Inspection Technique for Buried Pipelines

Project Summary Document			
Project Title	Alternative Inspection Technique for Buried Pipelines		
Reference Number	001	Current Year	2012/13
Project Description	To develop and alternative inspection technique for OLI4 pipelines that cannot be pigged due to difficult circumstances.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£0	£941.00	£0.00	£108,053
External	£1,250.00	£11,414.00	£0.00	
Materials	£0	£0.00	£0.00	
Totals	£1,250.00	£12,355.00	£0.00	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	NA	
Eradicating Fuel Poverty	NA	
Promoting Energy Savings	NA	
Secure & Reliable Network	Good Alignment	This project will provide a technique for inspecting non piggable pipelines on the 7>bar network, and thus operators can mitigate the risk of an incident occurring by understanding fully the condition of its pipeline assets
Environmental	NA	

Technical Area / Issue Addressed by Project

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	3	21	-5	26

Expected Benefits

Knowledge - The technology watch will provide valuable information on whether any new emerging technologies and techniques are fit for purpose for adoption or whether key components can be incorporated into the delivery from stages 1 and 2.

Safety - Incidents concerning the failure of >7 bar pipelines tend to be catastrophic events. Where such pipelines are located by significant populated areas any such failure exposes the risk to staff and the general public.

Network Performance - The new tool will minimise costs for inspecting difficult to inspect areas. The increased understanding of the condition of the asset in these difficult to inspect areas should allow GDNs to take appropriate remedial measures quickly to prevent a major pipeline failure. This will allow pipelines to be operated to the maximum safe level.

External Risk - Incidents concerning the failure of >7 bar pipelines tend to be catastrophic events. Where such pipelines are located by significant populated areas any such failure exposes the risk to staff and the

general public.

Other benefits - The main financial benefit to accrue from this project is primarily avoiding costs of unexpected failures and subsequent cost penalties due to failure to supply.

This project is primarily concerned with detecting external corrosion. Pipeline failure frequencies are given in IGEM/TD/2 - Application of pipeline risk assessment to proposed developments in the vicinity of high pressure natural gas pipelines. Safety considerations are normally based on failure frequencies for ruptures, but there is not a history of ruptures due to corrosion in the UK - this is reflected in the failure frequency for external corrosion in IGEM/TD/2 of 0. Note there have been ruptures as a result of corrosion in the USA.

Hence, it is proposed that the failure frequency to be used for the cost benefit is based on the failure frequency for a hole due to external corrosion in IGEM/TD/2, which is 0.011 failures per 1000 km yr. For a typical Distribution network of, say, 5000 km, over a 40 year life, this would result in 2 failures over 40 years.

The notional value of a potential pipeline failure and penalty due to failure to deliver is taken as £1m. This is a conservative estimate that includes costs associated with repair, recommissioning if the failure occurred on a critical pipeline, loss of gas supplies, compensation, and responding to subsequent regulatory action should an incident occur.

If it is assumed that a catastrophic incident is a 1 in 20 event the annual cost avoided is £50k. Assuming the benefit over the next formula period of 8 years the total cost avoided is £400k

Year of Adoption	28/02/12	**Probability Of Success**	50%
Duration Of Benefits	20 Years	**Project NPV**	£39,881

Potential for Achieving Expected Benefits

2008/9

- The expected project benefits should be achieved. Stage 1 of the project progressed and was completed as planned. The proposal for stage 2 is in line with the initial project objectives.

2009/10

- The information generated from Stage 2 of this project will help to determine whether any of the currently available above-ground survey techniques have the capability to locate coating damage in difficult to inspect areas e.g. on pipe work running under hard surfaces (gravel, tarmac and concrete) and on cased and uncased crossings; and are able to benchmark coating damage in terms of its surface area.

- The practical work currently being conducted under Stage 2 of this project will also help provide information on the relative sensitivity of the Pearson and DCVG techniques; this will help support the use of one or other of these techniques as the preferred option for coating defect location within the OLI/4 document.

2011/12

- Stage 2 delivered a number of technical benefits that may be codified within the GDN's OLI/4 policy. These will assist in managing the risk of unpiggable pipelines and therefore the cost avoidance benefit associated with the project should remain as the value proposed was a very conservative estimate.

- Stage 3 delivered a knowledge benefit concerning the MTM and NoPig techniques. The GDNs see merit in these techniques but both require some development work to be undertaken to make them applicable to the distribution networks. As this is currently being progressed by other companies a watching brief will be maintained, awaiting further developments.

Project Progress

The preferred indirect inspection techniques that are currently used within the OLI/4 process and for other pipeline surveys have been reviewed along with their limitations in difficult to inspect areas including pipeline segments running under hard surfaces and through sleeved and unsleeved crossings.

Information has been provided on alternative inspection techniques, to those referred to within the OLI/4

document but not routinely used, in order to make a judgment on their ability to detect corrosion risks in difficult to inspect areas.

The ability of above ground survey techniques for sizing coating defects has been assessed for the above ground inspection techniques currently used by National Grid.

The ability of Long Range Ultrasonic Testing (LRUT) for assessing the integrity of sleeved and unsleeved crossings has been reviewed.

2009/10

- Field trials have been conducted using the Pearson and DCVG techniques to compare their sensitivities for coating defect location.
- The sizing capabilities of the DCVG survey method has been assessed using buried coupons, located at test posts, and using pin probes of varying surface area.
- The sensitivity of the Electromagnetic Current Attenuation technique, for locating small areas of coating damage that might exist on cased and uncased crossings, has been assessed.

2011/12

The report reviews emerging technologies for above ground surveys, including reviewing the MTM (Magnetic Tomography Method) technique,. The report recommends:

- The OLI/4 document should be modified, during subsequent revisions, to make specific reference to the four stages identified in the ECDA and ECCDA processes i.e. pre-assessment, indirect inspection, direct examination and post-assessment.
- That further trials be conducted with the magnetic tomography method (MTM) to validate the claims of the vendors and to assess the full capabilities and limitations of the system.
- That a watching brief be conducted to monitor future developments of the NoPig system with a view to performing field trials in the future.

The Project Steering Group has agreed that no further work be undertaken on this project. The key recommendations to be considered from the output of this work are:

- Keep a watching brief concerning the NGGT MTM project and the GERG NoPig project. The visibility of these projects to the Project Steering Group is currently low; GL Noble Denton will keep the project participants informed of developments.
- If the ongoing MTM and NoPig developments are found not to meet the requirements of the GDNs, then a collaborative expression of interest to the market will be considered in the future.
- The consensus is to incorporate the knowledge from this project into a set of shared industry documents. However this will require GNCF approval due to the different version of the policy and procedure documents that each GDN currently has.
- The output of this project should be presented at GNCF, not only to seek agreement on Item 3 above, but to propose a GNCF sub-group specifically focused on >7 bar high pressure pipelines. The group should have membership representatives from all GDNs, and potentially NGGT, with the remit of covering policies, procedures and potential future IFI projects.

Partners	**Collaborative**	SGN	WWU	NGN
		NGG		
	Service Provides	GL Noble Denton		

7.2 Improvements to the MRPS Model

Project Summary Document			
Project Title	Improvements to the MRPS Model		
Reference Number	002	**Current Year**	2012/13
Project Description	The key objective of the project is to develop improvements to the MRPS model to efficiently identify mains that are likely to leak and therefore reduce the risk of fire/explosion from any potential escape, to enhance safety to gas employees and the general public whilst also complying with HSE legislation.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£7195.85	£18,750.00	£7,000.00	£718,288
External	£0.00	£80,016.00	£17,360.00	
Materials	£0	£0	£0	
Totals	£7195.85	£98,766.00	£24,360.00	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	NA	
Eradicating Fuel Poverty	NA	
Promoting Energy Savings	NA	
Secure & Reliable Network	Good Alignment	This project will investigate possible enhancements to the methodology including the consideration of age as a factor with the cast iron 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 work proposed within this proposal has been costed over a 5 year period.
Environmental	Good Alignment	The ability of MRPS to identify mains before they leak will have a direct impact on the level of methane emissions from the UK distribution system. In addition, more efficient planning of mains replacement has a direct impact on road closures and traffic congestion.

Technical Area / Issue Addressed by Project

The UK gas industry DNs are all subject to a mains replacement policy which dictates that all ferrous distribution gas mains within 30 metres of 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 has been developed by GL Industrial Services and the weightings have been updated regularly. However, the basic methodology has not changed for several years. This project will investigate possible enhancements to the methodology including the consideration of age as a factor with the cast iron 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 work proposed within this proposal has been costed over a 5 year period.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	3	20	-4	24

Expected Benefits

The majority of work under this project is feasibility in nature and as a result no further costs have been incorporated if further work is required. However, if further work is required the probability is high that a full co-efficient review and update will be required that would cost the industry £180k each time. It is hoped the right results for the industry in validating the current risk scores for the specific areas targeted by this project are robust. For the purposes of this NPV calculation it has been assumed that only one update will be avoided.

Knowledge – The knowledge used to analyse the data and produce improvements to MRPS will be communicated in detail to the industry participants. This understanding will assist GDN's in defending the model robustly when challenged by the HSE

Safety - Any improvement in the way in which mains are prioritised for replacement will affect the Uk incident level. This has a direct impact on improving safety but is very difficult to quantify.

Environmental – The ability of MRPS to identify mains before they leak will have a direct impact on the level of methane emissions from the UK distrubution system. In addition, more efficient planning of mains replacement has a direct impact on road closures and traffic congestion

Network Performance – The MRPS is model is used to effectively replace those pipes with a higher degree of risk. By doing so, the GDN can allocate expenditure accordingly and avoid significant cost if a minor or major incident occurs

External Risk – The application of a credible methodology for identifying mains at risk will contribute to mitigation measure for any potential litigation arising from fatalies linked to incidents.

Other Benefits – The research and validation into the model will provide a high level of reassurance for all GDN's and their stakeholders that the associated risk of service and mains pipes is clearly being managed in a professional and consistent manner and thus provide reputational and credibility benefits for all. The output will be of significant value for GDN's as it will be used as part of the next formula review under GDPRC2

Year of Adoption	31/03/2013	**Probability Of Success**	50%
Duration Of Benefits	20 Years	**Project NPV**	-£566,983

Potential for Achieving Expected Benefits

2008/9

- This specific project is being managed via the National Replacement Forum (NRF) that has representation from all four Gas Distribution Network operators. A review of the project benefits was undertaken on 23.04.09 as part of the stage closure process for the first stage. The group concluded that the current benefits documented were robust and ranked accordingly and that it was still very difficult to provide precise quantification for each one listed. Safety remains the primary benefit for this project as MRPS enables a GDN to prioritise its resources according to the risk score as calculated via this methodology. If an incident does occur a GDN can fully demonstrate the understanding and application of the up to date knowledge ascertained from this project if challenged by the HSE or regulator.
- The group did agree to amend the NPV. This is on the basis that if any of the planned work requires extensive further investigation the cost for doing so is not factored into the current programme, as most of the planned work is feasibility in nature. This will be included as a specific risk to the project also.

2009/10

- The main benefit of the project has been to confirm that the distribution system, in terms of leaks, gas in buildings and incidents, is stable and not showing signs of significant deterioration, thus the current version of MRPS is adequately modelling the current risk. The further work on spun cast mains has shown that the model could potentially be improved by the inclusion of corrosion data but this needs

to be confirmed with further analysis in 2010.

- Work completed this year has also confirmed that it is appropriate to have and maintain two separate models for above and below 12" CI mains. The application <12" model to >12" mains produces a significantly different risk factor profile and therefore should not be applied.

2010/11

- The scoping document for stage 3 defined the main benefit of this project as demonstration of regulatory compliance – i.e. each network has to demonstrate effective reduction in risk by use of an acceptable methodology.

- MRPS has been endorsed by HSE as a method to allow for prioritisation of mains replacement that effectively reduces the risk of incident. The effectiveness of MRPS was formally recognised in November 2010 when MRPS was credited with the Gas Industry Safety Award for Safety Related Research over the last 10 years. However it is necessary that MRPS is continuously developed and is kept up to date with the most recently available data to ensure that the models reflect recent leakage activity. This project enables each Gas Distribution Network to demonstrate compliance with safety legislation in this respect.

- Stage 3 of this project has successfully provided an updated set of coefficients for MRPS based on the most recently available data. This in turn has provided a demonstrable level of confidence and assurance that the MRPS model remains stable and fit for purpose for continuing use by the GDNs.

- The process has also highlighted a small number of isolated data anomalies where analysis in the stage 3 identified areas of uncertainty requiring further investigation. It is proposed that further work be carried out in stage 4 to review these areas with additional supporting data being provided by the GDNs.

2011/12

- 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 each Gas Distribution Network to demonstrate compliance with safety legislation in this respect.

- Stage 4 of this project has successfully provided an updated set of coefficients for MRPS based on augmented data and has established which of the changes investigated will improve the accuracy of the software. Furthermore, work carried out under stage 4.1 provided the GDNs with valuable information to support them in demonstrating the effectiveness and continued improvement of MRPS.

- The GDNs remain committed to the ongoing development and improvements to the MRPS model.

2012/13

- 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 each Gas Distribution Network 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 the GDNs with a wealth of information relating to their own data and has highlighted clearly where changes in data collection or definition have impacted upon their 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 GDNs remain committed to the ongoing development and improvements to the MRPS model.

Project Progress

2008/9

- It has been clearly demonstrated that there is no discernible link between fracture rates and the age of pit cast iron. This finding is very beneficial to the industry enabling any potential impacts to be clearly ruled out and negating the need for further investment in this area. This also allows the planned programme of work to move forward examining other potential relationships that may have a bearing in how risk in the MRPS model are presented.
- Trend analysis of gas in building occurrences, failures and incidents has been carried out to determine if deterioration of the system is occurring over time. The analysis highlighted some issues with particular DN's data which has been resolved. No statistically significant changes were evident and therefore it was recommended that the co-efficient remain unchanged for 2008.
- The technical achievements to date are:
  > Research into the correlation or link between the age of pit cast mains and fracture rate

2009/10

- Analysis of historic data determines that the metallic distribution system appears to be stable in terms of leaks, gas in buildings and incidents and does not show signs of significant deterioration.
- Initial observations from the report "Investigation into the Effect of Previous Corrosions on the Fracture Rate of Spun Cast Distribution Mains" have concluded that previous corrosion activity on spun cast mains is likely to increase the likelihood of future fracture activity by an average of around 30%. The report has raised issues about the data upon which the analysis was based and the National Replacement Forum suggested that is prudent to repeat the analysis with more recent data in 2010 before a decision is taken as to whether the MRPS models for Pit and Spun Cast are updated.
- Examination of the Applicability of the <=12" CI MRPS Model to >12" CI Mains concluded that the present <=12" MRPS model is not a suitable substitute for the >12" model as both the correlation of scores and correlation of ranks are too dissimilar.

2010/11

- A scaling factor for mains with and without previous corrosions was generated. Analysis revealed a marginally insignificant difference between Pit and Spun Cast and therefore recommended that the analysis be repeated in 12 months time with more data.
- Coefficients were calculated for mains fracture factor, mains corrosion factor (cast iron, ductile iron & steel mains), mains Joint factor (cast iron & steel mains), ductile iron scaling factor, gas ingress factor, gas history factor and consequence factor. It was concluded that the impact of changing to the 2010 coefficients would lead to an increase of 11% in the expected number of incidents.
- The output of the stage 3 analyses was deemed to have provided the Networks with some useful information, and highlighted the need for a high standard of data to obtain robust results. It has been recognised that further work is required in stage 4, before updating the code base, to further improve data quality and thus enhance the benefits provided by this programme of work.

2011/12

- As a result of the higher levels of detail and quality within the data collected by each Gas Distribution Network (GDN); stage 4 achieved greater accuracy and more meaningful analyses ,which allowed more significant coefficients to be calculated for the mains fracture factor, gas ingress factor, and ductile iron scaling factor. The GDNs jointly concluded that adopting a 10 year drop off (with equal weighting for all fractures) for the mains fracture factor would provide an improved measure of the level of fractures actually occurring. Additionally, the calculated Cast Iron

GIF coefficients were recommended for MRPS inclusion. The Ductile Iron analysis provided useful knowledge surrounding the relative risk between joint leaks and corrosion failures. The GDNs jointly agreed that further investigations are required before incorporating the revised DI coefficients to better understand the behaviour of the relative risks.

- The investigation into the effect of previous corrosion on future fractures relevant to Cast and Spun Iron was significantly useful in understanding the compounding effect previous corrosion has on future fractures. This investigation concluded that Cast and Spun Iron experienced an increased future fracture rate when they endured corrosion failures in previous years. It was recommended that a scaling factor is added to the Cast Iron Risk model to increase the risk score of a main where there have been previous corrosions.
- Trend analysis of data from all UK networks for 2010 and their comparison with data from 2008 and 2009 has shown that, in general, there is no obvious trend in failures, Gas in Buildings or incidents which would suggest increasing levels of deterioration.

- Additionally, a change control during this stage implemented work packages that assisted the GDNs in the development of a business case for MRPS to inform the Price Control Review (PCR).

2012/13

The more detailed analysis carried out this year identified some anomalies in the trends in failures and GiBs, which were attributed to particular GDNs 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 (100m for example) 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.

Partners	**Collaborative**	NGN	WWU	SGN
		NGG		
	Service Provides	GL Noble Denton		

7.3 Development of DANINT FWACV software for New Gas Chromatograph

Project Summary Document			
Project Title	**Development of DANINT FWAVC software for New Gas Chromatograph**		
Reference Number	003	**Current Year**	2012/13
Project Description	Develop and trial engineering software for data management of Gas Composition, CV and volume data in compliance with 'The Gas Calculation of Thermal Energy Regulations'.		

Expenditure

Description	NGN Costs Only			Total Project Cost
	Current Year	Previous Year	Projected Next Year	
Internal	£6,475	£0	£7,000.00	£189,400
External	£21,381	£14,000.00	£0	
Materials	£0	£0	£0	
Totals	£27,856.00	£14,000.00	£7,000.00	

Based on IFI/SD Financial Year

Alignment to Sustainable Development

Area	Strength of Alignment	Evidence
Low Carbon Economy	Minor	Lower installation and maintenance costs for directed CV measurement resulting in fewer visits to sites.
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network	Good	Accurate and reliable monitoring of throughput in accordance with Ofgem regulatory requirements.
Environmental	Minor	Lower consumption of bottle gases.

Technical Area / Issue Addressed by Project

- Develop software for Communication and Data collection from new embedded controller CV Analyser.
- New integration and configuration set-up for new controller.
- Enhancements to hardware ot software configuration allowing more efficient management
- Development of test requirements that will facilitate more competition in the respective hardware markets
- To develop a standard Ofgem compliant Application configuration for the 2350A (new Processor card) and the Model 500 & 700 Danalyzer.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	3	14	-6	20

Expected Benefits

Knowledge - A number of the specialist investigation will establish if it is possible to enhance the technology or software to ensure correct configuration and operations are installed, thus mitigating against any potential issues concerning accurate metering.
Environment - Less visits to site by operational staff will obviously contribute to less pollution from vehicles however, it is very difficult to quantify the benefit.
Network Performance - The main benefit of this proposal is in demonstration of regulatory compliance. By providing a robust method of monitoring CV for the billing process and monitoring metering and gas quality data for detection and reconciliation of errors it ensures that there is a reliable gas supply [by being commercially viable] which is in line with one of Ofgem's sustainable development themes. Importantly full resilience testing including simulations will test various scenarios. This will mitigate against errors for custody transfer measurements, avoiding issues of non compliance leading to loss of reputation and possible challenge by third parties which could cost each participant a significant amount of money. For this purpose

a conservative £1m (cost avoidance) is assumed.

The development of DANINT 12C and 12D will hopefully provide each participant the following efficiency benefit. It is assumed that each operator has at least 20 sites. The average site consumes bottled gas (helium) and requires changing approximately once every 8 weeks. This is a one-day job requiring two members of staff on site. Assuming a day rate of £250, each visit costs £500 in labour and £45 for materials (1 bottle of Helium) resulting in a total cost of £545. Each site will require 6 visits per year costing £3,270 in total. The total cost for 20 sites is £64,400 per annun.

The new software and equipment will be more efficient by at least 65%. It is expected that the cost will reduce from £64,400 to £22,540. This solution is expected to last approximately 5 years and therefore the full life cycle savings for each operator is estimated to be £209.3k or £10,465 for each site (based on 20 sites). However, it is assumed that each operator will deploy the solution over 10 sites only during 5 years following project completion. Therefore the saving per operator is £104,650.

If this solution is approved by Ofgem there will be two solutions available for Operators to use. This Model 700 solution will be more cost effective that the Model 500, and will also enhance the viability of injecting other gas sources. This software can be pre loaded when a new model 700 analyser is installed. The software is also compatible with existing systems when fitted with the new processor card.

These benefits may be enhanced following the completion of stage 2.0 and stage 2.1

Other Benefits - This project is being funded equally between the Gas Distribution operators and National Grid Transmission. This provides a good leverage ratio of 5:1 for each funding participant.

Year of Adoption	2016	**Probability Of Success**	50%
Duration Of Benefits	5Yrs	**Project NPV**	£125,783

Potential for Achieving Expected Benefits

This Project is one of the first to be undertaken via the Energy Innovation Centre and collaboration all expected targets are due to be met

Project Progress

A Report defining the Scope of Development for Stage 2.0 & 2.1 has been provided by the supplier. The document has been reviewed by all Networks and its collaborative partners and a final document issued, first Steering Group meeting held April 2013.

Partners	**Collaborative**	NGGD & NGGT	SGN	WWU
		NGN		
	Service Provides	EIC	GL Noble Denton	

7.4 Virtual Testing Platform for Emergency Scenarios

Project Summary Document			
Project Title	Virtual Testing Platform of Emergency Scenarios		
Reference Number	005	**Current Year**	2012/13
Project Description	Develop a working virtual testing platform for investigating possible emergency incident scenarios and solutions.		

Expenditure				
Description	**NGN Costs Only**			Total Project Cost
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£1,516.00	£2,956.00	£0	£30,600
External	£0	£17,400.00	£0	
Materials	£0	£0	£0	
Totals	£1,516.00	£20,356.00	£0	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	NA	
Eradicating Fuel Poverty	NA	
Promoting Energy Savings	NA	
Secure & Reliable Network	Minor Alignment	The creation and development of an emergency exercise testing tool will further improve safety by providing a virtual platform, which will improve safe testing of emergency plans through table top exercises without the need for engineers to experience actual incidents. This will significantly enhance emergency testing procedures.
Environmental	NA	

Technical Area / Issue Addressed by Project

Virtual Reality (VR) and three-dimensional modelling and visualization technologies. Potential for developed use and application within the gas industry. 2008 Research Assessment Exercise was rated as 'nationally significant' with 90% being internationally recognised, excellent, or world-leading. Unique access to develop a bespoke platform for testing and interaction. Development of a virtual tool for enhancing compliance

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	1	11	-1	12

Expected Benefits

Knowledge - This research will bring about a collaborative partnership between Northern Gas Networks and Northumbria University and will realise the development of a virtual tool for enhancing compliance

Safety - Increases the operational safety of employees, but also of the responding agencies to an incident and to the public at large

Network Performance - improves testing of emergency plans through table top exercises without the need for engineers to experience actual incidents.

Year of Adoption	31/12/2012	**Probability Of Success**	50%
Duration Of Benefits	10 Years	**Project NPV**	-£28,000

Potential for Achieving Expected Benefits
In particular it was felt that the proposed solution was a cost effective, safe approach to testing a variety of scenarios. As feedback shows "Other benefits included the ability to test various scenarios and record responses to be used to develop further training and plans". It was agreed that the proposed solution will significantly enhance emergency testing procedures. The outputs following a final meeting in April 2013 will be a copy of the emergency testing platform handed to NGN, with an instruction manual for setting up exercises. A copy of the research thesis undertaken by Kay Rogage will be provided.
Project Progress
This progress report outlines the project activity carried out between April 2012 - March 2013. In March 2012 an exercise was set up to test a third iteration of the prototype with representatives of multiple agencies likely to be involved in a response to a major incident. Following this, a meeting on 22nd May 2013 was held at NGN. The outcome of this was to refine the exercise model further to make it facilitator orientated and to ensure that participants can request data. It was agreed that a simple set of instructions for the model would be supplied. It also became apparent that one of the main outputs of this project, alongside the emergency testing platform would be the research undertaken by Kay Rogage. This involves understanding peoples responses to emergencies. A copy of the thesis undertaken by Kay Rogage is to be handed to NGN following completion.

Partners	**Collaborative**	NGN		
	Service Provides	Northumbria University		

7.5 Study of Potential Sources & Quantities of Biomethane for Gas

Project Summary Document			
Project Title	**7.5 Study of Potential Sources & Quantities of Biomethane for Gas**		
Reference Number	011	**Current Year**	2012/13
Project Description	Identify targets within the NGN distribution area that could be approached to explore collaboration opportunities to develop projects for biogas production and biomethane to grid injection (BtG).		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£8590.00	£0	£0	£25,000
External	£4554.20	£0	£0	
Materials	£0	£0	£0	
Totals	£13,144.20	£0	£0	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Good	By facilitating and supporting various sectors accessing the grid network with Bio-Methane this has the potential to contribute to the de-carbonisation of Natural Gas
Eradicating Fuel Poverty		
Promoting Energy Savings	Good	Uses an alternative source of gas to enhance capacity, thus having potential energy savings
Secure & Reliable Network	Good	Injection of gas into a gas network will increase capacity further improving a reliable gas supply
Environmental	Strong	The biogas or gas from biomass, if not used, may have to be disposed of alternatively which could impact on the environment. The project meets the environmental objectives to achieve (<1%) methane emissions.

Technical Area / Issue Addressed by Project

Provide a guide on future potential areas for development of Biomethane to Grid
Produce a roadmap for future feasible projects at specific location within NGN Network
Identify specific sectors for potential collaboration opportunities to develop B2G projects
Provide quantification of the potentially available feedstock volumes that are suitable for AD processing in the NGN area
An assessment will be provided that identifies the geographical areas that present the highest potential to process available feedstock

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	4	23	6	17

Expected Benefits

Knowledge - Roadmap will provide essential knowledge of all sectors, potential collaboration partners and strategy for future AD plants close to NGN network
Environmental - Potential to have an impact on the decarbonisation of gas
Network Performance - Increase in renewable gas volumes and sources into the network
External Risk - Sustainable increased supply from biogas and gas from biomass
Other Benefits - External benefits, target 5 new connections to the network over five years benefiting industrial sectors and removing waste for processes

Year of Adoption	2013	**Probability Of Success**	50%
Duration Of	10Yrs	**Project NPV**	£10,480,762

Benefits				
Potential for Achieving Expected Benefits				
• The aim of the study is to identify as many potential suppliers of Biogas within the NGN network area as possible. This will be achieved • How many of these suppliers NGN can then encourage and facilitate to become real bio methane projects will become clearer towards the end of 2013				
Project Progress				
• Study kicked off in February 2013 • Initial meetings held with IGEM to define conference to be held September 2013 • Conference partners contacted • Data collection undertaken as part of study				
Partners	**Collaborative**	NGN		
	Service Provides	Rob Heap Consulting		

7.6 Increased Entry Capacity by Compression

Project Summary Document			
Project Title	Increased Entry Capacity by Compression		
Reference Number	012	**Current Year**	2012/2013
Project Description	To demonstrate the feasibility of the use of compression to pump gas into higher pressure tiers at times of low demand, and hence to maximise the capacity for biomethane injection into the gas networks		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£72,632.30	£40,468	£0	£405,590
External	£94,980.02	£60,000	£1,494.85	
Materials	£0	£0	£0	
Totals	£167,612.32	£100,468.00	£1,494.85	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Good	Successful integration of compression into the gas network at strategic locations will enable GDNs to accept biomethane into their networks at many more locations than at present, as capacity is often constrained by the lack of year-round local demand
Eradicating Fuel Poverty	NA	
Promoting Energy Savings	NA	
Secure & Reliable Network	Minor	The introduction of biomethane at a multiplicity of locations will provide additional resilience for gas networks, and also facilitate the long-term continued use of all gas networks
Environmental	Good	The additional quantities of biomethane injection that will be facilitated by the development of intra-network compression will reduce the proportion of fossil gas in the gas network and hence reduce greenhouse gas emissions from gas utilisation

Technical Area / Issue Addressed by Project

- Confirm, by means of simulation model, the steady-state and transient operating characteristics of a compressor installed at a PRS to pump gas from one pressure tier to a higher tier.
- Quantify operational constraints, gas flow metrics, site and equipment pressure settings, safe operating envelopes, consequences of breaching limits
- Review and quantify plant performance characteristics, reaction times, and start-up/shut-down reliabilities
- Derive site or network-specific sensitivities to clarify key considerations when designing explicit site requirements
- Define the technical, commercial and regulatory requirements for a field trial project.
- Injection biomethane into a higher pressure tier using compression

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitute (Industry)	3	13	-4	17

Expected Benefits

Knowledge - The output will provide significant knowledge benefits for the funding parties via firstly the development and testing of the Simulation Model (to be owned by National Grid and NGN) and then subsequently via the design and testing from the field trial installation.

Environmental - It is estimated that compression could be required in relation to around 40% of potential biomethane injection sites, which would otherwise not connect to the gas network. Additional biomethane injection should enhance the resilience of the gas network, and secure its long-term future in an environment when there will be increasing pressure to reduce the use of fossil gas. It is difficult to quantify the environment benefit here given that installation and injections rates may vary from site to site and it is also difficult to predict the number of connections that may be requested in the future.

Network Performance - By ensuring that the output is codified and adopted into existing connection processes it will allow the funding to parties to respond accordingly within the appropriate standards of service.

Other benefits - The project will provide both NGN and National Grid with significant reputational benefits not just by collaborating together but leading the way in maximising the opportunities for biomethane injection and supporting the low carbon economy.

Good leverage will be gained given that the project will be joint funded between NGN and National Grid. However, consideration is required given that part of the costs may be capitalised depending upon the field test site.

Year of Adoption	31/03/2013	**Probability Of Success**	80%
Duration Of Benefits	0Years	**Project NPV**	-£360,191

Potential for Achieving Expected Benefits

Technical/Engineering Achievements to Date:
These are detailed in the final report and include:

- Proof that the computer control system was appropriate for compliance.
- Proof that the control system on the governor installation was appropriate from compliance.
- Over and under-pressure compliance was confirmed as being compliant.

The objective of this project is to deliver a low cost option to create entry capacity medium pressures systems during periods of low demand i.e. summer evenings. During these conditions potential biomethane entry schemes would not be able to flow gas thus restricting income and the respective scheme viabilities. The field trial demonstrated compliance and now when a suitable biomethane scheme applies for network entry in a demand restricted network a full working scheme could be considered. Only the compression element would be considered for IFI funding as the clean up BtG would have to be funded fully by the developer and not the GDN

Project Progress

- Completion of site installation of all components specified in the design
- Completion of network trials to test the safety and security of supply functions of the equipment, with results confirming there is no additional risk to the network or connected consumers.
- Completion of a simulated biomethane grid injection pilot trial to successfully prove the operational functionality of the equipment
- Validation of the computer model in respect of steady state conditions and transient flows

Additional costs were incurred by NGN in order to prepare the Skipton site for the field trial. These costs will be funded between National Grid and NGN equally utilising the contingency on the project and the funds that were available for the final stage that is no longer required given the project will close after the current stage is finalised.

Partners	**Collaborative**	NGN	National Grid	CNG Services
	Service Provides	CNG Services		

7.7 Investigation of CO Atmospheric Detectors for use by FCO's

Project Summary Document			
Project Title	Investigation of CO Atmospheric Detectors for use by FCO's		
Reference Number	014	**Current Year**	2012/13
Project Description	To confirm the capabilities of gas detection equipment to perform atmospheric tests for Carbon Monoxide in addition to the normal methane detection function.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£36,162.50	£39,063	£9,000	£318,229
External	£124,175.69	£86,203	£25,461.50	
Materials	£0	£0	£0	
Totals	£160,338.19	£125,266.00	£34,461.50	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	NA	
Eradicating Fuel Poverty	Strong Alignment	Project will deliver capability for FCO's responding to emergency calls to carry out atmospheric tests for Carbon Monoxide
Promoting Energy Savings	NA	
Secure & Reliable Network	NA	
Environmental	Strong Alignment	Delivers safe environment for customers

Technical Area / Issue Addressed by Project

Issue is that at present tests are by visual inspection only and not by approved atmospheric testing methods.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution (Industry)	4	21	0	21

Expected Benefits

Knowledge - NGN - retain report's findings

Safety - Possible reduction in CO incidents

Environmental - Every job will have CO detection capability particular societal benefits in GIB and PRE responses plus responding to specific CO request

Network Performance - Demonstrates businesses approach to deliver beyond GS(M)R

External Risk - Deliver better confidence in potential CO enriched environments

Other benefits - Significant in going over and above regulatory requirements to address a socially sensitive issue. NB may be included in GD1- RIIO

Year of Adoption	31/08/2013	**Probability Of Success**	90%
Duration Of Benefits	5 years	**Project NPV**	-£120,850

Potential for Achieving Expected Benefits

Expected benefits have been easily met, good feedback from operational staff, new information gathered for CO publicity, Local Councils contacted with new information				
Project Progress				
48 FCOs and 5 Repair and replacement teams trained and operating the 7B-500R 5 Network Officers fully trained and supporting Operational staff 8300 Domestic properties checked for CO FCOs working to approved CO deviation All CO readings (374) have been dealt with using new procedures CO Findings recorded				
Partners	**Collaborative**	NGN		
	Service Provides	GMI		

7.8 Cured In Place and Polyurethane Spray Linings for >12" Pipes

Project Summary Document			
Project Title	Cured In Place and Polyurethane Spray Linings for >12" Pipes		
Reference Number	015	**Current Year**	2012/13
Project Description	The overall aim is to demonstrate that CIP and PU spray linings are 'fit for purpose' as a permanent repair/rehabilitation technique for gas distribution mains, so supporting future Health and Safety Executive approval for the techniques as an alternative to pipeline replacement. This will include conducting mechanical testing on linings, laboratory and site trials and auditing of installation practicalities, quality assurance and quality control procedures.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£9,609.50	£2,570.00	£10,000.00	£1,500,000
External	£14,742.54	£5,942.00	£83,700.00	
Materials		£0	£0	
Totals	£24,352.04	£8,512.00	£93,700.00	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Strong alignment	Utilisation of thinner wall solutions over PE, that are easier to transport and install
Eradicating Fuel Poverty	NA	
Promoting Energy Savings	NA	
Secure & Reliable Network	Strong alignment	Leads to a significant improvement in large diameter replacement
Environmental	Strong alignment	Reduction in excavation due to reduced pipe entries and ability to replace longer lengths

Technical Area / 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

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	3	7	0	7

Expected Benefits

Knowledge - This initial stage of this project is to validate the proof of concept which will also will inform the business of the potential benefits

Network Performance - Significant. These will be articulated during later stages

Year of Adoption	??	**Probability Of Success**	25%
Duration Of Benefits	10 Years	**Project NPV**	-£261,559

Potential for Achieving Expected Benefits

2011/12

At this stage it is envisaged that the following work elements would be required in order to achieve expected

benefits:

- desk review of available CIP & PU lining technologies
- write a performance specification and best practice guide for CIP linings in the Gas Industry
- write a performance specification and best practice guide for PU Spray Linings in the Gas Industry
- evaluate and develop CIP & PU products as required
- trials and testing of products and auditing of process installation and monitoring procedures

2012/13

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

Work during 2011/12, WRc has undertaken:

- appointing sub-contractors
- starting desk review of National and International performance specifications for cured-in-place pipe linings for utility applications
- starting desk review of available cured-in-place pipe technology
- developing the contents listing for an interim performance specification for cured-in-place pipe linings for gas application
- developing the contents listing for an interim best practice guide for cured-in-place pipe linings for gas application

Work to be undertaken in 2012/13 includes:

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 Cured-in-Place 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 cured-in-place liners and spray lining, UC9239.02, February 2013, and;
- Use of Cured-in-Place and Polyurethane 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 and validate against these Stage 1 documents, under controlled conditions, a range of available CIP lining solutions 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).

-

Partners	**Collaborative**	NGN	WWU	SGN
		NGG	DVS Pipelines	
	Service Provides	WRC		

7.9 Customer Self Isolation & Restoration Risk Assessment R&D

Project Summary Document			
Project Title	Customer Self Isolation & Restoration Risk Assessment R&D		
Reference Number	016	**Current Year**	2012/13
Project Description	This project is to develop a risk assessment model that would be included in the gas supply emergency procedures for all DNs, that would determine the optimal approach to take to customer self isolation & restoration.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£6,318.60	£1,673.00	£0	£29,897
External	£2,259.00	£1,457.00	£0	
Materials		£0	£0	
Totals	£8,577.60	£3,130.00	£0	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	NA	
Eradicating Fuel Poverty	Minor Alignment	This proposal enables GDNs to focus its resources on vulnerable customers in an incident rather than across the whole customer population
Promoting Energy Savings	Minor Alignment	By reducing the incident duration, fewer (fuel inefficient) electric heaters will need to be issued, and will be in use for a shorter duration.
Secure & Reliable Network	Good Alignment	This proposal will enable the gas network to be restores much quicker than under current arrangements
Environmental	Good Alignment	By reducing the incident duration, fewer (fuel inefficient) electric heaters will need to be issued, and will be in use for a shorter duration.

Technical Area / Issue Addressed by Project

To determine:
The predicted number of fatalities caused by gas incidents
The predicted number of fatalities caused by the effects of weather

during a gas supply outage, for:
Established approaches to managing the incident
Alternative approaches to managing the incident.

This information will then be used during an incident to determine the most appropriate approach to adopt.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	3	22	-5	27

Expected Benefits

Knowledge - This will deliver a robust risk assessment module which will enable informed decision making on when it is appropriate to use self isolation and restoration.

Safety - Incident casualties will be reduced by shortening the duration of the incident.

Environmental - By reducing the incident duration, fewer (fuel inefficient) electric heaters will need to be issued, and will be in use for a shorter duration

Network Performance - Supply to the affected customers are restored much quicker and thereby enhancing the performance of the network.

External Risk - Reduces impact on society in the affected areas. e.g. Not overloading the electricity grid with subsequent electrical supply failures.

Other Benefits - £25/hr X 8hrs + £37.50/hr X 4hrs = £350/day per FCO (Excl overheads and any recharging uplifts).
£350 X 200 FCOs in 1 day = £70,000.
This data is based on the assumption that the UK will experience 1 incident in a 10 year cycle

Year of Adoption	31/8/13	**Probability Of Success**	90%
Duration Of Benefits	1 Year	**Project NPV**	£34,011

Potential for Achieving Expected Benefits

The work will be undertaken in two separate phases to enable a feasibility analysis to be carried out initially. This phase will consist of locating and obtaining available data and determining whether it is sufficient to allow the full risk analysis to be undertaken. The assumptions required, where data is not available will need to be considered in detail during this phase.

The second phase will then utilise all available information and assumptions to build the models that can be used to generate the required graphs. The probabilistic model will utilise fault tree methodology and will consist of a QRA (Quantified Risk Assessment) approach which identifies potential hazards and quantifies the risk associated with them. Scenarios and assumptions agreed under Phase 1 will be used within the model.

A sensitivity analysis will also be carried out on the inputs. The delivered report will then provide the required graphs and will state clearly all assumptions made, the reasoning behind the assumptions and the results of sensitivity analysis

Project Progress

The work was undertaken in two separate phases to enable a feasibility analysis to be carried out initially. This phase consisted of locating and obtaining available data and determining whether it is sufficient to allow the full risk analysis to be undertaken.

The second phase utilised all available information and assumptions to build the models that can be used to generate the required graphs

Event diagrams have been established to enable a model to be built to estimate the predicted number of gas safety related fatalities required for graph 1. A methodology for developing graph 2 (predicted number of cold weather related fatalities) has also been developed. The inputs for both graphs have been highlighted to show where the most uncertainty in the data lies.

The development of event diagrams and the availability of associated probabilities has determined that the development of a fully populated model is feasible to enable the two graphs required by SGN to be produced

This work has been completed and the decision support tool developed. The HSE have reviewed the risk assessment and have concluded it is sound although there are some recommendations which will be followed up in due course.

Work is currently ongoing to integrate this decision support tool into industry emergency procedures and to develop the wider customer self isolation & restoration process.
This project is substantially complete

Partners	**Collaborative**	NGN	SGN	WWU
		NGG		
	Service Provides	GL Noble Denton		

7.10 Assessing the Threat of Internal Stress Corrosion Cracking (ISCC) on Pipeline Integrity

Project Summary Document			
Project Title	**Assessing the Threat of Internal Stress Corrosion Cracking (ISCC) on Pipeline Integrity**		
Reference Number	017	**Current Year**	2012/13
Project Description	The objective of this project is to develop a method of assessing the threat of internal stress corrosion cracking (ISCC) in pipelines previously used to transport manufactured gas. Using 6 pre selected sections of pipeline that is to be tested to confirm the presence of Internal cracking. 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 selected pipe samples retrieved from Lamesley. The report will present a methodology to identify whether a pipeline 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.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£0	£0	£7,000.00	£78,000
External	£19,500.00	£0	£0	
Materials		£0	£0	
Totals	£19,500.00	£0	£7,000.00	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy		
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network	Strong	Understanding where ISCC occurs to allow a repair to be made prior to an incident
Environmental		

Technical Area / Issue Addressed by Project
Summarise the different gas manufacturing processes used historically in the UK, from 1950 to conversion to natural gas; Where possible, identify which transmission pipelines were fed by which gas manufacturing process; Develop an ISCC threat assessment algorithm, and provide guidelines to identify the position(s) along the pipeline route where ISCC is most likely.

Innovation Type	**SD Rating**	**Benefits Rating**	**Residual Risk**	**Overall Score**
Substitution (apps)	4	30	-6	36

Expected Benefits			
Knowledge - Understanding the extent of the threat of ISCC to the integrity of the gas pipeline networks. Other Benefits - Cost avoidance benefit, however this will not be quantified in Stage 1.			
Year of Adoption	30/4/14	**Probability Of Success**	100%
Duration Of Benefits	1 Year	**Project NPV**	-£77,999

Potential for Achieving Expected Benefits				
This Project is one of the first to be undertaken via the Energy Innovation Centre and collaboration all expected targets are due to be met				
Project Progress				
A Report defining the Scope of Development for Stage 1.0 has been provided by the supplier. The document has been reviewed by all Networks and its collaborative partners and a final document issued, first Steering Group meeting held April 2013. Networks currently interrogating their own systems to locate old Gas plants in their Network.				
Partners	**Collaborative**	NGGD	SGN	WWU
	Service Provides	EIC	GL Noble Denton	

7.11 System Control Simulator

Project Summary Document			
Project Title	**System Control Simulator**		
Reference Number	018	**Current Year**	2012/13
Project Description	To design and develop a software programme which simulates the daily system control operation of North and North East LDZ.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£5,750	£0	£0	£29,750
External	£24,000	£0	£0	
Materials		£0	£0	
Totals	£29,750.00	£0	£0	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	NA	
Eradicating Fuel Poverty	NA	
Promoting Energy Savings	Good	Improved operational practice resulting in reduced own use gas for pre-heating and efficient offtake performance, both part of shrinkage costs.
Secure & Reliable Network	Good	Improves operator confidence in system performance allowing better decision making. Improved training and assessment increases competency and consistency throughout the daily control operation
Environmental	High	Reduced carbon emissions at pre-heat installations

Technical Area / Issue Addressed by Project

Often, finding the solution to the complex systems we have is a game of chance, where there are a limited number of variables but a near limitless combination of these to achieve the required result. Because simulation software is visual and animated it lets you clearly describe your proposal to others. It's more convincing that just displaying the end results as people can't see where these came from. Simulation is so effective at communicating ideas that many companies now use it as a sales tool to promote their products.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Radical	3	17	3	14

Expected Benefits

Knowledge - Carry out on-line emergency analysis /Training/Simulation
Safety - Reduction in Leakage due to 24/7 Pressure Management
Environment - The simulator could provide the detail to avoid the venting of gas to atmosphere during maintenance such as pipeline depressurisation. It can also reduce the need for some pre-heating and the potential for some removal
Network Performance - Improved Security of Supply – monitor critical sites/improve site security, Measure & Improve Fault Resolution
External Risks - Reduce Average & High System Pressures to minimise system leakage

Year of Adoption	2013	**Probability Of Success**	50%
Duration Of Benefits	10 yrs	**Project NPV**	-£509,656

Potential for Achieving Expected Benefits
The benefits will not be achieved as the project is not being pursued. Delivery of new and enhanced systems are to be completed under Business Strategy Record 26

Project Progress
The feasibility study was completed in April 2012. GL Noble Denton prepared a full proposal together with commercial quotation for consideration. Proposals from other business partners to enhance our systems were also received and given careful consideration. After much deliberation it was decided not to proceed with the Simulator at this point in time.

Partners	**Collaborative**	NGN		
	Service Provides	GL Noble Denton		

7.12 Representation of Gas Distribution Networks in key standardisation areas

Project Summary Document			
Project Title	**Representation of Gas Distribution Networks in key standardisation areas**		
Reference Number	019	**Current Year**	2012/13
Project Description	The aim of the proposed work is to brief the UK gas industry on international and European developments in standardisation in the area of standardisation and energy measurement. The main objectives will be to: a) Provide reports and updates on an agreed list of key working groups. b) Facilitate an agreed position and UK input into the agreed list of key working groups		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£0	£0	£0	£31,517
External	£5148.60	£0	£10,000.00	
Materials	£0	£0	£0	
Totals	£5148.60	£0	£10,000.00	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy		NA
Eradicating Fuel Poverty		NA
Promoting Energy Savings		NA
Secure & Reliable Network	Strong	Ensure a continued secure and reliable gas supply and standardised gas quality in line with the potential changes European legislation or directive may bring as a result of changes within the UK gas industry based upon decision made at European working groups.
Environmental	Minor	This work will provide the participating DN's with a routine into and potential influence of the use of Bio methane within their distribution networks.

Technical Area / Issue Addressed by Project

Natural gas - Calculation of calorific values, density, relative density and Wobbe index from composition.

Natural gas - Determination of composition with defined uncertainty by gas chromatography.

Natural gas – Performance evaluation for on-line analytical systems.

UK gas quality and the Gas Safety (Management) Regulations.

European specification or standard for quality of biogas and other non-conventional sources of gas.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	2	12	-12	24

Expected Benefits

Knowledge – All knowledge will be transferred in full to the Network

Year of Adoption	2013	**Probability Of Success**	100%
Duration Of Benefits	1 year	**Project NPV**	-£21,179

Potential for Achieving Expected Benefits

- Industry has been appraised of the progress and issues surrounding the key standards in two briefing sessions with Gas Quality within the Gas Distribution Networks. An impact assessment on the changes in ISO6976 will also be updated.
- Best practice in Europe is being shared during the development of European standards for natural gas and biomethane
- In particular biomethane injection in Europe is further advanced than in the UK and this is helping to shape UK view on biomethane specifications in the UK.
- Performance evaluation of CVDDs in the UK has advanced significantly in the UK and the methodologies developed have been incorporated into the revised ISO 10723.

Project Progress

- The Gas Distribution Networks have been represented on the review or development of five standards that were agreed as key to the UK gas industry: three international standards that are under review and two European standards that are being developed following Mandates issues to CEN by the EC.
- The three ISO standards are concerned with analysis of natural gas and the calculation of key properties from the resulting composition.
- ISO 6974 is the natural gas analysis standard under development currently comprises six parts. The first two parts deal with processing of data and have been extensively revised and include methods for determining the uncertainty in compositions. Publication of Parts 1 and 2 is expected soon. Part five deals with the most commonly used CV Determination Device (CVDD) employed in the UK and has been revised to include uncertainty calculations. It will shortly be issued for comment as a Final Draft ISO Standard, the last stage before publication. A new seventh part will also be developed, which will cover micro GCs. These can be used as lower-cost CVDDs and are likely to play a greater role in natural gas in the future.
- ISO 6976 is the standard covering calculation of properties of natural gas from composition. It covers calculation of properties such as Calorific Value and Wobbe Index, which are extensively referred to in UK legislation. Calorific Value is critical in calculating energy, which is the basis by which natural gas is traded and the amount of gas conveyed by gas transporters is quantified. The draft standard has been issued for commend as a Committee Draft. ISO have asked the working group charged with revision of ISO 6976 to harmonize this standard with similar US standards.
- The two new European standards cover future European natural gas and biomethane specifications. Both are at a relatively early stage of development.

Partners	**Collaborative**	NGGD	SGN	W&WU
		NGN		
	Service Provides	Dave Lander Consulting		

7.13 Orifice Plate Deformation

Project Summary Document			
Project Title	**Orifice Plate Deformation**		
Reference Number	020	**Current Year**	2012/13
Project Description	The objective 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 the Industry Standard.		

Expenditure

Description	NGN Costs Only			Total Project Cost
	Current Year	Previous Year	Projected Next Year	
Internal	£0	£0	£7,000	£81,525.00
External	£12,920	£0	£12,920	
Materials	£0	£0	£0	
Totals	£12,920.00	£0	£19,920.00	

Based on IFI/SD Financial Year

Alignment to Sustainable Development

Area	Strength of Alignment	Evidence
Low Carbon Economy		NA
Eradicating Fuel Poverty		NA
Promoting Energy Savings		NA
Secure & Reliable Network	Good	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.
Environmental		NA

Technical Area / Issue Addressed by Project

- Survey of existing technical literature to establish current status of orifice plate deformation calculation.
- Establish the causes of the differences between the Jeplast routine within HPMIS 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 by all Networks

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	3	10	4	6

Expected Benefits

Knowledge -
The main benefit to arise from the initial stage of this work will be ascertaining of crucical knowledge in determining whether the current assessment tools are robust and fit for purpose. This initail work will enable the business to defend outstanding actions and challenges from Ofgem and independent auditors.

Network Performance
Most of the gas going through National Grid Gas Distribution's offtakes passes though orifice-plate metering systems. The mass flow through the meter is proportional to the square root of the differential pressure across the plate. During normal operation, the plate is deformed elastically but when excessive differential pressures are applied the plate can become permanently deformed. As an orifice plate deforms, metering

errors are introduced. A plate that is permanently deformed can lead to:-

- Significant metering errors which have a direct impact on transmission and distribution revenue
- Potential operational difficulty in orifice plate extraction
- Total orifice plate replacement (precision machining)

At this stage it is difficult to quantify any financial impact.

Other Benefits

There will be reputational benefits to be gained with Ofgem, Shippers and external technical auditors if the work is successful.

Year of Adoption	2015	**Probability Of Success**	25%
Duration Of Benefits	1 year	**Project NPV**	-£232,554

Potential for Achieving Expected Benefits

2012/13

This Project is one of the first to be undertaken via the Energy Innovation Centre and collaboration all expected targets in Stage two: Carry out novel computational fluid dynamics and finite element analysis calculations to establish how orifice plates behave in the field. This study will establish those parameters or geometries that have the greatest effect on the deformation of orifice plates. Recommend a new method, as appropriate, to assess orifice plate deformation for implementation

Project Progress

2012/13

The document has been reviewed by all Networks and its collaborative partners and a final document issued, first Steering Group meeting held April 2013. Stage one has already been completed with National Grid Gas Distribution. This 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 Gas Distribution 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

Partners	**Collaborative**	NGGT	NGGD	SGN
		NGN		
	Service Provides	EIC	GL Noble Denton	

7.14 SR25 IGEM

Project Summary Document			
Project Title	**SR25 calculator**		
Reference Number	022	**Current Year**	2012/13
Project Description	To create an excel spreadsheet calculator tool to allow the calculations in IGEM/SR/25 Edition 2 to be easily and consistently applied and an elexctroic auditable.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£2072.90	£0	£0	£31,517
External	£3350.00	£0	£0	
Materials		£0	£0	
Totals	£5422.90	£0	£0	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy		
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network	Good	Accurate and reliable identification of SR25 requirement at operational sites and an output aligned to the requirements if IGEM SR25 Ed 2 document
Environmental		

Technical Area / Issue Addressed by Project

The classification of Natural Gas installation hazardous areas and the requirements to ensure adequate ventilation for safe operation and the location in which they operate.

The main features of the package include:
Modules: In addition to the existing modules (Buildings, Vents, Multi-Venting and Gasholders) as the existing tool, a new Outdoors module will be implemented. However, there will be significant differences and additions in the Buildings, Vents and Multi-Venting modules, affecting the underlying methodology and/or the user interface.

GUI: The Graphical User Interface will remain similar to that of the current tool. However, improvements may be introduced if dictated by ergonomic considerations or more robust implementation of the methodology logic.

Data files: The calculator makes extensive use of pre-computed results, which are included as tables in the Excel spreadsheet. This approach will be retained but some will be modified and new tables will be added.

Save/Load facilities: The current facilities of saving the data for a case in a text file will be retained. If desirable, backwards compatibility will be implemented, so that case files produced with the current version of the tool will be accessible from the new package.

Output: The current approach of writing the results to pre-existing templates in the spreadsheet, also containing explanatory diagrams, will be retained.

On-line help: The existing system of informative messages on the methodology will be retained and possibly

augmented with new information, when appropriate.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	1	13	-4	17

Expected Benefits

Knowledge - Transfer the use of the SR 25 model to GDN's
Safety - Lead to the avoidance of potential LTA's and major injury which can be quantified on a GDN specific basis.
Network Performance - ensure compliance with adopted IGEM/SR/25 specification and the avoidance of any associated fines.
External Risk - Mitigate or prevent against minor incidents

Year of Adoption	2012	**Probability Of Success**	100%
Duration Of Benefits	3Yrs	**Project NPV**	-£26,800

Potential for Achieving Expected Benefits

The benefits identified in the PPF:

1. Consistent and rapid assessment of hazardous area classification of Natural Gas installations throughout UK.
2. Enable safety of the public, employees and plant to be maintained.
3. Enable cost savings for the both the assessment of hazardous areas and the cost of implementing the requirements for safety.

Implementation is in the initial phase as this report is compiled but it is envisaged that ALL benefits will be realised.

Project Progress

This project has delivered a software program that allows the GDN's to assess each above ground installation in line with the requirement of SR25 Ed 2.

This will ensure a consistent review of above ground installations across the 4 GDN's.

During the development of the model/calculator minor issues were identified and addressed but some issues such as calculation the hazardous area of a below ground installation cannot be calculated with the delivered calculator.

Training and delivery was made during 2012 to all networks.

Partners	**Collaborative**	W&WU	SGN	NGGD
		NGN		
	Service Provides	IGEM	GL Noble Denton	

7.15 Green Road Installation

Project Summary Document			
Project Title	Green Road Installation		
Reference Number	023	**Current Year**	2012/13
Project Description	Increase safe driving behaviours to improve our performance with regard to blameworthy collisions.		

Expenditure

Description	NGN Costs Only			Total Project Cost
	Current Year	Previous Year	Projected Next Year	
Internal	£141,395.00	£55,486.00	£0	£238,081
External	£17,500.00	£23,700.00	£0	
Materials	£0	£0	£0	
0Totals	£158,895.00	£79,186.00	£0	

Based on IFI/SD Financial Year

Alignment to Sustainable Development

Area	Strength of Alignment	Evidence
Low Carbon Economy	Good Alignment	This will reduce carbon emissions from lower fuel usage
Eradicating Fuel Poverty	NA	
Promoting Energy Savings	Minor Alignment	Can reduce fuel consumption by 10%
Secure & Reliable Network	NA	
Environmental	Good Alignment	This will reduce carbon emissions from lower fuel usage

Technical Area / Issue Addressed by Project

Within the business we are able to measure our safety performance but we were only able to measure driving behaviour after an incident had occurred

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution (Industry)	3	19	-1	20

Expected Benefits

Knowledge - This solution empowers the drivers to manage their own safety and the technology highlights which drivers are at highest risk

Safety - Increased driver safety that reduces the number of collisions and protects lives

Environmental - Benefits the environment with decreased fuel consumption by 10%

External risks - Reduces blameworthy collisions by 30%

Other Benefits - Decreased fuel consumption by 10%

Year of Adoption	2014	**Probability Of Success**	90%
Duration Of Benefits	5 Years	**Project NPV**	£302,352

Potential for Achieving Expected Benefits

- Based on project results to date we expect all outline benefits to be achieved

Project Progress				
• 99 Fleet vehicles have now been fitted with GreenRoad Technologies telemetrics devices to measure driver behaviour within NGN • 50 Devices were installed in June 2011 • November 2011 analysis was completed on the driver behaviour to find that there had been a 47% increase in safer driving behaviour • Drivers in the 'Green Zone' produce a 10.8% saving on fuel • 49 Devices installed in March 2012				
Partners	**Collaborative**	NGN		
	Service Provides	GreenRoad Technologies		

7.16 Small Distribution Techniques

Project Summary Document			
Project Title	Small Distribution Techniques Project (Duct Probe)		
Reference Number	025	**Current Year**	2012/13
Project Description	Working in collaboration with partners, suppliers and other stakeholders these small scale projects be aimed at increasing safety, reliability of supply and improve our environmental performance. Typically these projects will be aimed at our mains replacement, new connections and repairing the network, but could including emergency and maintaining apparatus. NGN require assessment and demonstration of new and emerging techniques that have potential to improve frontline operations. Early adoption of new technologies assists SME's deliver improvements to the whole of the gas sector. Adoption will raise operational knowledge via an independent appraisal that will determine whether an innovation opportunity can be quickly deployed into the business as efficiently.		

Expenditure

Description	NGN Costs Only			Total Project Cost
	Current Year	Previous Year	Projected Next Year	
Internal	£0	£700.00	£7,000.00	£26,804
External	£6,604.00	£5,000.00	£7,500.00	
Materials	£0	£0		
Totals	£6,604.00	£5,700.00	£14,500.00	

Based on IFI/SD Financial Year

Alignment to Sustainable Development

Area	Strength of Alignment	Evidence
Low Carbon Economy	Minor Alignment	Avoidance of excavation early resolution of escaping gas
Eradicating Fuel Poverty	NA	
Promoting Energy Savings	NA	
Secure & Reliable Network	Good Alignment	Improvement in operator safety. Efficient utilisation of tools, techniques and equipment that enhance the operation, replacement and maintenance of the gas network
Environmental	Good Alignment	Reduce leakage from system earlier

Technical Area / Issue Addressed by Project

Reducing need for landfill
Speed to market for emerging small technologies
Operational knowledge and learning from safe development and deployment
Reducing day to day safety risks for frontline operators
Reducing noise pollution from existing plant and equipment
Avoid isolation or customer interruptions or reduce impact on customers
Improve no-dig technologies or no gas operations
Improve the performance of the network and reduce average system pressure

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	3	20	-3	23

Expected Benefits

Knowledge - New skills developed by operational teams
Safety - Reduction in possible MOP injuries
Environment - Small number of jobs that resolved escape earlier than without technique

Network Performance - Minor incremental improvements in operational activities External Risk - Prevention of minor accident				
Year of Adoption	2013	**Probability Of Success**		75%
Duration Of Benefits	5 Years	**Project NPV**		£245,385
Potential for Achieving Expected Benefits				
This project focuses on a wide range of development and deployment of small emerging tools and techniques that incrementally improve day to day safety of operatives and members of the public. Areas under investigation and improvement all affect our impact on the environment including quickly reducing emission from the network, reducing our carbon footprint and reducing energy consumption. With direct employee involvement NGN is committed to developing its people and ensuring they have regular involvement in the innovation process. This project will always involve frontline staff and assist in them gaining new knowledge.				
Project Progress				
• The purchase of 12 rapid service isolation kits • Trial usage and deployment planned for 2013 • Still awaiting start date				
Partners	**Collaborative**	NGN		
	Service Provides	Steve Vick Ltd		

7.17 Cured In Place Spray Lining For Repairs of Pipes below 8" Mains

Project Summary Document			
Project Title	**Cured-in-place and polyurethane spray linings <8"**		
Reference Number	027	**Current Year**	2012/13
Project Description	The overall aim is to demonstrate that CIP and PU spray linings are 'fit for purpose' as a permanent repair/rehabilitation technique for gas distribution mains, so supporting future Health and Safety Executive approval for the techniques as an alternative to pipeline replacement. This will include conducting physical site trial and auditing of installation practicalities, quality assurance and quality control procedures.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£875.00	£0	£0	£50,000
External	£34,830.40	£0	£8,706.98	
Materials		£0	£0	
Totals	£35,705.40	£0	£8,706.98	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Strong	Utilisation of thinner wall solutions over PE, that are easier to transport and install
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network	Strong	Leads to a significant improvement in none MPRS Risk replacement
Environmental	Strong	Reduction in excavation due to reduced pipe entries and ability to replace longer lengths.

Technical Area / 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

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	5	19	-1	20

Expected Benefits

Knowledge - This initial stage of this project is to validate the proof of concept which will also will inform the business of the potential benefits

Safety - Impact on reducing leakage and possible gas incident

Network Performance - These will be articulated during later stages

Year of Adoption	2013	**Probability Of Success**	75%
Duration Of Benefits	20 Years	**Project NPV**	-£3,084

Potential for Achieving Expected Benefits
• The expected benefits were not realized on this trial mainly due to the fact of the number of services and joints on the existing main. • The lining of the main was proven to work on the sections of main where there were no services or joints and the camera survey proved there was an even coating of the spray lining resin on these areas of the main. • Although the trial did not meet the expected benefits on this project it is believed that it would be successful on other projects of a larger diameter with no services and limited fittings.
Project Progress
The project was surveyed and identified as a appropriate project to trial the use of spray lining rather than using the traditional methods of mains renewal such as insertion or open cut. All the services were renewed in advance of the spray lining going ahead to ensure that there would be enough time on the day to do the trial and get the customers back on gas at an appropriate time The main laying team prepared the mains and isolated the gas supply to allow the sprat lining process to commence. Due to the condition of the existing 4" steel main the team could not get the main to hold an adequate pressure test as the lining could not adequately cover the "pin holes" in the main To ensure that the gas supply was back in commission on the same day the team reverted to a traditional method of inserting a new 63mm main in the 4" main and the gas supplies were restored. The process was trialed again on other sections but again the team could not get the main to hold an adequate pressure test due to the services and joints on the existing main.

Partners	**Collaborative**	NGN		
	Service Provides	BBUSL		

7.18 Energy Innovation Centre

Project Summary Document			
Project Title	**Energy Innovation Centre**		
Reference Number	028	**Current Year**	2012/13
Project Description	The primary objective for 2012 / 13 is to deliver a minimum of 3 investments to each network operator, as agreed with Industry. This will secure future of the EIC by providing Industry Partners with the added value which enables them to continue to fund the EIC in 2013 / 14.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£5,905	£0	£0	£339,488
External	£124,836	£0	£0	
Materials		£0	£0	
Totals	£130,741.00	£0	£0	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy		
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network		
Environmental		

Technical Area / Issue Addressed by Project

- It is unclear who to approach with an innovative idea or product and there is no clear process – suppliers rely on existing relationships
- A formal and regular collaborative forum to generate ideas and test solutions amongst suppliers would be welcomed
- An industry wide challenge is the lack of investment from networks
- Networks with dedicated R&D or innovation departments are not necessarily the easiest to engage with on innovative topics
- There needs to be clarity on proactively engaging with the supply chain to maximise the benefits available and promote awareness
- SME's or start up's find it extremely difficult to deal with Networks

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score

Expected Benefits

Minimum of 34 IFI eligible propositions developed and presented to Electricity Network Operators
Minimum 12 IFI eligible propositions developed and presented to Gas Network Operators
Deliver 10 international referrals
3 Investments per DNO
5 Investments per GNO
Minimum £600K IFI investment

Year of Adoption		**Probability Of Success**	
Duration Of Benefits		**Project NPV**	

Potential for Achieving Expected Benefits

With all GDN's and most of the DNO's now partners in the EIC it has the potential to raise innovation within the energy sector.

With the emphasis on sharing innovation across companies under Network Innovation Allowance this has the potential to speed up collaborative projects.

Project Progress

Seven Projects are at the Synopisis Uploaded Stage

Seven Projects are at the stage of working up detailed proposals

Six projects are live and in progress

Partners	**Collaborative**	WWU	NGGD	SGN
		NGN		
	Service Provides	EIC		

7.19 Predictive Analytics

Project Summary Document			
Project Title	**Predictive Analytics**		
Reference Number	030	**Current Year**	2012/13
Project Description	Predictive analytics is an area of statistical analysis that deals with extracting information from data and using it to predict future trends and behaviour patterns. The core of predictive analytics relies on capturing relationships between independent variables and the predicted variables from past occurrences and exploiting it to predict future outcomes. The level of accuracy of the created predictor is very much dependent on the quality of the data analysis and assumptions within the model. Key objective is the proof of concept in this technique to provide a demonstration of the benefit of deploying predictive modelling to trial this technique against a test sample of data to demonstrate that it can clearly identify those cases that are going to fail. IBM along with its partner Presidion will deliver a report and repeatable outputs that can be immediately used as part of a possible NGN Predictive Analytics implementation strategy		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£5,064.80	£0	£20,000.00	£176,840
External	£38,244.67	£0	£100,000.00	
Materials		£0	£0	
Totals	£43,309.47	£0	£120,000.00	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Minor	Reducing travel by reducing the number of multiple visits to site
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network	Good	Potential to complete escapes in a more effective manner reducing open excavation times and remove risk of escaping gas early
Environmental	Good	Improvement in the amount of gas emitted from the network by ceasing escape earlier

Technical Area / Issue Addressed by Project
NGN would like to identify the major factors that are associated repairs failing to be completed within 7 and 28 days. This would then help COAM's to prioritise repair cases from an objective and more scientific base, helping them to meet the safety case targets.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitute (Industry)`	3	20	0	20

Expected Benefits
Knowledge - New knowledge will be fully transferred to NGN Safety - Ensuring increased response times to attending escapes by understanding where escapes are likely to occur Environment - Preventative maintenance prior to leakage occurrence Network Performance - Reduced down time as better resource planning capability

External Risks - Failure to meeting regulatory and statutory targets			
Year of Adoption	2014	**Probability Of Success**	75%
Duration Of Benefits	5 Years	**Project NPV**	£95,321

Potential for Achieving Expected Benefits

It is believed that the application of the principle of Predictive Analytics will be a major contributory factor towards achieving these benefits.

- Resource Management
- Winter Contingency Planning
- Logistics Management
- Business Continuity Scenario Planning
- Effective Job Allocation
- Effective Scenario Development
- Pressure & Load Management
- Customer Satisfaction

Project Progress

Proof of Concept of Predictive Analytics Model developed for Leeds Area, providing a predictive capability of up to 96% accuracy for PREs.

Further enhancements to the model to provide predictive capability of PREs that are in danger of going out of standard.

Reporting capability on Repair type required for each PRE.

The major issue during the project was that of data sourcing and extraction

Partners	**Collaborative**	NGN		
	Service Provides	IBM - Presidion		

7.20 Gas Futures Group – Domestic Heating Project

Project Summary Document			
Project Title	**Domestic Heating Project**		
Reference Number	032	**Current Year**	2012/13
Project Description	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 (cost to change and behavioural) and the impact on the gas and electricity distribution networks out to 2050.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£10,670.00	£0	£0	£77,671
External	£8335.08	£0	£0	
Materials		£0	£0	
Totals	£19,005.08	£0	£0	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Good	Research to better understand future the uptake of various residential appliances that may develop in a low carbon economy.
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network		
Environmental		

Technical Area / Issue Addressed by Project

1. 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.

2. Map out a range of realistic heating solutions base around long term scenarios, in particular, referencing the types of appliances suitable for different housing types out to 2050

3. Providing a more detailed scenario analysis with focus on domestic heating supply, demand and heating method up to 2050 achieving the 80% national CO2 reduction target.

4. Review the implications of how existing Government policies could influence the scenarios i.e. the Carbon Neutral Homes, Renewable Heat Incentive or any other relevant assumptions or sensitivities that should be considered.

5. Consider the current UK housing stock split and new build “zero carbon homes” definitions from the Zero Carbon Hub.

6. Consider the within day and within year seasonal swing in heat demand and demand reductions over time by segmented housing analysis and how that could be met from alternative sources e.g. hybrid/peak heating, electrification, storage etc.

7. Consider the existing assumptions and projections regarding energy efficiency rollout rates and examine how various levels of energy efficiency can impact on overall costs.

8. Consider injection of biomethane, quantity realistically available and alternative uses for heat, transport and power.

9. Evaluate the average annual cost for the provision of heat taking into account technology, efficiency and variations in house types and compare this to costs for conventional heating systems.

10. Map out other impacts on customers e.g. behavioural change/demand side response e.g. changes in appliance usage and system interaction such as those outlined in the EST research into heat pumps

11. Identify any issues associated with suitability of technologies i.e. retrofitting heat pumps, solid wall insulation issues, biomass boiler fuels availability and emissions.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	3	8	-5	13

Expected Benefits

Knowledge - Transfer of key information from modelling related to the longevity of network assets - identification of business requirements / need by 2050 which will support asset depreciation, regulatory submissions and reputation.
Identifies the market segments for gas into the future and indicate market intervention risks to such markets so business impacts can be assessed and strategies formulated.
The output is seen as necessary to enter into dialogue with DECC regarding long term views concerning the delivery of heat in a low carbon economy.
Other Benefits - Reputational benefits for all participants as the output will input inform the DECC Heat Strategy. The project also provides good leverage benefits for all funding participants.

Year of Adoption	2012	**Probability Of Success**	25%
Duration Of Benefits	0Yrs	**Project NPV**	-£77,671

Potential for Achieving Expected Benefits

Knowledge benefit realised.
Other reputational benefits are likely to have been incurred due to the report being warmly received by the wider energy industry.

The report can be accessed via the ENA website. In order to review the options within the report a model was produced in order 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 it should pursue in meeting their own renewable targets. This model will be used by Strategy & Policy department within the Market Operations team with Transmission.

Project Progress

The production of the report provides essential knowledge concerning the suitable technologies and processes the energy industry could adopt that will assist the UK in meeting its 2050 renewable targets. This output will inform the DECC Heating Strategy.

Partners	**Collaborative**	NGGD	SGN	WWU
		NGGT	Inexus	GTC & NGN
	Service Provides	Delta-ee	ENA	

7.21 E-Pipe

Project Summary Document			
Project Title	**ePIPE**		
Reference Number	033	**Current Year**	2012/13
Project Description	To develop an existing technology to allow the technology to cross over from the water distribution industry to the gas distribution industry.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£0	£0	£7,000.00	£403,810
External	£11,072.56	£0	£83,270.56	
Materials	£0	£0		
Totals	£11,072.56	£0	£90,270.56	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Minor	This technology will prevent leaks and thus help to reduce gas usage.
Eradicating Fuel Poverty	Minor	Many vulnerable customers are housed in buildings that contain gas risers. This system will help to make these environments safer.
Promoting Energy Savings	Good	Prevention of gas leaks.
Secure & Reliable Network	Strong	After a gas riser has been treated the supply of gas should not be interrupted.
Environmental	Good	Preventing gas leaks is beneficial to the environment as methane is a potent greenhouse gas.

Technical Area / Issue Addressed by Project

Improving asset performance

Reducing working at heights

Extending asset life.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitute (Application)	4	29	-5	34

Expected Benefits

Knowledge - Product will be developed with input from GDN's
Safety - Implementation of system will reduce leaks in risers
Environmental - Fewer leaks will mean less methane released to atmosphere
Network Performance - Fewer leaks will enhance network performance
External Risks - Fewer leaks will mitigate the chance of any fire or explosion
Other Benefits - A decrease in costs for the GDN and less disruption for the customers

Year of Adoption	2014	**Probability Of Success**	80%
Duration Of Benefits	36 Years	**Project NPV**	£1,215,472

Potential for Achieving Expected Benefits

The purpose of the Project is to access the existing ePIPE product and to establish its suitability for use on gas risers. Stage one will involve the construction multi-storey mock risers. It also involves the introduction of leakage paths to represent possible on site leakage. Once this stage has been completed successfully it is excepted that all benefits will be achieved, as Stage 1 is a major milestone, once achieved.

Project Progress

The document has been reviewed by all Networks and its collaborative partners and a final document issued, first Steering Group meeting held April 2013.

Initial test location and design has been discussed and finalized, PRS are undertaking off site trials to confirm process, PRS & GLND still to agree Commercial agreement this will be reviewed end May via a Tele conference.

Partners	**Collaborative**	SGN	WWU	NGGD
		NGN		
	Service Provides	EIC	Morrison / Pipe Restoration Services	

7.22 Renewable Technology for Pre-Heating Feasibility Study

Project Summary Document			
Project Title	**Renewable Technology used for Pre-Heating feasibility study**		
Reference Number	034	**Current Year**	2012/13
Project Description	To provide a detailed analysis of renewable technologies this could be suitable for use across NGN's network to pre-heat gas.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£37,380.00	£0	£10,000.00	£100,000
External	£16,588.00	£0	£33,412.00	
Materials		£0		
Totals	£53,968.00	£0	£43,412.00	

Based on IFI/SD Financial Year

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Strong	The pre-design study will provide specific examples of how renewable technology can be utilised by NGN to pre-heat gas across their network. It will also provide details of any limiting factors for a variety of renewable technologies in this application. Examples given will quantify the benefits of a variety of renewable technologies in terms of tonnes of carbon saved per annum compared with traditional methods of pre-heating.This study will be used to inform investment decisions for NGN's RIIO pre-heat scheme justified under CBA.
Eradicating Fuel Poverty		
Promoting Energy Savings	Good	Where inefficient heating systems are currently being used, for example on sites where pre-heating is provided by water bath heaters, the study will detail the most energy efficient way to upgrade these systems. The study will consider the use of renewable technologies and will factor the benefits of using renewable energy into the overall reduction of the carbon footprint of the network.
Secure & Reliable Network		
Environmental	Good	By reducing the amount of natural gas used by NGN as they pre-heat their gas flows, the carbon emissions of the company will be reduced per annum. This will be by the recommendations to improve the efficiency of the pre-heating plant, or by proposing to use alternative fuel / renawable technology to reduce the overall emissions of NGN.

Technical Area / Issue Addressed by Project

- Renewable technologies to be considered
- Biomass Boilers
- CHP (Combined Heat and Power)
- Anaerobic Digestion
- Ground Source Heat Pumps
- Existing Boiler Efficiency Improvements

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score

Significant	4	24	4	20

Expected Benefits
Knowledge - NGN will be the own all of the research carried out and will be able to use the study to base future pre-heating designs on. Environment - Potentially we will be able to roll out renewable technologies applicable to pre-heating across the entire network. Network Performance - The recommendations of this report will calculate the benefits in terms of carbon savings per annum. This will reduce the carbon footprint of the company. External Risk - Each site where pre-heating systems are upgraded will reduce the number of incidents due to younger equipment and improved controls.

Year of Adoption	2013	**Probability Of Success**	50%
Duration Of Benefits	1 year	**Project NPV**	-£100,000

Potential for Achieving Expected Benefits
• The objects of the study have been realized i.e. a comprehensive study into alternative sources of pre heat detailing carbon outputs and overall system efficiency assumptions. • The results of the study have been presented to NGN's design contractors who are now incorporating the findings into the first six pre heating designs of RIIO.

Project Progress
• A comprehensive study of all sources of alternative pre heat has been completed • A detailed analysis of each technology has been undertaken • A report has been produced detailing the findings of the study with clear recommendations against three specific technologies • A new 'system efficiency algorithm' has been developed. • A presentation has been made to all NGN key stakeholders and our design partners

Partners	**Collaborative**	NGN		
	Service Provides	Sweett Group		

7.23 Fracture Monitoring Using Acoustics - Syrinix

Project Summary Document			
Project Title	**Fracture monitoring using Acoustics**		
Reference Number	035	**Current Year**	2012/13
Project Description	To provide an Acoustic monitoring system that will monitor the UK Gas Network 24 / 7 and alert Emergency Gas personnel immediately should the Gas main crack or break.		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£0	£0	£7,000.00	£289,500
External	£30,333.33	£0	£28,334.00	
Materials		£0		
Totals	£30,333.33	£0	£35,334.00	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Strong	Reduced excavation with the use of remote monitoring
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network	Strong	24/7 constant monitoring system that ensure the Gas system is unaffected by ground movement
Environmental	Strong	Reduced excavation also reduces the amount of Natural resources required

Technical Area / Issue Addressed by Project

Acoustic monitoring of buried pipelines.
No requirement to replace Gas mains that historically haven't caused the Network an Operational problem.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution (Industry)	5	31	-1	32

Expected Benefits

Knowledge - New working procedures that will benefit the Business
Safety - 24/7 Constant monitoring of Gas network
Environmental - No need to carryout un- necessary work replacing pipelines
Network Performance - Resources can be utilised in other areas to benefit the Network
External Risk - Allows an immediate response to any major gas escape on these pipelines monitored by Syrinix

Year of Adoption	2014	**Probability Of Success**	70%
Duration Of Benefits	8Yrs	**Project NPV**	£5,087

Potential for Achieving Expected Benefits

This Project is one of the first to be undertaken via the Energy Innovation Centre and collaboration all expected targets are due to be met

Project Progress

This project aligns with Theme 4 of OFGEM's Sustainable Development Themes - Ensuring a secure and reliable gas and electricity supply. The overall project will be informed by the completed Feasibility Study. The design, production and operation of this sensory system will be completely unique and would represent significant technical innovation in the understanding of the nature of the propagation of fracture signals, sensor development and application as well as delivering the ability to react quicker to fracture incident

The project commenced April 2013. It was agreed by all Networks to commence the Project immediately, Syrinix highlighted actions for the Networks (highlighted below) these are key to ensure time scales are not extended. The start date has slipped owing to a number of legal issues, these have now been resolved, the existing timeline is to be moved on 1 month but reviewed later in the project. It was agreed that the Target area of the Project would be Tier 2 Pipelines (8" - 18"inc.) Syrinix has started some project work owing to University time demands.

Partners	**Collaborative**	NGGD	SGN	NGN
	Service Provides	EIC	Syrinix Ltd	

7.24 Tuneable Diode Laser (OptoMole)

Project Summary Document			
Project Title	**OptoMole**		
Reference Number	036	**Current Year**	2012/13
Project Description	Development of a mobile, optical methane sensing system for gas escape teams to use in urban areas.for early detection of gas escapes in cable ducting.		

Expenditure

Description	NGN Costs Only			Total Project Cost
	Current Year	Previous Year	Projected Next Year	
Internal	£0	£0	£7,000.00	£192,896
External	£7,128	£0	£14,357.15	
Materials		£0		
Totals	£7,128.00	£0	£21,357.15	

Based on IFI/SD Financial Year

Alignment to Sustainable Development

Area	Strength of Alignment	Evidence
Low Carbon Economy		
Eradicating Fuel Poverty		
Promoting Energy Savings	Good	Rapid leak location and reduced repair time minimises gas losses from the distribution grid ensuring that more gas is then available for power generation.
Secure & Reliable Network	Strong	Using this technology could: 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
Environmental	Strong	This technology could: Deliver faster gas leak location reduces fugitive methane (a potent greenhouse gas) 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

Technical Area / Issue Addressed by Project

Technical Benefits of OptoSci Solution

Using Tuneable Diode Laser Spectroscopy (TDLS) and fibre optic technology confers other technical benefits to this solution beyond the operational ones above when compared to other sensing techniques:

• 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.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	5	31	-6	37

Expected Benefits			
Knowledge - Essential knowledge transferred to the DNO's as required to operate the system and to realise the benefits Safety - Through earlier leak source detection there is a reduction of multiple potential failures. Environmental - Environmental benefits to a significant population of affected sites Network Performance - Leads to sustainable improvements in regulatory performance targets External Risk - Mitigation of multiple major incidents or prevention of one major incident Other Benefits - Significant financial savings			
Year of Adoption	2015	**Probability Of Success**	75%
Duration Of Benefits	8Yrs	**Project NPV**	£2,730,231

Potential for Achieving Expected Benefits
This Project is one of the first to be undertaken via the Energy Innovation Centre and collaboration all expected targets are due to be met

Project Progress
The document has been reviewed by all Networks and its collaborative partners and a final document issued, first Steering Group meeting held April 2013. Project now called OptoMole and research work started at OptoSci labs, planned meeting on site due June 2013.

Partners				
	Collaborative	NGG	SGN	NGN
	Service Provides	EIC	OptoSci Ltd	

7.25 Research into sustainable energy and relieving fuel poverty in Multi Storey Building

Project Summary Document			
Project Title	**Research into sustainable energy and relieving fuel poverty in Multi Storey Building**		
Reference Number	040	**Current Year**	2012/13
Project Description	Working in collaboration with Northern Power Grid and Leeds City Council on reducing energy costs, de-risking buildings with Gas and supporting low carbon alternative energy for fuel poverty. Develop a program to understand developments for Multi Story Buildings and their owner / occupants requirements		

Expenditure				
Description	**NGN Costs Only**			**Total Project Cost**
	Current Year	**Previous Year**	**Projected Next Year**	
Internal	£7782.60	£0	£7,000.00	£19,500
External	£3556.60	£0	£15,943.40	
Materials		£0		
Totals	£11339.20	£0	£22,943.40	
Based on IFI/SD Financial Year				

Alignment to Sustainable Development		
Area	**Strength of Alignment**	**Evidence**
Low Carbon Economy	Good	Opportunity to identify lowest emission heat source for MSB and decrease waste heat
Eradicating Fuel Poverty	Strong	The majority of people occupying housing association building fall into this area improving heat options will be aimed at decreasing costs
Promoting Energy Savings	Good	By working in collaboration with NPG and promoting options part of the project will raise awareness around options to save energy
Secure & Reliable Network		
Environmental	Good	Look for opportunities to provide renewable heat sources

Technical Area / Issue Addressed by Project

Above ground asset on buildings above six storeys are a risk to the residents and the buildings. Maintenance is extremely labour intensive and difficult. Detailed inspection, repair and replacement is intrusive for the residents, expensive and time consuming.

Removing these assets and leaving residents with Electrical Heat could result in further fuel poverty and place an unacceptable burden on the electricity grid.

Removing high rise supplies and providing residents with a renewable heat source that removes the burden on the electricity network is a major challenge on all three parties in this project.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution (Apps)	4	23	-3	26

Expected Benefits

Knowledge - Knowledge is shared across LA, electricity and gas sectors. Combined knoweldge is also shared with residents of MSB's.
Safety - Opportunity to de-risk MSB's
Environment - Aim is to provide lower emission heat source
External Risk - Working in collaboration with Northern Power Grid as the power sector challenge a difficult to reach sector of the community
Other Benefits - Stakeholder and customer benefits

Year of Adoption	2014	**Probability Of Success**	50%
Duration Of Benefits	10 Years	**Project NPV**	£176,227

Potential for Achieving Expected Benefits

This is at an early stage but all parties are committed to the project and have shown a real willingness to address this issue. Some technological & human issues to overcome that may be challenging in the future.

Project Progress

- Commissioned CES to act as coordinator for the project
- Held a series of meeting with Northern Power Grid and Leeds CC on approach and project scope
- Shared data across sectors, highlighting new information and assisting in developing strategy
- Started a similar approach with Newcastle City Council to share experience

Partners	**Collaborative**	NGN	NPG	
	Service Provides	CES		

7.26 Innovation Project Management

Project Summary Document			
Project Title	Innovation Project Management		
Reference Number		**Current Year**	2012/13
Project Description	Programme Management of ENA projects as per the good practice guide. Implementing process changes within NGN to ensure reporting compliance. Working with authority, other networks and external bodies on programme controls and understanding innovation processes.		

Expenditure

Description	NGN Costs Only			Total Project Cost
	Current Year	Previous Year	Projected Next Year	
Internal	£75,058.85	£50,087.00	£75,000.00	£75,000pa
External				
Materials				
Totals	£75,058.85	£50,087.00	£75,000.00	

Based on IFI/SD Financial Year

Alignment to Sustainable Development

Area	Strength of Alignment	Evidence
Low Carbon Economy		
Eradicating Fuel Poverty		
Promoting Energy Savings		
Secure & Reliable Network		
Environmental		

Technical Area / Issue Addressed by Project

- Development documentation
- Scoping projects that do not reach approval level
- Scoping future projects
- Supporting managers in IFI/SD processes and documentation completion
- Ensuring compliance with good practice guide
- Contributing to and consulting on proposed changes to innovation stimulus
- Making recommendations and changes to internal processes
- Completing Annual Report

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score

Expected Benefits

By undertaking this process centrally it avoids duplication of effort and inconsistent approaches. Delivers visibility of internal costs on managing innovation support rather than including these overhead costs to each individual project.

Internal management of IFI/SD is critical to ensure costs are managed effectively and reported accurately.

Year of Adoption		Probability Of Success	
Duration Of		Project NPV	

Benefits				
Potential for Achieving Expected Benefits				
Project Progress				
Partners	**Collaborative**			
	Service Provides			