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IFI/SD Annual Report

Innovation Funding Incentive for Sustainable Development I **Gas Distribution**

2010 - 2011

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Front cover image IFI 11 Keyhole Technology Winner of the Innovation Award at the IGEM/SBGI May 2011 award ceremony

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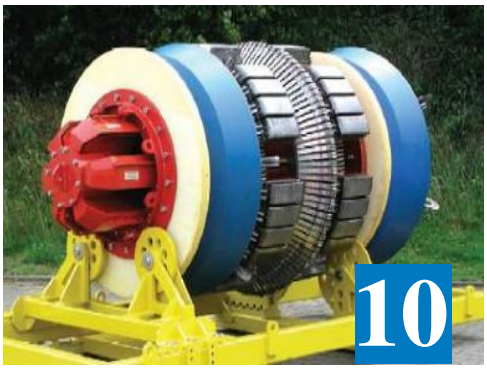

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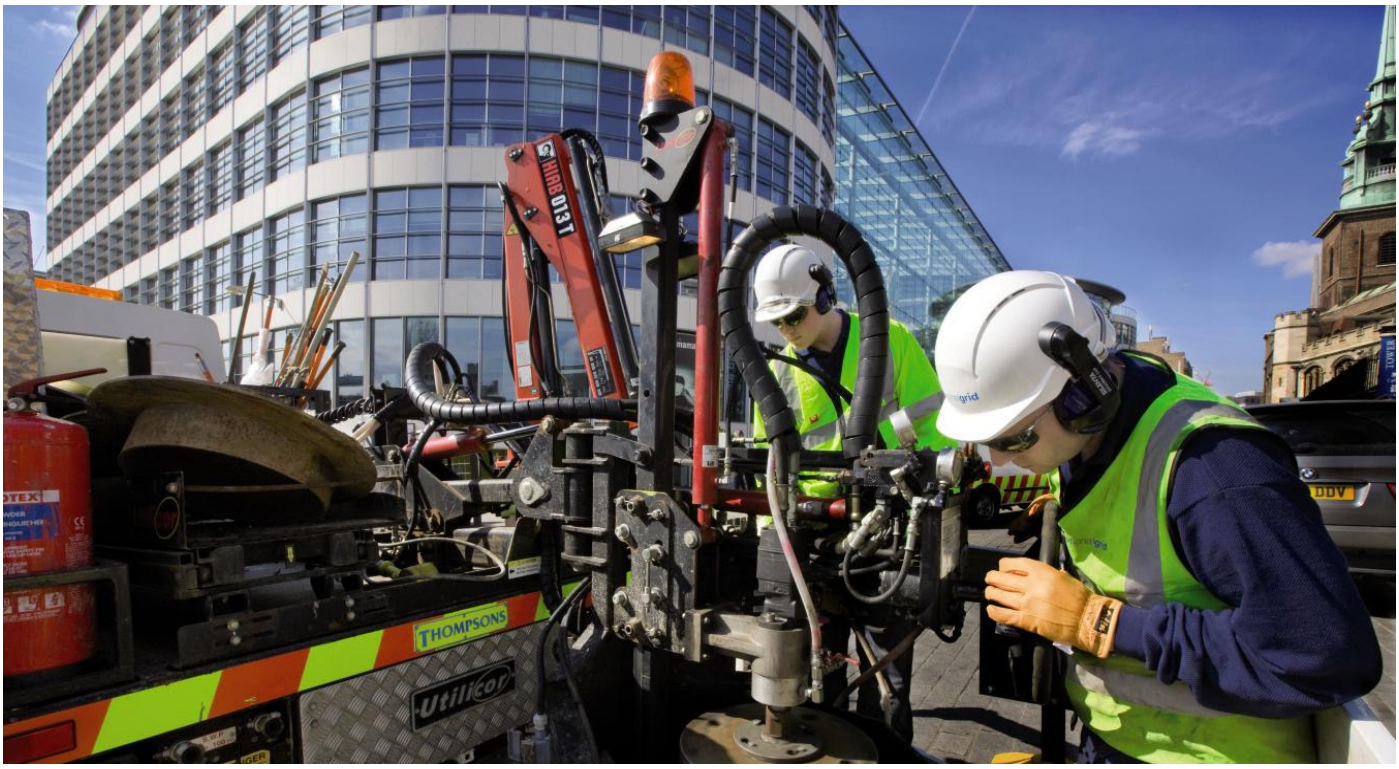


National Grid UK owns and operates the Gas Transmission system throughout Great Britain and, through its low pressure Gas Distribution business, distributes gas in the heart of England to approximately eleven million businesses, schools and homes. National Grid owns and operates the high voltage electricity transmission system in England and Wales and operates the Scottish high voltage system.

> “190,000 kilometers of gas distribution pipelines and 10.8 million customers”

Gas Distribution UK

Gas Distribution UK segment comprises four of the eight regional gas distribution networks in Great Britain. The networks comprises of approximately 190,000 kilometers of gas distribution pipelines and transports gas on behalf of 25 active gas shippers from the gas national transmission system to around 10.8 million consumers. We also manage the national gas emergency contact centre service for all the gas distribution networks and for other transporters in the UK.

Introduction from John Pettigrew

Welcome to the third report presenting the Gas Distribution Innovation Programme delivered under the Innovation Funding Incentive for Sustainable Development (IFI/SD).

Our current Innovation Strategy compliments our Company vision and strategy, promoting technological advances and developing knowledge to provide a safe, efficient and reliable network - to deliver value to our customers and safeguard the environment. Our aim is to balance our portfolio to improve efficiency, improve asset and energy management and support the environment.

During 2010/11 National Grid Gas Distribution invested 78% of the gas allowance with a total spend of £5.72m and continued to address priorities and challenges to improve future business performance in 3 main areas:

1. To improve asset and energy management;
2. To trial new technology and techniques to support operational efficiency and challenges in the field;
3. To support improvements in all aspects of the environment especially the transition to a low carbon economy.

As we move into 2011 our Strategy will continue to align to our Company vision and compliment key strategic principles of the new RIIO-GD1 framework by maximising the opportunities of innovation to improve our performance and to support the development of a safe, sustainable, efficient and affordable, secure and flexible energy system for future generations.

In the three years since IFI/SD commenced Gas Distribution has commissioned a total of 67 projects. These cover a wide spectrum of activities and this year resulted in the construction of the first UK purpose built biomethane plant preparing to inject Bio-Methane into our gas network in 2011. This is an area that requires further development to ensure the best utilisation of such a valuable resource for the UK economy. We also deployed further keyhole technology to improve efficiency and safety to our field workforce and minimised disruption to the public and we continue to conduct research into the life of our PE network to inform future asset management strategy.

I'm personally proud that nearly a third of our projects have been commissioned through collaboration with other industry stakeholders and we aim to continually increase project collaborative into the future.

This report provides details of each active project currently in the portfolio with some interesting programme highlights.

I hope you find this third report a useful insight into the value of IFI/SD from a National Grid Gas Distribution perspective and that the report illustrates our commitment to the future Gas network.

John Pettigrew,
Chief Operating Officer for Gas Distribution & Metering

Overview of 2010 / 2011 programme

In the third year of the Programme we have continued to:

1. Work to the Gas Distribution Innovation Strategy in line with our Company strategy
2. Review and move existing projects through their various stage gates to ensure projects meet the intended objectives
3. Improve our processes and systems to manage the programme more effectively.

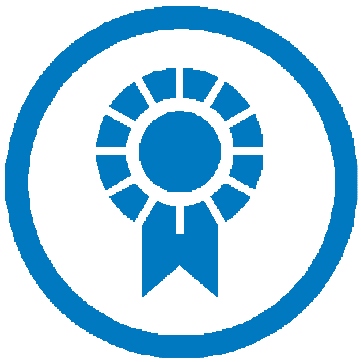
Our aim is to balance our portfolio to improve efficiency, improve asset and energy management and support the environment - always aligning to one or more of the 5 sustainable themes*.

There are 45 live projects detailed in appendix 1 . Each project summary provides details of costs to date, project progress and benefits we aim to achieve.

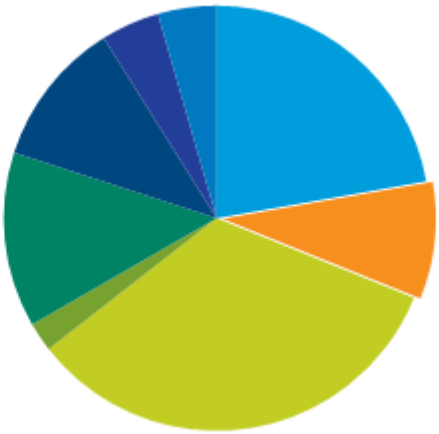
The pie chart to the right aims to summarise the challenges we are addressing within our portfolio which shows

We have clear governance and visibility of our plans at executive level. We have adopted a stage gate approach to project management that ensures decisions are made to proceed or close a project, reviewed against the project objectives and the potential benefit delivery. Our processes have been improved this year to further enhance the project scoping phase and to improve communications with key stakeholders.

We continue to collaborate with our Gas Transmission business however these projects are either jointly funded with other European partners or with the GDN's. Since the formation of IFI/SD 8 projects have been commissioned with all the GDN's.



"Safety, Efficiency, Reliability"



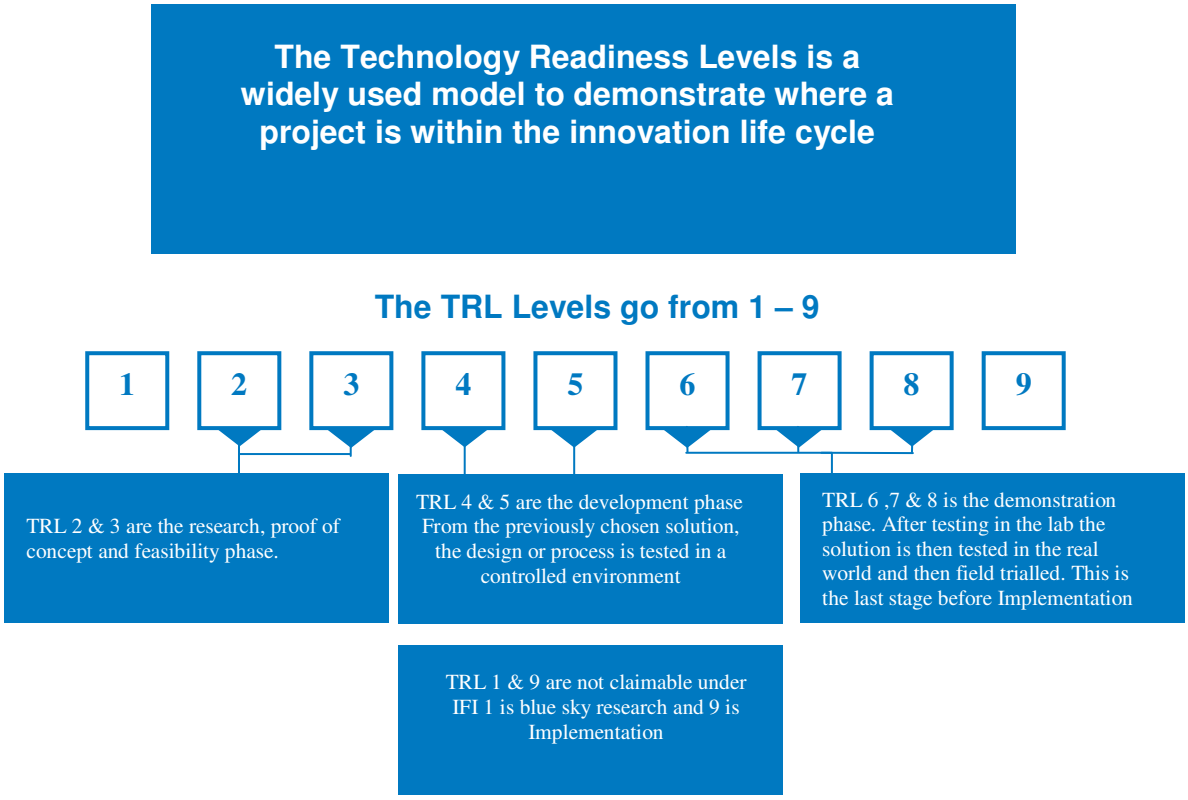
- 1 Techniques for new and Replacement Programmes (10)
- 2 Asset Data and Systems (4)
- 3 Asset Integrity Management (15)
- 4 Damage Prevention (6)
- 5 Environmental improvements (6)
- 6 Renewable gas &/Bio fuels (5)
- 7 Safety (2)
- 8 Security of Supply (2)

(Indicates number of projects within each field)

* The 5 sustainable themes are : *Managing the transition to low carbon energy economy, Eradicating fuel poverty & protecting vulnerable customers, Promoting energy saving Ensuring secure & reliable gas & electricity supply, Supporting improvement in all aspects of the environment*

Programme Highlights

As part of this report Gas Distribution would like to highlight the broad range of challenges that currently make up our innovation portfolio all at different phases of development and technical maturity. In order to highlight the different levels of maturity that we are currently exploring, all projects highlighted will have an indication of their technology readiness level (TRL).



The Innovation Project Lifecycle

The TRL indicates how close a technology is to becoming both technically and commercially viable and can be seen above. Level 1 relates to research with no obvious purpose more commonly known as “Blue Sky Research” and Level 9 on the TRL scale indicates products/information readily available with no development required. Currently Gas Distribution innovation activities have been focussed between TRL’s 2 and 8. This range ensures that Gas Distribution balances both tactical and strategic projects within its portfolio but also ensures that the innovation money is being used for innovation activities and not purchasing existing solutions.

To establish a project’s importance can depend on a number of factors, technological advancement, size, cost, benefits, risk (both technical and commercial), leverage, strategic or tactical positioning, and whether it is short or medium term in nature.

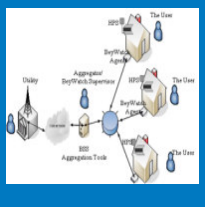
The projects highlighted in the following pages provide the differences between the TRL’s and illustrate National Grid’s approach to maintaining a balanced portfolio.

Validating the Role of Gas in the Energy Mix of a Low Carbon Economy Future

Focus : Long Term
Positioning : Strategic
Risk : High
Benefits : Knowledge

IFI 3 Impact of Future Energy Systems on Energy Networks (TRL 4)

IFI 61 Gas Futures Study (TRL 2)



Through the European collaborative project "Project Beywatch", IFI:3 aimed to further our understanding of the impact of new and renewable energy systems on energy supply in order to model the design of potential future energy network infrastructures. The project uses simulations of individual property energy demands to assess the impact of decadal scenarios for overlapping low voltage electricity and low pressure gas energy networks with a view of identifying the timescales for reinforcement. Whilst the project was initiated in 2007 additional scenarios were included from 2011 to align with subsequent work carried out through IFI:61 - "Gas Futures Project" by Redpoint and Trilemma.

The project identified that the transition to a low carbon economy and the optimisation of smart grids depends not only on the deployment of smart meters and the associated telecommunication systems, but also the adoption of major consuming appliances compatible with sizeable demand size management flexibility, such as heat appliances (boilers, micro Combined Heat and Power and heat pumps) and transport (cars, small fleet vehicles) that can provide for an effective demand side response. Such technology will also require significant development of the lower voltage networks (in some scenarios upwards of 5 to 7 times the electricity network capacity) which would need to be deployed to accommodate the rate of appliance adoption.

The work also highlights the potential for gas appliances such as micro Combined Heat and Power as an option for delivering peak heat demand when central generation plant becomes constrained for longer periods (particularly in winter). The project highlights the need for a comprehensive plan to align appliance uptake with energy network infrastructure deployment and suggests, given the scale of potential DNO potential capacity requirements, that such "rewiring" for anticipated demand may be necessary to avoid a detrimental consumer experience. The study has also stimulated questions to the role of hybrid heating systems or dual gas/ electric heating appliances as part of an integrated "Smart Grid" and the potential need for integrating gas and electric network planning and management.

The joint GDN project IFI:61 determined that the role of gas was key to the UK economy and could both achieve environmental targets and play an enduring role in the future energy mix as a solution to peak heat demand. The analysis highlights that whilst natural gas is the cleanest fossil fuel and has the advantage of being stored between seasons, unlike electricity, it could be economically advantageous to integrate gas and electric heating for peaky heat loads i.e. older housing stock. It was also highlighted that natural gas could be further de-carbonised by adopting technologies much as carbon capture and storage (CCS) and bio-methane injection in the gas grid. This analysis provided four key scenarios all of which have different levels of complexity, risk and more importantly investment and consequential cost to consumers.

From our work in both these studies it is highly likely that in the next 5-10 years the primary function of gas conveyance will not change significantly. It is expected that gas will continue to play a dominant role in heating and a significant contribution to unabated power generation. Our work has indicated that we are entering a period of significant uncertainty to network demands. Historically, demand and therefore network capacity requirements grew with new connections and UK economic growth. From these studies and under certain conditions it is possible that demand could fall if affordable efficiency measures are adopted by individual consumers. There remains additional uncertainty to the uptake of new connections due to policy on "zero Carbon Homes and Offices" and the impact of Carbon reduction measures and the recovery from recession on commercial and industrial load growth.

However, it is not anticipated that any significant transaction from gas heating to electricity heating would take place over the next decade and in the long term it is suggested that gas could act as a primary method of balancing seasonal heat demand economically with low Carbon electricity. The work has highlighted the need for continued advancements in electricity and gas technologies and further research and development. Whilst some technologies are well established i.e. Heat pumps or Bio-Methane (Anaerobic Digestion), over the next decade there needs to be continued focus on determining whether other technologies may come to fruition and play an economic role into the future and how such technologies most effectively contribute to a Low Carbon Economy that is secure, affordable, sustainable and flexible to environmental and market conditions.

Facilitating Renewable Gas Injection into the Network

Focus : Medium / Short
Positioning : Tactical
Risk : Low
Benefits : Environmental / Knowledge

IFI 18 Biomethane (TRL 5)

IFI 47 Adnams (TRL 6)

Renewable gas has the potential to make significant contribution to renewable energy targets while also providing diversity and security of supply and is one National Grid's top priorities. During 2010 within IFI 47 we have designed and constructed a biogas plant at Adnams brewery in Suffolk which will take gas produced from food and brewery waste which when processed via a cryogenic clean up process will be injected into out IP network.

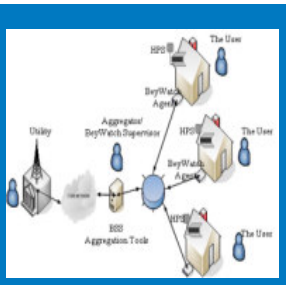
IFI 18 provided the feasibility and knowledge to design a biogas plant however constraints has meant that our collaborative partners had to stop the project. See appendix 1 for more details.

The injection of bio-methane is still an emerging market place and two perspectives can be outlined:

- In the short term the number of bio-gas injection points is likely to increase given that the renewable heat incentive (RHI) has been agreed. Whilst work is in progress to modulise or package bio-methane connections, future innovations will probably be in the incremental form of improving the current technologies and on different configurations that will enable the capital investment costs to be reduced for end users to adopt.

- In the medium term, there is still further research to complete. Research on how bio-methane gas impacts upon assets on the network and also how it will impact upon the wider society given that it will be potentially sourced from sewage and animal farms, where the impact to human health increases from microbial perspective.

Accurate Demand Scenarios to aid future Network Investment Decisions



Focus : Medium term
Positioning : Strategic
Risk : Medium
Benefits : knowledge and efficiency

IFI 3 Beywatch Impact of Future Energy Systems on Energy (TRL 4)

IFI 19 Better load Analysis and demand forecasting (TRL 4)

IFI:3 and IFI:61results have been used to inform the national debate on future networks for the next 40 years and has been presented to Ofgem, DECC and the wider industry. The IFI:3 energy model can be used to model a variety of future energy scenarios and is anticipated to be further used in subsequent studies.

IFI:19 seeks to determine whether the current principles of managing peak demand, based upon assumptions developed in the late 1980's, are still valid for use today. These assumptions are also critical from a planning perspective as they underpin how future modifications to the network are specified, designed and then deployed.

Reducing Risk for a Safer Operation of a Network

Focus : Short Term
Positioning : Tactical
Risk : Low
Benefits : Risk management

IFI 21 Improvements to the MRPS Model (TRL 7)
IFI 50 Proximity Effects of Squeeze Off on PE Pipe Joints (TRL 5)
IFI 64 New Interval Methodology for In Line Inspection (TRL 7)

While most tactical projects focus on utilising tools and technology that will then deliver efficiency benefits, other projects focus on reducing risk associated with our activities of conveying gas in a safe and secure manner.

The output from the IFI:21 project demonstrates how we manage and maintain the risk prioritisation tool that determines when mains and services need remedial action or indeed replaced. This is in line with the Intervals risk based approach however, given its alignment to mains replacement activities this is often a key part of the price control.

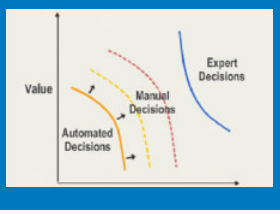
IFI 50 will provide new industry knowledge concerning the stresses involved on PE pipelines during squeeze off operations.

IFI 64 Interval - the output will provide a significant improvement in how corrosion management will be undertaken going forward. The output has been endorsed by the HSE in November 2010
The benefit of having R&D to underpin business practice demonstrates that the risk is being managed appropriately based on up to date knowledge but more importantly, supported by the HSE it proves invaluable independent justification for our required business plans.

Maximising the opportunity from new tools and techniques

Focus : Short Term
Positioning : Tactical
Risk : Low
Benefits : Efficiency and Customer

IFI 11 Keyhole technology (TRL 8)
IFI 7 Risk based automatic handling of plant enquiries (TRL 7)



A proportion of the portfolio is focused on developing new tools and techniques. These broadly fall into two categories either, tangible tools/techniques for physical use in the field or intangible tools/techniques for the management of assets and day to day processes (i.e. decision support tools / procedural processes etc). These projects often will deliver efficiency savings.

IFI:11 Using conventional techniques, the drilling and tapping of holes in gas mains requires a large excavation to be made that goes under the main. Keyhole equipment has been developed that when used with a weighted beam, allows holes to be drilled and tapped using keyhole excavations without the need to expose the full circumference. This, in turn, means that it is possible to install fittings, undertake internal camera surveys of the main, and internally spray joint sealant in the main. The main benefits expected from this project will be a significant reduction is excavation costs, less materials going to landfill and an improved customer experience

In addition new manual tools were developed so that the technique and processes could be adapted for use in the UK which facilitated the isolation, installation and relaying of a domestic gas service and making the necessary connection to a metallic gas main. This is an example of substitutional Innovation taking existing technology from the USA.

IFI7 has developed a new web based system that will handle plant enquires from third parties. The system will be able to automate responses based upon a set of pre-defined rules and provide these back to the initiators much quicker than in the past. It is hoped that this system will not provide process and cost efficiencies but will also improve safety and our service to customers. During 2010_11 the external trial of the system with third parties proved successful increasing response time significantly, therefore improving customer service. This project has been collaborative with our transmission business so all National Grid plant enquiries are fed through one system.

Finance Overview and Benefits of Programme

This section of the report gives the financial information associated with the 2010_11 programme as agreed in the IFI/SD Good Practice Guide (GPG).

In year 3 there are 45 live projects moving through the research, development and demonstration phase with the total spend of £5.72m utilising 75% of the gas allowance Ten new projects started and 35 continued from year 2.

Internal resources supporting projects increase as projects move through the innovation lifecycle. 9 projects exceeded the internal 15% cap demonstrating our internal technical input is vital to the success of the projects.

Potential benefits are assessed on an individual project basis against the GPG benefit criteria and reassessed at each stage gate. This has delivered a balanced programme providing a potential positive NPV overall.

Anticipated benefits are documented against project in appendix 1 and are achieved by:

- Direct cost reductions
- Avoided cost
- Managing risk
- Strategic knowledge
- Environmental or safety

The potential benefits outlined in 2010/11 programme knowledge acquisition and direct future costs savings and avoided costs. Typical benefits are estimated based on implementation of innovation for a 5 to 10 year period dependant on project and estimated implementation timescales. These benefits are factored into future business plans for Gas Distribution and will be reviewed as projects progress through to implementation. The programme also delivers non financial benefits such in safety, environment, reputational and customer benefits.

Revenue	**£1459m**
IFI Allowance	**£7.290m**
IFI Carry over	**£0**
External Expenditure	**£4. 975m**
Internal Expenditure	**£745m**
TotalTotal Expenditure	**£5.720m**
Anticipated IFI Allowance (For 2011_12)	**£6.900m**
Number of Active Projects	**45**

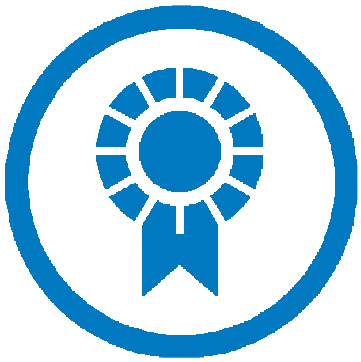
Looking Forward

Our Innovation Strategy will be reviewed during 2011 to ensure it is relevant during transition to the new innovation strategy as part of RIIO-GD1 and remains aligned to our Co strategy. We believe that the IFI programme can migrate through to the new price control regime and will work with Ofgem to understand how this will be achieved through participation in Ofgem's Innovation Working Group.

Our aim is maximise the benefits from the current portfolio during the remaining price control period so more focus will be given on implementation of projects which are progressing through to TRL8 and 9.

We will continue to seek to influence governments and regulatory bodies on the forward energy agenda incorporating knowledge gained through innovation – leading in demonstration of renewable gas to the gas distribution networks.

We will look ahead for opportunities to bid into the Network Innovation Competition to support the transition to a low carbon economy.



"We expect to utilise the full IFI/SD allowance in 2011_12"

RIIO GD1

Innovation Project Reports Contents Page

Project Reference & Title:

Appendix 1

(IFI3) Impact of Future Energy Systems on Energy Networks (Beywatch)

Year: 2010/11

Project Description	Design guidelines for future energy networks need to be enhanced to take account of the increasing use of new and renewable energy systems. This project will provide the data that will be used to optimise the design/sizing guidelines of future energy networks.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£8,779.00	£17,385.00	£0.00	
External	£80,892.00	£132,060.00	£0.00	£3,617,250.00
Materials	£0.00	£0.00	£0.00	
Total	£89,671.00	£149,445.00	£0.00	

Status	
	Approved
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	The project will use energy modelling & field trial data to drive network analysis models for large scale energy networks. The network modelling will examine the impact of future usage patterns of energy networks will be affected by the increasing application of new and renewable energy systems such as: o New/future distributed environmental technologies on power distribution networks o Local renewable technology (solar, PV's, DCHP etc) o New energy efficient home appliances/energy systems o Smart metering o Energy suppliers' demand-side management models The work will propose solutions for future energy grid operation & infrastructure design.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	The future usage patterns of energy networks will be affected by the increasing application of new and renewable energy systems. The project will use energy modelling & field trial data to drive network analysis models for large scale energy networks. The network modelling will examine the impact of: o New/future distributed environmental technologies on power distribution networks o Local renewable technology (solar, PV's, DCHP etc) o New energy efficient home appliances/energy systems o Smart metering o Energy suppliers' demand-side management models The work will propose solutions for future energy grid operation & infrastructure design.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Development of a flexible energy model design approach that can be adapted to fit a variety of energy scenarios and provide hourly demand profiles for both gas and electricity. o Definition of 30 year energy scenarios for application to the energy model o Production of a detailed SynerGEE gas distribution model for a sample network (large town)

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	13	-5	18

Expected benefits of project	To understand the impact of new and renewable energy systems on energy supply in order to optimise the design of future energy network infrastructure. The new model will enable optimised design/sizing of future energy network infrastructure to take account of changing energy load requirements. The project should allow optimum design of future network infrastructure to take account of the impact of new renewable energy systems.

(IFI3) Impact of Future Energy Systems on Energy Networks (Beywatch)

Year: 2010/11

National Grid's project is part of a pan european collaboration project. The total cost of the project is 4.7m euros and therefore the leverage ratio is approximately 13:1.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	10 yrs	50%	£1,349,480

Potential for achieving expected benefits

The work has provided key information that has been used to help develop a strategy for energy supply and the optimum development of future energy networks.

Results from the project have been used to inform the national debate on energy network futures and identify areas that the UK strategic plan must address to build a cohesive network strategy for the next 40 years. In accordance with this objective the work has been presented to both DECC and OFGEM.

The energy model will be used to model a variety of future energy scenarios and help identify issues and opportunities to enhance network development and performance.

Project Progress

Energy modelling results for 3 detailed scenarios were fed into network distribution models for both gas and electricity. Following base-line verification work of the network models, the energy scenarios were then played forward over 4 decades to provide a decade-by-decade view of the demands placed onto the energy networks to provide a view of the typical seasonal and peak demands on both gas and electricity networks for the period 2010 to 2050. The results have been used to help guide strategy and the development of such network in the future.

Collab' Partners

Telefonica (Spain)
EDF (Electricite de France - France)
Synlexis Solutions (Greece)
GL UK (UK)
Gorenje DD (Slovenia)
Fagor (Spain)
Keletron (Greece)
University of Palermo (Italy)
Sigma Research (France)

Provider(s) GL Noble Denton

(IFI4) Optimise Own Energy Use (PRIs)

Year: 2010/11

Project Description

The project targets the energy used by National Grid in non-vehicular applications, aiming to reduce and optimise the energy used to establish company-wide best practice for operational Pressure Reducing Installations and Offtakes.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£60,034.00	£39,693.00	£101,371.00	
External	£545,511.00	£219,750.00	£575,972.00	£3,143,304.36
Materials	£208,011.00	£54,020.00	£1,026,789.00	
Total	£813,556.00	£313,463.00	£1,704,132.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Good Alignment. Viable alternative forms of pre-heat with measured energy savings of lower carbon emissions.
☐ **2 Eradicating Fuel Poverty**	
☑ **3 Promoting Energy Savings**	Major Alignment. More effective and efficient use of energy will lead to energy savings and reduced emissions.
☑ **4 Safe, Reliable Network**	Minor alignment. Moving away from traditional water bath heater solutions for pre-heating should lower the risk of supply failure as water bath heaters are essential assets in ensuring security of gas supply to consumers. Faults occurring due to corrosion that pose risks of fire / injury at the PRI and loss of gas supply downstream will be eradicated with these new technologies.
☑ **5 Protecting the Environment**	Minor alignment. Moving away from traditional water bath heater solutions for pre-heating will improve environmental performance as there will be no need to use or dispose of large quantities of potentially hazardous glycol or non-glycol solutions.

Technological area / issue addressed by project

Viable alternative heating solutions that will reduce own energy use for pre-heat conditions that either:

- optimise the energy use only as and when required
- use another method of pre-heating that is sustainable and environmentally friendly

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	21	3	18

Expected benefits of project

To reduce energy consumption at National Grid gas operational sites and offices. Improved environmental and performance of water bath heaters. The new technologies offer improved environmental, integrity and cost effective performance over water bath heaters. Current Water Bath Heater replacement systems (modular boilers with heat exchangers) require contingency arrangements in the form of backup modular boilers and heat exchanger. These also need to be maintained and notably require an electricity supply.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2013	21 yrs	50%	-£1,659,894

Potential for achieving expected benefits

Despite challenges during the current phase understanding of the requirements and complexities regarding European and UK compliance, this project is still on target to deliver the benefits envisaged.

Project Progress

Stage 2 of the project has been completed which included delivery of:
- Site monitoring equipment and summary of the performance of existing pre-heat technologies.
- Pipeline Stress Analysis for the intended sites.
- Detailed mechanical and civil design documentation for the new pre-heater systems.

Collab' Partners

Provider(s) GL Noble Denton

(IFI5) Reduction in Methane Losses

Year: 2010/11

Project Description	Understand where major natural gas losses from the gas distribution network originate (include both controlled emission from venting operations and fugitive emissions with special focus on above ground installations) with the aim to develop strategies, methods and tools to reduce the amount lost from the system.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£7,878.00	£12,844.00	£15,040.00	
External	£75,200.00	£105,200.00	£28,800.00	£412,170.75
Materials	£0.00	£11,800.00	£0.00	
Total	£83,078.00	£129,844.00	£43,840.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Reducing the methane lost from Gas Distribution assets will assist in lowering National Grid's carbon footprint.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	The technology will aid in the efficient identification of methane lost from Gas Distribution assets, which remedied quickly will reduce the risk of a potential incident and loss of supply.
☐ **5 Protecting the Environment**	

Technological area / issue addressed by project	o the development of methods to identify leakage in an optimum and effective manner. o a review of technologies to capture and re-use vented gas. o the quantification of environmental benefits achievable through the adoption of the developments. o the evaluation of the performance of the initial leakage decision tool.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	14	-2	16

Expected benefits of project	- Reduced methane loss leading to reduced safety risk for National Grid staff during normal operational & maintenance activities. - Reduced methane loss leading to reduced environmental impact. - Reducing the loss of methane from the system will lead to less shrinkage gas purchased.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	0 yrs	50%	-£184,397

Potential for achieving expected benefits	Actual benefit will be realised following the site trials and the application to gas holders. An additional benefit is the reduction in time to undertake gas holder crown and side surveys and the increase in detection sensitivity. An option have also been identified to improved environmental performance.
Project Progress	Additional site test work using the combined technologies were undertaken and efforts made to quantify the results. At gas holder sites there are benefits to reduce survey time. Options have been evaluated for introducing gas capture technology to limit gas emissions from AGIs and progress will continue into 2011/12.

Collab' Partners		**Provider(s)**	GL Noble Denton

(IFI7) Risk-Based Automatic Handling Of Plant Enquiries

Year: 2010/11

Project Description

This project aims to produce an intelligent web based enquiry system, incorporating damage prevention management procedures and automated responses, for individuals proposing to carry out third party work in the vicinity of National Grid buried assets.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£188,523.00	£36,325.00	£15,590.00	
External	£147,315.00	£139,418.00	£110,805.00	£732,263.00
Materials	£0.00	£14,656.00	£0.00	
Total	£335,838.00	£190,399.00	£126,395.00	

Status	
Approved	
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ 1 Low Carbon Economy	
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☑ 4 Safe, Reliable Network	The proposed system will determine the appropriate response to enquiries based on querying the asset data directly and through applying an expert system rules-based approach. This intelligent web based enquiry system, incorporating damage prevention management procedures and automated responses, for individuals proposing to carry out third party work in the vicinity of National Grid buried assets resulting in - Less damage to assets. - Reduced consequential loss of supply or service. - Reduced safety risk for those working in or near underground assets. - Reduced safety risk to members of the general public. Resulting in - Reduced direct, third party damage and societal costs. - Improved health and safety. - Reduced congestion.
☐ 5 Protecting the Environment	

Technological area / issue addressed by project

- o Delivery of an automated response system to third parties for National Grid's buried assets
- o Development of expert system rules based on risk and assets involved
- o Response will be provide with MAPS detailing the assets at risk via Web-based portal

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	17	-3	20

Expected benefits of project

Improve standards of customer service efficiency & consistency in responding to plant enquiries
The system is designed to mitigate risks of third party damage. Known areas of critical supply and impact on vulnerable customers can be defined and monitored for high risk works.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	6 yrs	75%	£196,790

Potential for achieving expected benefits

The trial is nearing completion and there is a high level of confidence in the reliability of the system and the viability of providing an external facing system for use by third parties. The expectation is that the project will realise the intended benefits.

Project Progress

The trial with third parties during 2010/11 has been a success and will continue into 2011/12.
Further enhancements have been identified and will be evaluated.

Collab' Partners National Grid Transmission **Provider(s)** GL Noble Denton

(IFI9) Cleaning of Gas Mains & Recovery of Gas

Year: 2010/11

Project Description	To develop a new vacuum-based method to clean gas mains while minimising venting. Application of LP & MP mains up to and including 24" diameter.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£4,158.00	£5,283.00	£7,272.00	
External	£10,900.00	£21,300.00	£18,590.00	£139,978.29
Materials	£0.00	£19,750.00	£2,500.00	
Total	£15,058.00	£46,333.00	£28,362.00	

Status	
	Approved
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Reduction in the amount of gas purged during flowstopping activities which see this reintroduced back into the system rather than venting to the atmosphere.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	The removal of dust and debris will aid the efficiency of certain flowstop operations, but more importantly it also can affect gas flow due to blockage of the pipes and filters within appliances and other control assets.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Development of a small-scale pump and filter system for the removal of debris from mains o Capture of gas whilst maintaining the upstream and downstream supply o Modular format design to allow the developed technology to integrate with equipment from various manufacturers o 3"- 24" diameter pipe application and up to 2bar gauge

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	14	3	11

Expected benefits of project	Reduction in the amount of gas purged to air during flowstopping activities, all gas to be recaptured into the system without affecting gas pressures. The ability to clean mains internally under no gas conditions will facilitate the deployment of flowstop technologies reducing the risk of bag failure by reducing or removing let by.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	10 yrs	50%	£980,389

Potential for achieving expected benefits	The proposed benefits will only be realised if and when a suitable and economically viable power unit can be identified and subsequently integrated into the prototype design.
Project Progress	This project has identified a technical process to allow the mains to be hoovered and reclaim the gas. It proved the concept works but recognises financial and practical constraints with its implementation. The knowledge ascertained concerning the technology has also proved to be valuable especially to overcome practical obstacles.
Collab' Partners	
Provider(s)	GL Noble Denton

(IFI10) Easy Flow Stop Systems

Year: 2010/11

Project Description	The primary objectives are to verify and demonstrate the use of stoppling flow stop equipment on PE pipes.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£4,975.00	£1,861.00	£9,073.00	
External	£12,540.00	£0.00	£51,549.00	£339,497.00
Materials	£0.00	£0.00	£0.00	
Total	£17,515.00	£1,861.00	£60,622.00	

Status	
	Approved
Draft	10/05/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Good Alignment. Will enable a flow stop solution that will be cost effective and avoid the need for expensive cut-out operations.
☑ **5 Protecting the Environment**	Good alignment. Will reduce excavation sizes and thus materials to landfill. Output will enable the ability to reuse same location to carry out same type of flow stop operation in the future. Minimises disruption to members of the public through reduced excavation footprint.
Technological area / issue addressed by project	o Validation and verification that the Stopple equipment and launch platforms are fit for purpose for use within the UK.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	19	-3	22

Expected benefits of project	Reduced excavation footprint reduces potential for interference damage to other buried apparatus. This will reduce materials to landfill and minimise the disruption to members of the public.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2014	5 yrs	50%	£161,671

Potential for achieving expected benefits	We are confident of realising the benefits identified.
Project Progress	Continuing with the flow stop technologies identified in 2008/9 work was commissioned to review the most effective systems. The review of each system and associated launch platform have been compiled and support progress towards carrying out field trials using the equipment. Some minor limitations with the equipment have been identified but are not considered to be an obstacle to further progress.
Collab' Partners	Pipeline Maintenance Centre, National Grid Transmission
Provider(s)	GL Noble Denton

(IFI11) Maximising The Benefits Of Keyhole Excavation

Year: 2010/11

Project Description

Investigation, design, development and testing of specialised tooling to enable greater exploitation of keyhole technology by increasing the activities that can be completed.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£32,394.00	£52,483.00	£0.00	
External	£93,798.00	£232,293.00	£0.00	£786,599.38
Materials	£0.00	£121,262.00	£0.00	
Total	£126,192.00	£406,038.00	£0.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Normal excavation & reinstatement activities a number of vehicles are involved in transporting materials, this will be significantly reduced as the excavated core is used as part of the reinstatement. This should assist in reducing the company's carbon foot print.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	The ability to relay services from keyhole aids in the delivery of high quality performance which the system is designed for. This will enable repair and maintenance activities to be performed in shortest possible time keeping disruption to an absolute minimum especially in built up urban areas.
☑ **5 Protecting the Environment**	The need for large excavations are avoided as the activities will be undertaken via an 18" core excavation instead.

Technological area / issue addressed by project

- o New and novel method for preparation of PE pipe
- o Development of new technique for sawing & drilling of metallic mains for Keyhole excavations
- o Development of a range of prototype tools for use in keyhole activities for use in the UK and possible Europe
- o A new method for service isolation using fixotropic fluid
- o Challenge the customer perception and industry norm that requires an operative in the confines of excavation to complete operational pipeline activities.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	23	1	22

Expected benefits of project

Large excavations are minimised as the activities will be undertaken via an 18" core excavation leading to a reduction in reinstatement materials and waste. In addition, compared with conventional techniques, fewer vehicles are required for transporting materials thereby reducing the carbon footprint.

The workforce will no longer need to enter traditional excavations as the activities will be undertaken from the road or pavement surface thus reducing the potential for injury or working in confined spaces. The ability to relay services from keyhole aids in the delivery of high quality performance and efficiencies thereby minimising disruption to customers and enhancing reputation

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	5 yrs	75%	£969,741

Potential for achieving expected benefits

This remains high based on the successful work delivered to date. A post invetsment appraisal will follow.

Project Progress

Stage 2 established a core group of personnel now competent to operate the beam drilling systems in keyhole and small (slit trench) excavations. Feedback form candidates in the training course and process has been extremely good. Acceptance of the technology has been positive with teams and managers. The beams system facilitates the undertaking of operations which would not otherwise be possible without extreme levels of inconvenience to the public in sensitive locations such busy road junctions.

Stage 3 identified a drill and tap that will facilitate the drilling and tapping of the hardest steel.

(IFI11) Maximising The Benefits Of Keyhole Excavation

Year: 2010/11

Collab' Partners	Steve Vick, Umole, Grange Industries, Omega, Pipetech, ALH	**Provider(s)**	Able Engineering, GL Noble Denton, ALH, Grange Industries, IFI ADJUSTMENT, Pipeline Technology Ltd, Steve Vick

(IFI16) Alternative Inspection Techniques

Year: 2010/11

Project Description

To develop an alternative inspection technique for OLI4 pipelines that cannot be pigged due to difficult circumstances.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£2,386.00	£2,819.00	£1,918.00	
External	£15,205.00	£15,205.00	£10,895.00	£98,890.00
Materials	£0.00	£0.00	£0.00	
Total	£17,591.00	£18,024.00	£12,813.00	

Status	
Approved	
Draft	28/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ 1 Low Carbon Economy	
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☑ 4 Safe, Reliable Network	This project will provide a technique for inspecting non piggable pipelines on the >7bar network, and thus operators can mitigate the risk of an incident occurring by understanding fully the condition of its pipeline assets.
☐ 5 Protecting the Environment	

Technological area / issue addressed by project

o The limitations of above ground survey techniques currently employed as part of the OLI/4 process have been identified.
o The shortcomings of above ground techniques to provide information related to coating damage and CP potentials in difficult to inspect areas
o Inspect areas, such as hard surface and sleeved and unsleeved crossings, have been identified.
o Techniques that may be able to provide data from hard to inspect areas have been identified for site trials to be undertaken within Stage 2 of this project.
o The limitations of LRUT for measuring metal loss features that may compromise the integrity of high pressure pipelines have been identified.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	14	-5	19

Expected benefits of project

Potential to reduce incidents caused by the failure of >7bar pipelines. The increased understanding of the condition of the asset in these difficult to inspect areas should allow network operators to take appropriate remedial measures quickly to prevent a major pipeline failure. This will allow pipelines to be operated to the maximum safe level.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	20 yrs	50%	-£59,675

Potential for achieving expected benefits

The current stage has indicated that DCVG could be specified as the preferred coating survey technique based on, (a) its ability to locate small coating defects, which is critical where lines are interfered with by AC or DC interference, (b) the relative sizing capability of DCVG, which will allow the Operator to make a judgement whether to excavate and repair the defect or leave it for the CP system to protect, and (c) the ability of the DCVG technique to be used over hard surfaces and for the assessment of uncased crossing.

The work has also shown the limitations of the electromagnetic current attenuation technique, in particular its inability to locate even large coating damage and the effect of changes in depth of burial and geometry on the ECA signal. Changes in depth of burial and pipe geometry (inclusion of bends) are commonplace on pipe crossings.

The work has also provided information on the limitations of Long Range Ultrasonic Testing (LRUT), in particular the difficulties in interpreting results, which could lead to significant damage being overlooked due to complicated evaluation of data is required due to signal complexities, (b)

(IFI16) Alternative Inspection Techniques

Year: 2010/11

	dimension of corrosion (wall loss, longitudinal length, profile) cannot be directly determined, (c) areas of significant corrosion can be missed, (d) the reflected signal cannot be equated to a specific area or volume of loss due to a lack of an absolute calibration standard, (e) many field conditions exist that limit the distances that can be effectively inspected and that cause artefacts that can complicate the analysis, and (f) LRUT has not been applied to pipelines coated with cement based material e.g. grouting used in many cased crossings and would require additional proving trials if applied to grouted sleeves.
Project Progress	The field trials have shown that it is viable to perform CIPS over hard surfaces and to collect quality data which will enable a judgement to be made on the protection being afforded to a pipeline segment. This assumes that a dielectric barrier, such as PE sheeting, does not exist between the hard surface and the pipe. DCVG was successful in locating and sizing coating damage through tarmac and concrete surfaces. Electromagnetic current attenuation (ECA) is not viable for the detection of small area coating damage, on sleeved and unsleeved crossings, when ECA measurements are taken either side of a crossing. DCVG has the potential of detecting coating damage on sleeved and unsleeved crossings from locations upstream or downstream of the crossing. Detection of small areas of coating damage will depend on the DCVG signal strength, and the resistivity of the backfill surrounding the damaged areas on unsleeved crossings, and the resistance of the annular fill contained within the sleeve. Benchmarking of DCVG indications is viable using pin probes and/or buried coupons. Due attention should be paid to those factors that can influence readings such as the probe depth, the soil resistivity, the DCVG signal strength and the electrical conductivity between the soil and pin probe. DCVG is more sensitive to coating defect location than Pearson, is unaffected by AC interference and can be used over hard surfaces. Unlike Pearson indications, DCVG indications are able to be sized in relative terms.
Collab' Partners	NGN, SGN, WWU
Provider(s)	GL Noble Denton

(IFI18) Injection of Biomethane into the Gas Network

Year: 2010/11

Project Description

The key objective is to demonstrate the safe injection of biomethane into the UK gas grid, with the overall aim of establishing the overall feasibility of small scale "green gas" additions to the National Grid Gas Distribution network.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£1,526.00	£95,754.00	£0.00	
External	£33,036.00	£227,674.00	£27,158.00	£623,801.00
Materials	£22,106.00	£9,810.00	£34,456.00	
Total	£56,668.00	£333,238.00	£61,614.00	

Status	
Approved	
Draft	03/05/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Injection of bio-methane into the gas network provides the only large scale, non-disruptive & economic solution for decarbonising heat in the UK.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	National Grid have established that up to 50% of residential gas demand can be met with renewable gas and therefore this represents a potentially significant source of fuel that will enhance energy/security of supply within the UK.
☑ **5 Protecting the Environment**	Biogas promises to deliver substantial environmental benefits. This project should demonstrate the injection of this gas into the gas distribution network enabling it to be used in the most efficient way and thus delivering the greatest environmental benefit. By demonstrating the technology in the UK's regime and addressing any resulting barriers, and will lead the way for stimulation of many other biogas injection projects and the associated environmental benefits that they will bring.

Technological area / issue addressed by project

o The potential study has shown that the UK has material volumes of biogas potential that justify further investigation into its feasibility and demonstration for grid injection in the UK.

o Technical feasibility has been confirmed and shown that biomethane can be safely injected into the gas network, but work has illustrated that a number of technical, regulatory and financial challenges remain.

o A conceptual engineering design for a biogas injection plant has been produced.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	Medium	11	2	9

Expected benefits of project

Develop knowledge of best industry practice on the injection of biomethane into the grid in the UK. This will include fully understanding any safety or environmental risks and how they can be effectively mitigated to protect the consumer and the network.

Understand how the development of the biogas market is likely to impact on operations and thus how National Grid will need to develop its operations to accommodate this technology and facilitate the maximum benefit to the end consumer. This project should also identify any on-going barriers that may prevent biogas being injected and reaching its full potential. This project should also demonstrate the injection of this gas into the gas distribution network enabling it to be used in the most efficient way and thus delivering the greatest environmental benefit.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	20 yrs	25%	-£862,755

Potential for achieving expected benefits

Due to the contract with the Waste Resource Action Programme (WRAP) being terminated the benefits of this particular project will not be realised. However work completed at this site has enabled lessons learned and money to be saved on new bio-gas projects that are moving forwards. The successful announcement of the renewable heat incentive potentially allows United Utilities to re-evaluate this project in the future however, National Grid will not pursue it under IFI.

Project Progress

United Utilities have stated that the delays on site have been unfortunate but were necessarily incurred whilst they gained certainty around the technical and commercial arrangements for the

(IFI18) Injection of Biomethane into the Gas Network

Year: 2010/11

	project. Xebec the supplier of the gas cleanup facility also closed their UK offices adding to the project delays. National Grid have continuously worked with WRAP on the demonstration project. Through positive promotion and encouragement towards UU to continue the project National Grid's position with WRAP and DECC remains positive. With UU unable to secure the funding rolling over to the 2011-12 financial year National Grid's contract with WRAP for the demonstration project has been terminated.

Collab' Partners	United Utilities	**Provider(s)**	GL Noble DEnton, Hammonds, Mouchel, United Utilities, BIO SNG, Oribtal, CUI

(IFI19) Better Load Analysis & Demand Modelling (Feasibility)

Year: 2010/11

Project Description Develop a new and novel demand estimation model that can be practically utilised within <7bar analysis modelling.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£38,130.00	£65,725.00	£102,728.00	
External	£341,574.00	£201,461.00	£328,000.00	£1,857,925.45
Materials	£82,258.00	£369,684.00	£2,000.00	
Total	£461,962.00	£636,870.00	£432,728.00	

Status	
Approved	
Draft	10/05/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	A better understanding of demand profiles will: o facilitate better pressure management of the system and consequent improvements in control of leakage o provide a baseline for the understanding of current demand patterns against which the impact of new gas technologies and energy uses may be assessed.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	A better understanding of demand profiles will allow the peak demand requirements to be better understood. This will lead to a more economic and efficient design of the system to meet those peak demands and better understanding of off-peak demand will facilitate greater security and flexibility in carrying out maintenance activities.
☑ **5 Protecting the Environment**	A better understanding of demand profiles will facilitate better pressure management of the system and a consequent improvement in the control of leakage.

Technological area / issue addressed by project

o Statistical techniques for the development of improved demand models have been specified.

o The proof of concept models developed based on these techniques using available data indicates an increase in accuracy of the demand models over those currently in use and a general reduction in demand being modelled.

o The requirements for the flow data required to develop working demand models have been specified.

o The new Network Analysis model will take into account new factors such as socioeconomic data, cunsumer behaviour and current thermal effeciencies including appliance effeciency.

o Provision of initial winter data for Customer demand profiles to be developed and understood at later stages in the project.

o Whole network data will also be collected to enable the testing of the theroretical flow against the actual demand conditions experienced across the winter.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	Medium	19	5	14

Expected benefits of project

The principle benefit from this work at this stage will be knowledge that may ultimately lead to the production and replacement of the current published demand algorithms which will be appropriate for implementation.

A small scale test will also be undertaken to also validate any research received. Better identification of demand requirements into the future could lead to better targeted and timely reinforcement and replacement planning of the networks and better understanding of peak condition.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2013	10 yrs	50%	-£60,903

(IFI19) Better Load Analysis & Demand Modelling (Feasibility)

Year: 2010/11

Potential for achieving expected benefits	These continue to remain good given that further data is now being collected to allow the model to be modelled and validated.		
Project Progress	Work continues for the setting up and management of a second period of data collection and review. In addition, the statistical models developed in Stage 1 were trained using the partial data available from Stage 2. This allowed checks to be made on the data being collected and adjustments made as necessary.		
Collab' Partners		**Provider(s)**	GL Noble Denton

(IFI20) Starline 200 Service Replacement Trial

Year: 2010/11

Project Description	To avoid meter resite and the need for additional copper pipe work required when difficult services are relayed during 30/30 mains replacement and to maximise capacity of an inserted steel service by not restricting it to the bore of inserted PE pipe.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£1,305.00	£2,319.00	£3,146.00	
External	£17,294.00	£0.00	£32,706.00	£80,634.08
Materials	£0.00	£0.00	£0.00	
Total	£18,599.00	£2,319.00	£35,852.00	

Status	
	Approved
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	CO2 to produce liner and install less than that to produce copper pipe& meter box
☐ **2 Eradicating Fuel Poverty**	
☑ **3 Promoting Energy Savings**	Energy to produce liner and install less than that to produce copper pipe& meter box
☑ **4 Safe, Reliable Network**	External copper pipe a target for those who see it in terms of its scrap value.
☑ **5 Protecting the Environment**	Visually much better than external white boxes & copper pipe on the built environment
Technological area / issue addressed by project	o Suitable replacement technique that will deliver the ability to relay services without the need to resite the meter o This is CIPP liner technique for low pressure for services up to 3" diameter o This technology/technique will avoid the need for above ground riser supply construction during mains replacement operations o PE insertion technique will no affect the capacity of the pipe as the bore will not be reduced

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	18	-1	19

Expected benefits of project	Development of connection methodologies to resiting pipework utilising new fittings not previously used in the UK to improve our customers experience.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	10 yrs	90%	£511,417

Potential for achieving expected benefits	As the project is on hold the likelihood of success has diminished. A re-evaluation of benefits will take place during 11/12
Project Progress	Further trials have been undertaken but with limited success. Project has been deferred as sites likely for achieving success have not been identified. Further dialogue is taking place with the manufacturer to identify suitable technological advancement to enable a greater chance of success.
Collab' Partners	
Provider(s)	Karl Weiss

(IFI21) Improvements to the MRPS Model

Year: 2010/11

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 for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£8,957.00	£8,567.00	£11,961.00	
External	£99,842.00	£48,290.00	£67,959.00	£600,700.00
Materials	£0.00	£0.00	£0.00	
Total	£108,799.00	£56,857.00	£79,920.00	

Status

Approved

Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ 1 Low Carbon Economy	
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☑ 4 Safe, Reliable Network	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.
☑ 5 Protecting the Environment	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

Technological area / issue addressed by project

- o Research into the correlation or link between the age of pit cast mains and fracture rate
- o Research into the correlation or link between corrosion and fracture rate
- o Demonstration of cast iron and spun cast profile factors in live MRPS model.
- o Feasibility of profile factors for multi-occupancy buildings
- o Development & testing of profile factor for the update of the >12" model
- o Continued update of all profile factors within the MRPS model to accurate profile risk and prioritise remediation

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

Expected benefits of project

- 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.
- 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.
- 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.
- 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.
- 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.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2013	5 yrs	25%	-£233,456

Potential for achieving expected benefits

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

(IFI21) Improvements to the MRPS Model

Year: 2010/11

	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.
Project Progress	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.

Collab' Partners	NGN, SGN, WWU	**Provider(s)**	GL Noble Denton

(IFI24) European Pipeline Research Group (EPRG)

Year: 2010/11

Project Description

EPRG is a cooperation of European pipe manufacturers and gas transmission companies. EPRG undertakes a wide range of research directed to increase integrity and safety of gas transmission pipelines.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£6,910.00	£3,003.00	£0.00	
External	£26,053.00	£15,273.00	£0.00	£785,384.00
Materials	£0.00	£0.00	£0.00	
Total	£32,963.00	£18,276.00	£0.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ 1 Low Carbon Economy	
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☑ 4 Safe, Reliable Network	Jointly funded pipeline research to mitigate issue and risks associated with the high pressure network. The group also provides opportunities for sharing information on best practice and incidents with other pipeline operators.
☐ 5 Protecting the Environment	

Technological area / issue addressed by project

o (EPRG 124) DWTT Round Robin
o (EPRG 127) Reliability Based Analysis
o (EPRG 129) Hostile environmental effects on residual mechanical resistance of damaged pipes
o (EPRG 130) DWTT Testing philosophy
o (EPRG 134b) Development of tests for assessment of long term resistance to adhesion loss in 3-layer polyolefin external pipeline coatings
o (EPRG 137) Assessment of delayed failure under constant pressure
o (EPRG 138) Clarification of European view towards inline pipe standards ISO3183/2007 and EN 10208-2
o (EPRG 139) Hostile environmental effects on residual mechanical resistance of damaged pipes supplementary tests
o (EPRG 141) Discrimination for mill features using MLF pigs for baseline inspections- Phase 1
o (EPRG 142) Model of ultimate limit state design to predict combined loading capacity of line pipes
o (EPRG 143) Extension of FFP and puncture resistance criteria to X80
o (EPRG 144) Revision of EPRG guidelines on weld defect acceptance criteria
o (EPRG 145) Assessment of bending wrinkles
o (EPRG 146) Development of a reliable model for evaluating the ductile fracture propagation resistance for high grade steel pipelines
o (EPRG 147a) Development of an improved model for the burst strength of dent-gouge damage under sustained internal pressure loading Phase 2 part 1 Modelling
o (EPRG 147b) Development of an improved model for the burst strength of dent-gouge damage under sustained internal pressure loading – Phase 2 part 2 Experimental
o (EPRG 148) Investigation of automated ultrasonic testing concept for longitudinally SAW pipe and coupling control
o (EPRG 149) HIC Assessment of low alloy steel line pipe for sour service application Phase 2
o (EPRG 150) HIC Assessment of low alloy steel line pipe for sour service application Phase 3
o (EPRG 151) Assessment of sensitivity to hostile environments of damaged pipe, under cathodic protection and internal pressure
o (EPRG 152) The effect of toughness on the integrity of HFI pipe seam welds

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	11	-5	16

Expected benefits of project

- Improved system integrity knowledge, Improved corrosion protection, reduced 3rd party incidents leading to less supply disruptions. Networking opportunity with other pipeline operators, sharing information and best practice. It is very difficult to articulate the proposed benefits of these high level benefits until the output of each individual project is known.

(IFI24) European Pipeline Research Group (EPRG)

Year: 2010/11

- Prevention of incidents will also mean the prevention of the loss of gas to atmosphere. It is extremely difficult to quantify a value of the amount of gas saved from the proposed EPRG projects if all were implemented.
- The primary benefit from this programme is collaboration on projects that will help to maintain the integrity of the high pressure pipelines, via developed assessment, risk and prevention tools and techniques that mitigate the integrity threats on the high pressure pipeline network and thus reduce the overall risk.

Assuming the probability of a high pressure pipeline failure is approx 1 in 20 years. If the cost of the incident is assumed to be £10m, then the annual avoided cost year is £500k.

If the work from EPRG reduces this risk by 10%, then the annual avoided cost is £455k, giving a reduction of avoided cost of £45k per year. The current formula period has two years to run therefore the total avoided cost will equate to £90k.
- Significant research leverage benefits. The total value of projects being undertaken is 445,000 Euros in 2009 and about 300,000 Euros in 2010, which provides National Grid with a leverage ratio of 15:1, based on the total National Grid membership cost of 19,684 euros in 2009.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	2 yrs	25%	£1,416

Potential for achieving expected benefits

This programme of work has potential for achieving the expected benefits due the collaborative nature of the projects. The R&D leverage ratio of 15:1 and the shared knowledge on best practice and incidents are the main benefits and a consistency between our Distribution and Transmission businesses.

Project Progress

Three meetings of the EPRG Materials Committee have been attended. The documented procedures that are currently applied to gas transmission and distribution operations in the UK have been reviewed to establish how to incorporate any knowledge gained from the recent EPRG projects delivered.

Collab' Partners

BP Exploration Operating Co. Ltd. (United Kingdom
Corinth Pipeworks S.A. (Greece)
Corus Tubes - Energy (United Kingdom)
ENI G& P (Italy)
E.ON Ruhrgas AG (Germany)
Europipe GmbH (Germany)
Fluxys n.v. (Belgium)
Gaz de France (France)
N.V. Nederlandse Gasunie (The Netherlands)
Salzgitter Mannesmann Großrohr GmbH (Germany)
Salzgitter Mannesmann Line Pipe GmbH (Germany)
Shell Global Solutions International B.V. (The Netherlands)
SNAM Rete Gas S.p.A.n (Italy)
TENARIS DALMINE SPA (Italy)
Total E & P (France)
RAUTARUUKKI OYJ (Finland)
Vallourec & Mannesmann France (France)

Provider(s) GL Noble Denton, EPRG

(IFI25) PRCI Research Collaboration

Year: 2010/11

Project Description	The main focus for National Grid is assessment, prevention and migration of integrity threats, such as mechanical damage and external corrosion.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£16,307.00	£6,148.00	£0.00	
External	£53,841.00	£48,159.00	£0.00	£6,000,000.00
Materials	£0.00	£0.00	£0.00	
Total	£70,148.00	£54,307.00	£0.00	

Status	
	Approved
Draft	10/05/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Main focus for National Grid Distribution is assessment, prevention and migration of integrity threats such as mechanical damage and external corrosion. Jointly funded pipeline research/ sharing information on best practice / incidents.
☐ **5 Protecting the Environment**	

Technological area / issue addressed by project

The 2008 PRCI research program consisted of Member contributions of $7 million. The 2008 program included:

o Mechanical damage - detection, characterization, and management to address third party damage and geo-technical events.
o Design and construction (pipelines)
o Integrity management - research into corrosion and environmental cracking to enhance safety and reduce the potential for incident.
o Compressor and pump stations - air emissions and fuel requirements.
o Measurement - metering accuracy, reliability and cost-effectiveness.
o Underground storage - storage facility integrity and operational flexibility.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Minor	11	-4	15

Expected benefits of project

- Improved system integrity knowledge, Improved corrosion protection, reduced 3rd party incidents leading to less supply disruptions. Networking opportunity with other pipeline operators, sharing information and best practice. It is very difficult to articulate the proposed benefits of these high level benefits until the output of each individual project is known….
- Prevention of incidents will also mean the prevention of the loss of gas to atmosphere. It is extremely difficult to quantify a value of the amount of gas saved from the proposed EPRG projects if all were implemented.
- The primary benefit from this programme is collaboration on projects that will help to maintain the integrity of the high pressure pipelines, via developed assessment, risk and prevention tools and techniques that mitigate the integrity threats on the high pressure pipeline network and thus reduce the overall risk.

Assuming the probability of a high pressure pipeline failure is approx 1 in 20 years. If the cost of the incident is assumed to be £10m, then the annual avoided cost year is £500k.

If the work from EPRG reduces this risk by 10%, then the annual avoided cost is £455k, giving a reduction of avoided cost of £45k per year. The current formula period has two years to run therefore the total avoided cost will equate to £90k.
- Significant research leverage benefits. The total value of projects being undertaken is $7.9 million in 2009 and $7.5 in 2010, which provides National Grid with a leverage ratio of over 50:1 based on the total National Grid membership cost.

(IFI25) PRCI Research Collaboration

Year: 2010/11

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	2 yrs	25%	£42,382

Potential for achieving expected benefits

The PRCI collaborative programme gives National Grid the opportunity to benefit from a significant number of highly leveraged projects which compliment much of the work on the overall IFI programme. It also provides a link with PRCI global membership and benefits of identifying emerging threats and opportunities.

Project Progress

The following National Grid supported projects were launched this year by PRCI:
Corrosion:
- Develop Leak/Rupture Boundary for Corrosion in Low Toughness Pipe (Leverage 14)
- Performance of Above Ground Coating Evaluation Survey Method (Leverage 4)
- Integrity Issues for CO2 Pipeline Transport Including Corrosion, Cracking, and Rupture (Leverage 8)

Operations & Integrity:
- ILI Tool Error Calibration Based on In-the-Ditch Measurements with Related Uncertainty (Leverage 31)
- Improved Pipeline Reliability by Using In-Ditch Verification Data to Measure ILI Uncertainty and Applying Correction Factors (Leverage 13)
- Base Resource Document for Unpiggable Pipelines (Leverage 12)

Design, Materials and Construction:
- CO2 Shock Tube Testing (Leverage 6)
- Guidelines to Address Pipe Material and Construction Quality Issues in Response to Current Concerns (Leverage 18)
- Full-Scale Experimental Validation of Mechanical Damage Assessment Models (Leverage 10)
- Full-Scale Demonstration of the Interaction of Dents with Localized Corrosion Defects (Leverage 31)
- Improved Model for Predicting the Burst Pressure of Dent + Gouge Damage (Leverage 20)
- Improved Model for Predicting the Time/Cycle Dependent Behaviour of Dent + Gouge Damage (Leverage 20)
- Assessment of Delayed Failure for Mechanical Damage Under Constant Pressure (Leverage 14)

Measurement:
- Effect of Upstream Piping Configurations on Ultrasonic Meter Bias (Leverage 18)

Reports were delivered by PRCI during the year for the following National Grid supported projects:
Projects Launched in 2007
- Extend Solar Turbines DLN Operating Range (Leverage 33)

Projects Launched in 2008
- Large-Scale Cathodic Disbondment Testing for CTE (Leverage 52)
- Variable CP Criteria (Leverage 24)
- Methods to Reduce the Carbon Footprint of Pipeline Stations (Leverage 42)

Projects Launched in 2009
- CO2 Transmission and Storage - Research Plan Development (Leverage 7)

Collab' Partners

National Grid Transmission, and 34 other member companies with energy pipeline interests via PRCI (23 based in the USA; 5 European; 5 Canadian; 1 South American; 1 Middle-Eastern)

Provider(s) PRCI

(IFI26) The Effect of Thermal Lagging on Fiscal Metering Temperature Measurement

Year: 2010/11

Project Description To determine if existing non lagged high pressure metering installations provide a representative temperature measurement for the purposes of fiscal flow measurement, including impact on thermowell installation performance.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£14,833.00	£4,760.00	£14,403.00	
External	£130,259.00	£20,150.00	£81,833.00	£399,380.49
Materials	£98,922.00	£0.00	£0.00	
Total	£244,014.00	£24,910.00	£96,236.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ 1 Low Carbon Economy	
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☑ 4 Safe, Reliable Network	Mitigation against the pass on costs to customers if the lagging of high pressure metering tubes work has to proceed.
☐ 5 Protecting the Environment	

Technological area / issue addressed by project

o Validate and demonstrate the need for not having thermal lagging on meter tubes and its impact upon accurate tempeture measurement
o dentify any alternative techniques for accurate temperature measurement & methods of installation with subsequent tests
o Challenge the established engineering rationale regarding thermal lagging on meter tubes
o Challenge the established engineering rationale regarding thermowell design and configuration.
o Challenge the established engineering rationale regarding surface mounted measurement technqiues.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	Minor	10	3	7

Expected benefits of project Knowledge on thermal lagging future option requirements. The project could provide an efficiency for annual maintenance activities and Gas Industry reputation enhanced through improved metering accuracy.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	2 yrs	25%	£443,383

Potential for achieving expected benefits The benefits of improved measurement of temperature and the determination of the requirement for the thermal lagging of metering pipe work remain unchanged.

Project Progress Work has begun on the detailed design and ordering of the test equipment to be installed. This includes the special temperature sensors, the heating and cooling equipment, the pipe spools, data logging, barriers and thermal enclosures.

Collab' Partners | **Provider(s)** GL Noble Denton

(IFI27) High Pressure Metering Uncertainty Calculation Tool

Year: 2010/11

Project Description	Tool to calculate metering uncertainty clearly defining the Maximum Permissible Bias (MPB) & Maximum Permissible Error (MPE) of the system.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£1,952.00	£5,112.00	£6,538.00	
External	£7,150.00	£21,250.00	£37,150.00	£100,050.24
Materials	£0.00	£0.00	£0.00	
Total	£9,102.00	£26,362.00	£43,688.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Minor alignment to avoid wasted journeys due the wrong expertise sent to site to investigate meter related alarms and to investigate which contributor is at fault followed by sourcing suitable spare.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	The alignment to this theme relates to the "reliable" aspects. National Grid needs to demonstrate that its methodology and approach for accurate metering systems is robust and reliable so that any additional costs are not passed onto shippers and subsequently consumers. The proposed approach should also provide a method whereby the major contributors of bias and uncertainty lie thereby providing a more robust and traceable investigation for conformity against the specification. This should also lead to intelligent and targeted investment where necessary.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Determine the feasibility and proposed development of the OrifUncE tool to assess uncertainty and errors for orifice plate metering systems. o Outline principles for MPE and MPB established for wider industry review and use. o Validation of data to determine the estimation of errors and uncertainties from the secondary instrumentation. o Inclusion of the uncertainty of the temperature measurement in the calculation of the pipe and orifice diameter o Inclusion of uncertainty in the diameter of the drain hole (if present) o Inclusion of fixed viscosity and isentropic index values as well as calculated values used by the Omni flow computers and calculate the impact on the uncertainty and error the flow. o Incorporation of the secondary instrumentation validation results and separate out uncertainties from errors. o Inclusion of an overall sensitivity and error to the inputs.

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

Expected benefits of project	Feasible proof of concept for a tool that will calculate the Maximum Permissible Bias (MPB) and Maximum Permissible Error (MPE) terms of a high pressure metering system. Imrpoved targeted maintenance when inspections are necessary to investigate errors may be achieved. Industry reputation enhanced through improved metering accuracy.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	10 yrs	50%	£112,810

Potential for achieving expected benefits	The project has a high probability of realising expected benefits.
Project Progress	Stage 2 has been commissioned. This will the development and testing of the new tool with new MPB and MPE functionality. This work will continue in to 2011/12.
Collab' Partners	
Provider(s)	GL Noble Denton

(IFI28) Hazard & Risk Assessment Tools for Major Gas Installations

Year: 2010/11

Project Description	Research and development of two Software tools for hazard and risk assessment of Major Hazard, Gas Installations

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£3,254.00	£0.00	£0.00	
External	£37,332.00	£0.00	£0.00	£500,000.00
Materials	£48.00	£0.00	£0.00	
Total	£40,634.00	£0.00	£0.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Supports National Grid in assessing the risks from its above 7 bar pipeline system and ensuring that expenditure is appropriately allocated.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Ensure National Grid Gas Distribution is using appropriate and up to date risk assessment methodologies that can be justified to HSE when assessing the risks from its high pressure pipeline assets. o Enhanced Software tools for hazard and risk assessment of Major Hazard Gas Installations

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

Expected benefits of project	- Improves National Grid's understanding of pipeline risks - Safety management through application of the models developed through this project - The full cost of this project will collaborative partners is approximately £500k. National Grid's commitment to this is £135k. This provides a National Grid leverage ratio of 3.7:1 and individually GD's ratio will be 7.4:1.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	20 yrs	50%	£61,960

Potential for achieving expected benefits	High potential that the benefits will be realised. Collaboration reduces costs significantly and enhances the likelihood of success. Implementation of the benefits from the PIPESAFE collaboration and related studies have been demonstrated.
Project Progress	During this period, a new version of PIPESAFE was delivered through the PIPESAFE collaboration, including improved and more accurate fire models and enhanced user functionality. Improvements in the tool, knowledge and management reporting were implemented in an updated version of the Hazard Assessment Methodology. Good progress was made with several joint industry collaborations concerned with pipeline safety, funded through this project. This included the conclusion of Phase 1 of the AGI Failure Frequency project, which delivered recommended failure frequency failures for use in quantified risk assessments of Above Ground Installations, and the ESM project, which is concerned with measuring and improving the effectiveness of safety measures for pipelines. During this year, an initial series of field trials were undertaken to investigate the ability of physical protection laid above pipelines to resist impact damage from excavating machinery.
Collab' Partners	Collaborative partners for the "ORDER" group include (but are not limited to) GDF SUEZ (France)
Provider(s)	GL Noble Denton

(IFI28) Hazard & Risk Assessment Tools for Major Gas Installations

Year: 2010/11

Gasunie (Netherlands)
Enagas (Spain)
Energinet.dk (Denmark) &
Fluxys (Belgium).

"PIPESAFE" group include (but not limited to)
National Grid (UK)
Energinet.dk (Denmark)
Enagas (Spain)
Fluxys (Belgium)
Gasunie (Netherlands)
StatoilHydro (Norway) &
TransCanada PipeLines (Canada).

(IFI29) Water Bath Heater Corrosion Inhibitor Trial

Year: 2010/11

Project Description	Trial a new water and corrosion-inhibitor mix to replace existing anti-freeze solution (ethylene glycol).

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£838.00	£2,030.00	£0.00	
External	£850.00	£850.00	£0.00	£8,181.98
Materials	£0.00	£4,020.00	£0.00	
Total	£1,688.00	£6,900.00	£0.00	

Status	
Approved	
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☑ **3 Promoting Energy Savings**	The new solution is a better heat conductor than ethylene glycol and hence will improve the heating efficiency of the water bath heater.
☑ **4 Safe, Reliable Network**	Water bath heaters are essential assets in ensuring security of gas supply to consumers. Faults occurring due to corrosion pose risks of fire / injury at the PRI and loss of gas supply downstream. This solution is more effective at preventing corrosion thereby leading to a safer and more reliable network
☑ **5 Protecting the Environment**	Any leakage and disposal of the new solution will be more environmentally friendly than the toxic and acidic glycol solution.
Technological area / issue addressed by project	o Heater operates through one full year with new solution without any signs of freezing o Inhibitor chemical does not degrade and remains non-corrosive throughout the duration of the trial without the need for frequent 'dosing' o No visible/ measurable corrosion on the 'corrosion rack' within the heater.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Radical	Medium	21	-7	28

Expected benefits of project	Validation of supplier's claims and understanding of the new solution. Reduction in the level of corrosion on HP gas tubes within water bath heaters. More environmentally friendly solution and more efficient potential solutions.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	2 yrs	75%	£203,374

Potential for achieving expected benefits	The benefits are still realistically achievable. However, the solution will be deployed only for main and not secondary Water Bath Heaters installed on sites.
Project Progress	Successful validation of an alternative corrosion/anti-freeze inhibitor solution at two sites.
Collab' Partners	**Provider(s)** B&V Water Treatment

(IFI32) Carbon Accounting for Pipeline Installation/Rehabilitation

Year: 2010/11

Project Description

Address the common interest of water (and gas) utility companies and their suppliers in developing an Embodied or Life Cycle Carbon measure for pipeline installation and rehabilitation techniques, so that quantification can be made in a consistent, robust and auditable manner.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£64.00	£2,137.00	£875.00	
External	£1,250.00	£18,000.00	£5,000.00	£40,000.00
Materials	£0.00	£0.00	£0.00	
Total	£1,314.00	£20,137.00	£5,875.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ 1 Low Carbon Economy	Allows for the carbon accounting of pipe construction techniques.
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☐ 4 Safe, Reliable Network	
☐ 5 Protecting the Environment	

Technological area / issue addressed by project

The technological areas this project aims to achieve will be the carbon quantification of gas pipeline activities potentailly covering where applicable:

- impact moling;
- pipe ramming;
- guided boring;
- microtunnelling;
- conventional trenching;
- narrow trenching;
- lining with close-fit pipes;
- lining with continuous pipes;
- lining with cured-in-place pipes (i.e. curing at ambient, by hot water, using steam and via UV light);
- lining with discrete pipes;
- lining with pipe segments;
- lining with spirally wound pipes;
- repair by flood grouting; and/or
- repair with cured-in-place patch.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Minor	10	-5	15

Expected benefits of project

A tool that assesses the carbon impact for different construction techniques. Ascertain knowledge as to the level of information required for a specific number of activities, which will then be used on how to apply the methodology to other activities.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	0 yrs	75%	-£26,872

Potential for achieving expected benefits

The benefits remain on track. To ensure benefits are achieved, WRC has circulated details concerning a proposed extension to the work already delivered. NGG recognise there is growing interest externally concerning carbon especially as carbon budgets have now also been set internally.

Project Progress

A tool has been developed that enables the user to calculate the emissions associated with pipeline installation and rehabilitation projects. This provides a common measure and protocol to quantify project emissions and better understand the emissions associated with capital works/techniques.

(IFI32) Carbon Accounting for Pipeline Installation/Rehabilitation

Year: 2010/11

Collab' Partners	OnSite Central Ltd Insituform Technologies Severn Trent Water Prokasro Mechatronik GmbH Bournemouth & West Hampshire Water BKP Berolina GmbH	**Provider(s)**	WRc

(IFI33) Gas Alliance Group Excavation Protection System

Year: 2010/11

Project Description	Collaboratively develop a utilities sector, industry leading standard temporary fencing solution.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£4,801.00	£8,709.00	£0.00	
External	£0.00	£103,662.00	£0.00	£287,000.00
Materials	£63,800.00	£0.00	£0.00	
Total	£68,601.00	£112,371.00	£0.00	

Status	
	Approved
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Use of recyclable materials and eficient manufacturing techniques
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Reduction in injuries caused to members of the public and employees as a result of tripping over barriers and barriers that were not resistant to impact
☑ **5 Protecting the Environment**	Use of recycled materials
Technological area / issue addressed by project	o Development or redesign of an excavation barrier to BS standards to make it stronger, more robust and less obstructive to members of the public whilst enhancing its recyclable qualities.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	Minor	19	-4	23

Expected benefits of project	Reduction in the number of incidents through slips, trips and falls, to members of the public & workforce. Reduction in our Carbon Footprint through the use of increased recycled and recyclable products.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	1 yrs	90%	£29,526

Potential for achieving expected benefits	The project has met all its stated objectives; the final design is compliant with the latest legislation and has significant improvements in potential trip hazards, robustness to toppling, recyclability and the cost per unit is broadly similar to the existing barrier systems.
Project Progress	The barrier design has been progressed to the production of prototype units which have been tested in wind tunnels and field trials. The feedback from testing was shared with a manufacturing partner and the project has achieved all its stated objectives.
Collab' Partners	AMEC, Balfour Beatty, Skanska, MorganEst **Provider(s)** Balfour Beatty

(IFI34) Development of a Corrosion Camera

Year: 2010/11

Project Description	To develop a tool that detects and measures metallic corrosion remotely and where necessary through field coatings and insulation.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£704.00	£2,840.00	£0.00	
External	£6,672.00	£22,500.00	£0.00	£180,000.00
Materials	£0.00	£0.00	£0.00	
Total	£7,376.00	£25,340.00	£0.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Improvement to the maintenance inspection regime for some 730 pressure reduction installations and 1000 above ground crossings to identify corrosion qucikly and efficiently to reduce risk for staff and the general public.
☑ **5 Protecting the Environment**	Reduction in waste and minimising use of products used for cleaning, recoating.
Technological area / issue addressed by project	o Development of thermography technology for portable use in the field o Detection of defects via multipul layers of cladding o Assessment and evaluation of defect using enhanced software (development of algorithms)

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Minor	7	-7	14

Expected benefits of project	Enable more efficient routine maintenance. Avoids the need to dispose of cladding to landfill which is non bio-degradable. Prevent the removal of cladding and scaffolding required on site. Collaborative leverage ratio 4:1

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	10 yrs	50%	-£33,885

Potential for achieving expected benefits	The benefits will only be achieved by undertaking more fundamental R and D and further prototype development work. The project is on hold until such time the project partners can agree the scope of further work.
Project Progress	Field trials have been carried out and demonstrated the camera can detect hidden corrosion at distance. However, it cannot categorise between pure corrosion and delamination, or size the corrosion defect with the present design. To be of greater use in field operations, a more accurate reading of the corrosion activity would be necessary. Higher field performance and/or resolution is needed, and this requires a more fundamental review of the technology employed
Collab' Partners	Central Hudson Con Edison Keyspan Energy National Fuel Gas National Grid - NY Orange and Rockland PECO Energy
Provider(s)	NYSEARCH

(IFI36) PE Glue Repairs

Year: 2010/11

Project Description	To provide an alternative repair solution to full cut out or mains replacement when glue is used in conjunction with bridging strips and encapsulation.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£19,976.00	£29,013.00	£0.00	
External	£62,049.00	£152,680.00	£0.00	£315,355.15
Materials	£0.00	£51,638.00	£0.00	
Total	£82,025.00	£233,331.00	£0.00	

Status	
	Approved
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	A reduction in excavation to enable joint repair regeneration.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Improved utilisation of the asset, less cut outs and unnecessary tappings
☑ **5 Protecting the Environment**	Reduction in imported materials and waste to lndfill
Technological area / issue addressed by project	o Materials science analysis of chemical structure for both PE and adhesive to develop preperation and bonding requirements o Develop and refine the existing technology for PE adhesives so as to develop a fit for purpose product o Develop an application method for the glue o Develop and create a bridging strip that will maintain the joint strength when put into axial pull loading or vibration o Create a gas tight seal to protect against future leakage sing Polyform

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

Expected benefits of project	Significant knowledge will transfer to the business that the adoption of a glue based repair technique can be applied for operational use including its limitations and possible alternative applications.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	0 yrs	50%	-£309,465

Potential for achieving expected benefits	The output of the project identified that the life expectancy of the repair technique would not be viable to use. The main benefit to accrue has been knowledge that will be used for future testing requirements.
Project Progress	This project has been stopped.
Collab' Partners	MW Polymers
Provider(s)	GL Noble Denton

(IFI37) Road Plates

Year: 2010/11

Project Description	This project seeks to support the development of an existing patented interlocking system for trenches up to 1m width and hole openings 2m*1m used without mechanical lifting aids to enable road works to be undertaken without interrupting the flow of traffic.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£15,502.00	£28,699.00	£0.00	
External	£50,881.00	£197,676.00	£0.00	£376,694.24
Materials	£64,170.00	£19,766.00	£0.00	
Total	£130,553.00	£246,141.00	£0.00	

Status	
	Approved
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Reduction in traffic congestion
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Reduced risk of injury to members of the public and damage to assets.
☑ **5 Protecting the Environment**	Reduced vehicle emissions from stationary traffic
Technological area / issue addressed by project	o Structural analysis to extend range o Skid resistance of materials o Product design to account for road cambers and avoidance of injury to members of the public or employees

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	9	1	8

Expected benefits of project

Current road plates used within the business require the re-application of a non-slip coat every 6 months. Ramps are also required to hold these in place at site which also requires heavy lifting equipment. Potential improvement to reputation in the greater London area.

The black top asphalt used as part of the Tarmac ramps that hold the current road plates installed at present cannot be easily recycled. As the new road plates will avoid the need for ramps this will avoid the need for any used Tarmac to be sent to landfill and thus avoid landfill tax. which is approximately £30 per tonne at present. Avoid the need to divert or manage traffic through the affected area thus improving traffic management.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	10 yrs	90%	£30,854

Potential for achieving expected benefits	The project is on track to achieve the original planned benefits.
Project Progress	Completed field trials for road plate options. Briefing material produced and reviewed and a draft specification produced for external consultation.
Collab' Partners	
Provider(s)	GL Noble Denton

(IFI40) AGI Condition Monitoring

Year: 2010/11

Project Description	To review and test condition monitoring techniques for above ground installations (AGIs)

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£1,995.00	£3,938.00	£3,206.00	
External	£15,587.00	£31,150.00	£17,195.00	£102,062.56
Materials	£1,608.00	£0.00	£0.00	
Total	£19,190.00	£35,088.00	£20,401.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Reduction in maintenance taks and deferring of replacement of PRIs or their components
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	The system has the potential to allow targeted maintenance to be performed by detecting moisture under insulation to identify areas of potential significant corrosion. This will enable corrective measures to be taken prior to any leakage occurign thus ensuring no loss of supply.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Detecting conditions that would support corrosion under insulation. o Identify areas of insulation that require removal to inspect pipework. o Identify and rectify areas of pipe corrosion prior to failure.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	17	0	17

Expected benefits of project	The initial stage of this project is to validate the proof of concept which will also inform the business of the potential benefts.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2013	3 yrs	75%	£641,630

Potential for achieving expected benefits	The planned field trials will confirm if the expected benefits will be achieved.
Project Progress	Site trials to evaluate the chosen device and compare against detectors are in the planning stage and will be undertaken during 2011/12.
Collab' Partners	
Provider(s)	GL Noble Denton

(IFI42) Gas Decarbonisation

Year: 2010/11

Project Description	Deliver a conceptual design for a plant that would demonstrate a) the technical, economic, regulatory and legal feasibility of decarbonising network gas to give a hydrogen rich gas for introduction into the distribution network.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£8,636.00	£6,660.00	£2,677.00	
External	£40,795.00	£28,798.00	£24,300.00	£110,410.00
Materials	£0.00	£0.00	£0.00	
Total	£49,431.00	£35,458.00	£26,977.00	

Status	
	Approved
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Decarbonisation of Natural Gas by AHI to produce Hydrogen Enriched Natural Gas (HENG) has been the subject of a feasibility study (IFI 42). This demonstrated its potential to reduce carbon dioxide emissions
☐ **2 Eradicating Fuel Poverty**	
☑ **3 Promoting Energy Savings**	The conceptual design would be a further step to towards proving roll-out feasibility and could identify energy savings from the use of HENG as compressor fuel - long term and marginal
☑ **4 Safe, Reliable Network**	Decarbonising the gas supply helps ensure that gas remains a fuel if choice in a low carbon future.
☑ **5 Protecting the Environment**	The project will pave the way for wider application of the technology by demonstrating its successful application and identifying legal and regulatory actions required to permit distribution of gas with a higher hydrogen and lower carbon content
Technological area / issue addressed by project	o Feasibility and Conceptual Design for Gas Decarbonisation Plant using Atlantic Hydrogen's technology o Process design, including block flowcharts and functional diagrams for the main tasks to be handled within the plant and an estimate of space required for the plant; o An overview of the carbon management plan, which will address management of the carbon resulting from the operation of the CarbonSaver plant, including a description of the logistics to collect, store, handle, pick up, and transport the carbon production; o Revised estimates of electrical loads and consumptions of the plant; and

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	Significant	13	6	7

Expected benefits of project	Evaluate the potential to support a long term objective to decarbonise network gas and support the ongoing competitiveness of the network. Develop knowledge of cutting edge technology with the potential to help improve long term security of the gas distribution industry.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2010	1 yrs	25%	-£104,915

Potential for achieving expected benefits	Benefits remain as stated however the project has been expanded in scope to include further engagement with EU partners with the aim of comparing the whole life cycle carbon/energy and economic analysis against other alternative ways of generating hydrogen for injection into the grid.
Project Progress	Conceptual design of the selected site in the UK has been completed.
Collab' Partners	**Provider(s)** Atlantic Hydrogen, Multi-Tech, KEMA

(IFI44) Preheat Reduction at AGI's

Year: 2010/11

Project Description	To enable gas preheating to be safely reduced or removed at pressure reduction installations (PRIs) through the development of decision support tool containing validated site selection criteria.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£5,488.00	£4,071.00	£40,696.00	
External	£52,550.00	£31,970.00	£102,025.00	£479,157.53
Materials	£22,000.00	£0.00	£129,200.00	
Total	£80,038.00	£36,041.00	£271,921.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Reduction in emissions as a result of using less gas for preheat
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☐ **4 Safe, Reliable Network**	
☑ **5 Protecting the Environment**	Reduction in emissions as a result of using less gas for preheat
Technological area / issue addressed by project	o To validate and demonstrate the reduction of energy use from gas heating at PRIs whilst maintaining gas quality and system integrity downstream.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	16	1	15

Expected benefits of project	Validate the proof of concept and evaluate all risks associated with the reduction in pre-heat. The output will also will inform of the potential benefits. The reduction of pre-heating at PRI's could reduce the energy consumption.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2013	10 yrs	50%	£239,497

Potential for achieving expected benefits	Confidence remains high that the benefits will be achieved, but the results of the field trials will confirm the actual expected benefits.
Project Progress	The detailed design stage has started and is progressing to plan. In this stage the field trial sites will be selected, the monitoring instrumentation specified and G17 approval gained for the site instrumentation.
Collab' Partners	**Provider(s)** GL Noble Denton

(IFI45) Demonstration Trial for On-site Energy Savings

Year: 2010/11

Project Description	The project targets the energy used by National Grid in non-vehicular applications, aiming to reduce and optimise the energy used to establish company-wide best practice for offices, gas holder operational sites and potentially other building/site infrastructure..

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£1,892.00	£12,931.00	£0.00	
External	£22,275.00	£51,975.00	£0.00	£175,823.36
Materials	£0.00	£86,750.00	£0.00	
Total	£24,167.00	£151,656.00	£0.00	

Status	Approved
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Strong Alignment. Measured energy savings of lower carbon emissions and application of the decision tool to establish a targeted, on-going programme of improvements to the energy use at National Grid sites.
☐ **2 Eradicating Fuel Poverty**	
☑ **3 Promoting Energy Savings**	Strong Alignment. Energy savings lead to reduced emissions by an estimated 15%. The powerPerfector device has the potential to save over 2,000,000 kg of CO2 per year if installed on all Gas Distribution Sites.
☐ **4 Safe, Reliable Network**	
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Demonstration of the available technology for safe and reliable use on National Site sites o Voltage Optimisation system. This reduces waste or redundant power as sites will only consume the actual power that they require o Technology will mitigate against harmonics and spikes in supply

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Substitution	Medium	16	0	16

Expected benefits of project	Knowledge transferred concerning the suitable use for UK Gas Distribution sites. Energy savings demonstrated at case study sites - good options for roll-out across other sites within National Grid.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2010	11 yrs	90%	£17,126

Potential for achieving expected benefits	The preliminary indications have been shown to be correct. The units have given the emissions and cost savings identified in the feasibility study.
Project Progress	Monitoring of the performance at the sites was undertaken and the savings and benefits quantified. In summary: - Over 10% electricity-use reduction - Predicted saving of around 115 tonnes of carbon dioxide (after one year of installed operation), as a combined saving for the three installations - Significant cost saving resulting in payback of the order of 3 to 6 years
Collab' Partners	
Provider(s)	GL Noble Denton

(IFI46) Internal Joint Profiling System for PE Pipes

Year: 2010/11

Project Description

To demonstrate if the internal weld profile of in-service PE joints (both butt and electrofusion joints) meet gas industry engineering standards; this will be completed by a combination of:
- visual inspection
- reproducing the internal profile to enable comparison against acceptable parameters.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£5,826.00	£17,559.00	£27,280.00	
External	£16,500.00	£101,250.00	£69,770.00	£455,912.00
Materials	£5,000.00	£81,000.00	£0.00	
Total	£27,326.00	£199,809.00	£97,050.00	

Status	
Approved	
Draft	10/05/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ 1 Low Carbon Economy	
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☑ 4 Safe, Reliable Network	Good alignment as this will provide a methodology of determining the integrity of PE joints (both butt and electrofusion) to be undertaken without the need to undertake multiple excavations
☑ 5 Protecting the Environment	Minor alignment as the use of the new tool will result less excavations compared with current practice.

Technological area / issue addressed by project

To design a profile measurement device linked with a camera within PE pipe systems for measuring internal joints covering:
- LP/MP/IP pressure tiers, initially up to 4bar, but with the potential to increase to 10bar
- All PE pipe diameters from 125mm up to and including 630mm
- The following existing SDR ranges, 11, 17.6 & 21, plus the potential to modify the instrumentation for other SDRs which are currently under development, e.g, 26 & 33 - subject to acceptable entry systems being designed and developed.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	Medium	13	1	12

Expected benefits of project

This device could enable more accurate identification of PE plant to other 3rd party excavators to minimise the potential of interference damage. Reduced operational cost and environmental issues for a single excavation and improved decision making on the condition joints by internal visual appearance and accurate measurement of both butt and electrofusion joints.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	11 yrs	75%	£577,280

Potential for achieving expected benefits

The potential for achieving the benefits are good. The initial controlled test demonstrated avoidance of an external joint repair.

Project Progress

The demonstration and proven fit for purpose prototype in controlled laboratory environment. Successful initial test of the live launch system on an existing live 36" metallic main has been undertaken. Field tests have started

Collab' Partners Synthotech Ltd

Provider(s) Synthotech Ltd

(IFI47) Alternative Sources/Scenarios for Bio-methane Injection

Year: 2010/11

Project Description

To demonstrate the safe injection of biomethane into the UK gas grid from biogas sources other than sewage to demonstrate the overall feasibility of small scale "renewable" additions to the National Grid Gas Distribution network for LTS and IP systems.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£138,357.00	£8,325.00	£22,138.00	
External	£731,500.00	£24,650.00	£106,500.00	£1,475,225.00
Materials	£372,000.00	£0.00	£20,000.00	
Total	£1,241,857.00	£32,975.00	£148,638.00	

Status	
Approved	
Draft	17/05/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Strong Alignment Injection of bio-methane into the gas network provides the only large scale, non-disruptive & economic solution for decarbonising heat in the UK.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Minor Alignment. National Grid have established that up to 50% of residential gas demand can be met with renewable gas and therefore this represents a potentially significant source of fuel that will enhance energy/security of supply within the UK.
☑ **5 Protecting the Environment**	Strong Alignment. Biogas promises to deliver substantial environmental benefits. This project should demonstrate the injection of this gas into the gas distribution network enabling it to be used in the most efficient way and thus delivering the greatest environmental benefit.

Technological area / issue addressed by project

Conceptual Design for the IP system to inject bio-methane from Foodstocks and waste
- o Conceptual Design for the LTS system to inject bio-methane from pig slurry
- o Identify the specific gas quality monitoring equipment for each pressure tier compliant with GS(M)R requirements
- o Identify lower cost, fit for purpose, equipment for each pressure tier and the regulatory changes that would be required to implement them

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Significant	14	4	10

Expected benefits of project

Develop knowledge of best industry practice on the injection of biomethane into the grid in the UK for the pressure tiers identified. This project should also identify any on-going barriers that may prevent biogas being injected and reaching its full potential. This information combined with data from the trial is anticipated to enable effective solutions to those barriers, especially economic ones, to be identified.

This project should demonstrate the injection of this gas into the gas distribution network enabling it to be used in the most efficient way and thus delivering the greatest environmental benefit.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	0 yrs	25%	-£55,000

Potential for achieving expected benefits

This project has raised the profile of Biogas as a UK renewable resource. The injection of renewable gas into the gas network opens up the opportunity for green gas to be sold to consumers. With the announcement of the RHI at 6.5p per KWh, this will bring the added investment to help the biogas sector reach its full potential.

The site has been design to the appropriate safety standards and kit supplied. Regular management reviews will assess safety levels and adjustments will be made accordingly. HAZOP's of all parts of the site have been completed and each section put through the G17 process.

The challenges that still risk the delivery of the benefits include the economic and environmental benefit for bio methane injection has yet to be demonstrated. The demonstration plant needs to be over instrumented to ensure that it delivers the appropriate data, and the cost of the plant is likely to be increased due to the current requirements for metering and monitoring (which were designed for large importation facilities) being onerous for a small demonstration plant.

(IFI47) Alternative Sources/Scenarios for Bio-methane Injection

Year: 2010/11

Project Progress	Detailed design for the biomethane injection facility has commenced with completion date set for May 2011. Construction of the site was due to be completed in financial year 2010/2011. Due to technical difficulties completion is expected in Summer 2011.		
Collab' Partners		**Provider(s)**	Mouchel, Willows, Various

(IFI50) Proximity Effects of Squeeze Off upon PE Pipe Joints

Year: 2010/11

Project Description	To understand the loads imposed upon PE Pipes when they are squeezed off and to use this information to better understand the requirements for separation distances between squeeze off equipment and joints.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£8,278.00	£17,751.00	£3,059.00	
External	£63,227.00	£102,991.00	£17,382.00	£218,954.97
Materials	£525.00	£2,800.00	£0.00	
Total	£72,030.00	£123,542.00	£20,441.00	

Status	
	Approved
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Good Alignment. Project will mitigate against the risk of joint/fittings failures during squeeze-off operations and this maintaining supplies to customers.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Using validated finite element analysis of PE pipes to explore sensitivity of joint/fitting proximity to squeeze-off equipment o Explore Proximity issues when soil restraints is present o Explore Proximity issues when joints contain defects o To undertake basic testing of samples of PE material that have been subjected to Squeeze-Off to verify the Post Squeeze-Off Yield Strength

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	19	2	17

Expected benefits of project	This project will provide essential knowledge and understanding via validated finite element analysis regarding the loads imposed during PE squeeze-off operations. This informed position will then determine whether any modifications are required to working practices. There could be an environment benefit by not releasing natural gas into the environment.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	5 yrs	25%	£287,412

Potential for achieving expected benefits	This project is on target to deliver the proposed benefits.
Project Progress	Material testing was carried out to determine the tensile properties of PE80 and PE100 material. 3-D FE analyses of the squeeze-off process for PE 80 (SDR 11 and 17.6) and PE 100 (SDR 21) pipes have also been carried out at various temperatures.
Collab' Partners	**Provider(s)** GL Noble Denton

(IFI51) New Materials for Gas Distribution

Year: 2010/11

Project Description	Determine the feasibility of applying specific novel materials to gas distribution that will overcome the construction difficulties associated with reinforcement and replacement of mains in and around London, so that National Grid can design and construct the mains replacement programme from 2013.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£14,702.00	£12,253.00	£25,176.00	
External	£234,964.00	£167,940.00	£35,093.00	£515,161.83
Materials	-£9,200.00	£9,200.00	£0.00	
Total	£240,466.00	£189,393.00	£60,269.00	

Status	
Approved	
Draft	10/05/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Strong alignment. Currently there is no practical pipe material to meet the requirements of the London Strategy replacement programme for future years.
☑ **5 Protecting the Environment**	Strong alignment. In the absence of any innovative material and faced with no alternative, steel would have to be used typically by non trenchless techniques. This would cause major traffic congestion, additional excavation and waste materials
Technological area / issue addressed by project	Large diameter pipes other than PE/ST that meet Gas Industry standards and procedures of up to 7bar operation o Risk assessments for laying such pipes in close proximity to buildings o Ability to connect to existing gas distribution systems o Ability to connect new offtakes in PE/ST o simplified table or matrix specifying building proximity distances associated with PE material by SDRs and PE pipe generation, pressure range host pipe material and jointing method.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	Significant	25	2	23

Expected benefits of project	Developing an alternative to steel and provide environmental benefits by reducing excavation and waste materials. especially in urban areas.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2013	18 yrs	25%	£539,740

Potential for achieving expected benefits	The work completed to date indicates that the likelihood of success is good.
Project Progress	Draft promixity data has been produced. Further interogation is required to validate and update the assumptions within the risk model during 2011.
Collab' Partners	
Provider(s)	PB Rune / GL Noble Denton

(IFI52) European Gas Research Group (GERG) 2009/10 - 2010/11

Year: 2010/11

Project Description

GERG is a cooperation of European Gas Utilities. Its members undertake a wide range of research directed to increase integrity and safety of gas distribution systems. National Grid is an active partner within the Distributions stream of GERG and seeks to gain significant leverage by collaborating in joint research projects.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£3,139.00	£7,890.00	£0.00	
External	£6,706.00	£67,629.00	£0.00	£376,000.00
Materials	£0.00	£722.00	£0.00	
Total	£9,845.00	£76,241.00	£0.00	

Status	
Approved	
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ 1 Low Carbon Economy	Minor alignment. Development of best of breed methane emission methodologies.
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☑ 4 Safe, Reliable Network	Good Alignment,. Jointly funded research/ sharing information on best practice NDT of joints and Gas in Soils.
☐ 5 Protecting the Environment	

Technological area / issue addressed by project

Adoption of knowledge ascertained via the output of sponsored projects that can be quickly implemented into the business as q efficiently as possible.

For 2009/10:

- Non destructive testing using field made joints
- The dynamics of gas tracking in soils
- Bench marking of methane emission methodologies

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	13	-2	15

Expected benefits of project

Improved knowledge in all project areas. Specifically the methane emissions may lead to changes to the way shrinkage calculations are carried out. NDT technologies may lead to improvements in materials and/or field procedures, and gas dispersion may lead to changes in the MRPS model.

Significant research leverage benefits. The total value of projects proposed during 2009/10 is approximately £376,000 which provides National Grid will an 4:4 to 1 leverage ratio.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	0 yrs	25%	-£87,766

Potential for achieving expected benefits

Expected benefits are on track.

Project Progress

Gas Migration in Soils
- Phase 1 has been delivered, which was principally a data gathering exercise to determine typical gas distribution systems (diameter, pressures etc.) and ground conditions (depth and soil).
- The conclusions allow for Phase 2 to be worked up amongst the Partners to address gaps and undertake further testing to calculate actual gas dispersion rates at a test site in Germany

NDT Inspection Techniques
- 30 blind pipe joint samples have been non destructively tested in the laboratory using the 2 selected NDT techniques that involve Ultra sonic phased array/ Time of Flight (TOFD) and microwave.

Collab' Partners KIWA, GDF SUEZ

Provider(s) GERG, KIWA, GL Noble Denton

(IFI53) New Methods for Commissioning/Decommissioning Low Pressure Mains

Year: 2010/11

Project Description	To develop, verify and validate a new procedure for the commissioning and de-commissioning of Low Pressure Mains 250mm – 355mm in diameter

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£2,511.00	£4,071.00	£4,838.00	
External	£17,638.00	£23,499.00	£19,533.00	£81,602.03
Materials	£1,105.00	£7,618.00	£0.00	
Total	£21,254.00	£35,188.00	£24,371.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Minimising the delay to consumers during the reconnection process.
☑ **5 Protecting the Environment**	Reduce PE waste and avoid sending this to landfill.

Technological area / issue addressed by project

o The methodology can be adopted in all flow stopping operations within the size/pressure range specified
o Verify whether temporary or permanent end restraint is required on live low-pressure, metallic gas mains using the new design of end cap from AVK Ltd.
o Verify and validate the de-commissioning procedure using a two bag operation on LP metallic mains 7" – 12" diameter.
o Verify that the Pipe Equipment Test End is suitable for use as the test piece on the end of the 250mm - 355mm PE100 SDR21 LP main during pressure testing of the main.
o Verify and validate proposed commissioning procedure developed through a number of field trials for PE100 SDR21 LP mains 250mm - 355mm in diameter.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	9	-3	12

Expected benefits of project

Development of a new restraint system. The new methods will reduce waste of PE materials that would otherwise go to landfill.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	1 yrs	75%	£7,368

Potential for achieving expected benefits

We are confident of realising the benefits identified.

Project Progress

To date the successful completion and observation of 4 out of 6 field trials to demonstrate the new commissioning / decommissioning process, and the commencement of the preparation of the draft field trial report.

This work will continue into 2011/12.

Collab' Partners | **Provider(s)** GL Noble Denton, AVK Ltd

(IFI54) Development of New Rapid Service Cut-off Technique

Year: 2010/11

Project Description	Facilitation of the removal of elbows and tee type mains to service connections under no blow conditions.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£2,232.00	£4,575.00	£0.00	
External	£10,000.00	£20,500.00	£0.00	£37,251.46
Materials	£0.00	£0.00	£0.00	
Total	£12,232.00	£25,075.00	£0.00	

Status	
	Approved
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Removal of uncontrolled gas emissions to atmosphere resulting from service cut off operations.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	The new service isolator will reduce the risk of gas in building by allowing the faster repair to be undertaken. Internally, the removal of the denso-cut procedure will reduce the risk to staff from asphyxiation.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o the introduction of a sealant into a domestic service pipe for the purpose of isolation / cutting under no gas conditions and in a similar / quicker time to the 'denso cut' method o fast, safe and effective live / dead checks of capped services o injection of anaerobic sealant into screwed joints.

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

Expected benefits of project	Removal of gas emissions to atmosphere resulting from service cut off operations and more efficient gas repairs.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	12 yrs	75%	£909,621

Potential for achieving expected benefits	Early indications are that the revised design will be safer to use and as effective as traditional methods. It received positive reaction to use from those operatives involved in the trial.
Project Progress	2nd prototype has been successfully field tested, work procedures have been developed and implementation is planned.
Collab' Partners	Steve Vick
Provider(s)	Steve Vick

(IFI57) Calculation of Zones of Influence

Year: 2010/11

Project Description	To enhance existing zones of influence functionality so as to improve the efficiency and accuracy of the annual leakage return and economic assessment of leakage reduction projects.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£12,567.00	£5,253.00	£8,963.00	
External	£79,574.00	£35,828.00	£45,246.00	£188,867.97
Materials	£0.00	£0.00	£0.00	
Total	£92,141.00	£41,081.00	£54,209.00	

Status	
Approved	
Draft	10/05/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Minor Alignment. The output will facilitate reductions in leakage from subsequent projects i.e. allowing additional analysis to be undertaken to establish the effectiveness of MEG treatment which could then lead to remedial techniques to be deployed or other options to be sought.
☑ **5 Protecting the Environment**	Good alignment. Improved zones of influence calculation enables improved reporting and improved design of pressure management solutions.
Technological area / issue addressed by project	o Network analysis modelling software innovation bespoke to National Grid o Enhance our ability to report on the effectiveness of our leakage reduction strategy o Enhance our ability to design future leakage reduction proposals. o Identification of bio-methane sites to automatically calculate oxygen levels on the network for planning purposes o Ensure network analysis tools are in a position to easily enhanced in the future as the bio-methane market increases

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	17	-2	19

Expected benefits of project	Improved understanding of the impact on our networks upon of biomethane and modelling of leakage scenarios. This will then enable the creation of strategies and the deployment of solutions that will reduce our leakage in future years.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	1 yrs	50%	£664,743

Potential for achieving expected benefits	The demonstration version has shown that all the key benefits of this project will be achieved.
Project Progress	Successful delivery and testing of functionality within our core network analysis tool that allows: - zones of influence to be calculated for regulators - improved reporting capability for the annual leakage return making it more consistent and repeatable - tracking of gas components from sources of bio-methane entry
Collab' Partners	
Provider(s)	GL Noble Denton

(IFI58) Study into the Future Impacts on Calorific Value

Year: 2010/11

Project Description	To review and assess the future impacts and issues surrounding the injections of non-natural gases.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£2,723.00	£0.00	£2,975.00	
External	£15,500.00	£0.00	£15,500.00	£39,940.00
Materials	£1,495.00	£0.00	£1,495.00	
Total	£19,718.00	£0.00	£19,970.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Ensuring the CV of gas is maintained within the agreed limits for all future imputs.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Knowledge of key issues affecting the calorific value of gas in future years to mitigate the risk of accepting noncompliant gas and subsequent prosecution or financial penalty by Ofgem or HSE. o Identify alternative carrier gas of lower cost and unrestricted supply and demonstrate their suitability to Ofgem. o Identify low cost alternative to the Danalyzer suitable for installation at low volume network entry points

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Low	13	1	12

Expected benefits of project	Knowledge of key issues affecting the calorific value of gas in future years.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	1 yrs	25%	£188,007

Potential for achieving expected benefits	Project is on track to deliver benefits.
Project Progress	Various oxygen containing gases have been analysed and interpretation is underway. A performance evaluation has been carried out and to provide a benchmark in performance. A review of the market and identification of the most suitable instrumention for CV measurement has also been completed .
Collab' Partners	
Provider(s)	GL Noble Denton

(IFI60) Development of Pump Wier Tank Method for Multi-holder Sites

Year: 2010/11

Project Description	Design and trial of pump wier tank method for methane extraction at multi-gasholder sites.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£10,839.00	£2,073.00	£2,007.00	
External	£125,115.00	£0.00	£11,406.00	£160,411.00
Materials	£0.00	£0.00	£0.00	
Total	£135,954.00	£2,073.00	£13,413.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Water in gas holder tank contains certain amount of methane. As tank water is discharged into the sewer, methane can release from the water and build up in confined space. This can potentially lead to explosion and may impact upon the holder being operation as and when required in order to meet gas demand.
☑ **5 Protecting the Environment**	Local sewer undertakers have updated the Discharge Consents by prescribing limits of methane concentration in the water discharged at gas holder sites. This solution will assit National Grid in complying with these statutory regulations. In NG's corporate risk register, non-compliance with discharge consent scores 41.
Technological area / issue addressed by project	o Development of a pumped weir system for multi-holder sites o Utilisation of the last chamber of the site interceptor pit to house the submersible pump o Submersible pump operated by level switch

Innovation Type	**SD Rating**	**Benefits Rating**	**Residual Risk**	**Overall Score**
Incremental	Medium	18	1	17

Expected benefits of project	This project will test whether the weir tank solution can be modified so that it can be deployed for multi-holders sites.

Adoption (Year)	**Duration of Benefits**	**Prob' of Success**	**Project NPV**
2011	1 yrs	50%	£1,567,310

Potential for achieving expected benefits	Project is expected to deliver proposed benefits following results from 2 sites. This, along with the water test analysis, provides sufficient evidence to support this statement.
Project Progress	Stage 1 was delivered and demonstrated the production of new simplified generic design package alongside reduced design and delivery costs for future projects. Stage 2 successfully demonstrated the new design at two sites.
Collab' Partners	**Provider(s)** GL Noble Denton

(IFI61) Gas Future Scenarios Project

Year: 2010/11

Project Description	The Energy Networks Association Gas Futures Group (GFG) has identified the need to develop long ranging scenarios specific to the gas industry within the Great Britain.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£14,914.00	£0.00	£0.00	
External	£71,031.00	£0.00	£0.00	£85,945.08
Materials	£0.00	£0.00	£0.00	
Total	£85,945.00	£0.00	£0.00	

Status	
Approved	
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	It is anticipated that the project will identify the plausible actions to converge on Government agreed CO2 targets from the 2025 levels indicated in Project Discovery. The project will analyse the impact of Carbon Capture and Storage, Bio-methane injection and other supply sources.
☑ **2 Eradicating Fuel Poverty**	The project will provide understanding as to the full economic impact and average cost per customer for each scenario. The project will review the imiplications of how particular Government policies could influence the scenarios, the impact on CO2 emissions and costs i.e. Carbon Neutral Homes impact on new housing connections to gas from 2016, 2019 proposals for Carbon Neutral Commercial properties, revised Building Regulations.
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	The project will analyse the impact Bio-methane injection and other supply sources.
☑ **5 Protecting the Environment**	The project will analyse the impact of Carbon Capture & Storage on industry and the viability of Carbon Capture & Storage networks.
Technological area / issue addressed by project	The project will enable: o a timely review in more detail as to what Project Discovery scenarios indicate for Gas Transmission, Gas Distribution and Independent Gas Transporter networks in the short and long term that would facilitate a dialogue with DECC, Ofgem and other parties to the future of Gas in GB, o identify the plausible actions to converge on Government agreed CO2 targets from the 2025 levels indicated in Project Discovery i.e. identify whether GB fails to reach targets under any of the scenarios, o a review of the implications on specific gas consuming sectors including residential, non-residential (SME – large processing industry), generation and CNG (transport) o a review of the impact of Carbon Capture and Storage (on industry – CCS networks, and Generation), bio-methane injection and other supply sources, o an evaluation of the full economic impact (total investment and annual costs to operate) and the average cost per consumer (for gas and total energy as a comparison between scenarios), o the identification of longer term risks and opportunities through the use of appropriate stress tests, o a review of the implications of how particular Government policies could influence the scenarios, the impact on CO2 emissions and costs i.e. Carbon Neutral Homes impact on new housing connections to gas from 2016, 2019 proposals for Carbon Neutral Commercial properties, revised Building Regulations etc

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Significant	14	-8	22

Expected benefits of project	The outputs of the scenrio work will allow the ENA Gas Futures Group and individual project contributors to understand the challenges and opportunities within the GB Gas Distribution market out to 2050. The project outputs will also provide valuable information that may be utilised in subsequent stages of Project Discovery and RPI-X@20, and inform the GFG of further work that would be of benefit in (Tx & Dx) Price Control Review preparations.

(IFI61) Gas Future Scenarios Project

Year: 2010/11

The outputs of the scenario work will provide a strategic guidance to the project participants as to the differences in market conditions at 10 year intervals from 2010 onwards and fit into a wider context of climate change transition / impact. The project outputs will provide greater understanding of the impact of bio-methane injection and other supply sources.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2010	0 yrs	25%	-£71,031

Potential for achieving expected benefits

Benefits have been delivered

Project Progress

The Energy Networks Association Gas Futures Group (GFG) has identified the need to develop long ranging scenarios specific to the gas industry within Great Britian.

Ofgems's Project Discovery has provided a wider "Energy Market" scenario framework to 2025, comparing environmental development (low and high change) to economic recovery (low and high rate recovery). The ENA GFG identified a need to develop this work further.

The scenarios have been developed in order to derive plausible differences in market conditions at 10 year intervals from 2010 onwards and fit into a wider context of climate change transition / impact. Accordingly, in line with the Government climate change targets the scenarios have been extended to 2050 with detailed analysis at 2020, 2030, 2040 and 2050. The scenarios should be at a sufficient level of detail to identify the specific impact on transmission, distribution, new build and existing consumer demand levels over an annual period and under peak demand day conditions.

The scenarios focus on the overall energy and CO2 outlook including the developments in generation, transport and heat to 2050. However, more detailed analysis is required on the demand and supply of gas within the overall energy scenarios and their contribution to energy costs and climate emissions.

Collab' Partners

SGN, NGN, WWU, National Grid Transmission

Provider(s)

ENA/Redpoint

(IFI62) Development of DANINT FWAVC software for New Gas Chromatograph

Year: 2010/11

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 for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£4,706.00	£0.00	£0.00	
External	£14,000.00	£0.00	£3,440.00	£87,200.00
Materials	£0.00	£0.00	£0.00	
Total	£18,706.00	£0.00	£3,440.00	

Status	
Approved	
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Minor alignment. Lower installation and maintenance costs for directed CV measurement resulting in fewer visits to sites.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Good Alignment. Accurate and reliable monitoring of throughput in accordance with Ofgem regulatory requirements.
☑ **5 Protecting the Environment**	Lower consumption of bottle gases.
Technological area / issue addressed by project	o Develop software for Communication and Data collection from new embedded controller CV Analyser. o New integration and configuration set-up for new controller.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	10	5	5

Expected benefits of project

If this solution is approved by Ofgem there will be two solutions available for Operators to use. This Model 700 solution will require less maintanance and site visits than that the Model 500, and will also enhance the viability of injecting other gas sources.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2010	5 yrs	50%	£25,135

Potential for achieving expected benefits

The benefits will be realised providing that the new version/equipment is deployed by each funding party. The main benefits expected from the project to date are an operational efficiency saving per site where deployed and compliance with Ofgem approved equipment.

Project Progress

Development and testing of revised Ofgem approved DANINT FWACV software for use with Daniel Model 700 gas chromatograph and 2350 (new card) Controller. This included:

- DANINT modules modified to function with 2350 new card controller.
- DANINT build 12B with multi-stream functionality
- DANINT build 12C for use with a 2350A with the new Emerson Ethernet card. This version has been developed in conjunction with Emersons Ethernet card to allow better communication between different modules.
- Engaged in discussions with Emerson to agree address mappings for DANINT communications.
- Completed DANINT software module enhancements and carry out initial testing and User Acceptance Changes (NGG).
- Siemens Microbox deployed replacing Allen-Bradley.
- Support Ofgem approval of DANINT build 12C, carried out at Emerson Factory.
- Produced release CD for installation by GDN's.

The other development was the revision to the EOD software. Version 5.3 was developed to use the difference in the "Offtake Cumulative Volume Total" between consecutive DAT file records rather than the "Offtake Inst. Volume Flow Rate" as at present. The output included the demonstrating and

(IFI62) Development of DANINT FWAVC software for New Gas Chromatograph

Year: 2010/11

	testing of these revisions, and presenting the results back to Ofgem for approval. In addition to the above the new version of DANINT has been installed at NGGD's Holford site. Some issues have occurred but these are not necessarily associated with DANINT. The software will need to be revised and Ofgem will need to be informed. However, Holford may not flow gas and therefore a live operational site will be required for full testing and Holford will be used to complete the Site Acceptance Testing.
Collab' Partners	NGN, SGN, WWU, National Grid Transmission
Provider(s)	GL Noble Denton

(IFI63) PE Asset Life Reseach

Year: 2010/11

Project Description	To develop methodologies, techniques and decision support tools that establish the current condition of the existing PE network, identifies potential threats to the integrity of PE pipes and joints, assesses the residual life of the PE network and identifies possible strategies and policies for targeted replacement.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£23,622.00	£0.00	£18,563.00	
External	£366,302.00	£0.00	£105,471.00	£563,037.00
Materials	£7,000.00	£0.00	£0.00	
Total	£396,924.00	£0.00	£124,034.00	

Status	
	Approved
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☑ **1 Low Carbon Economy**	Strong alignment. The avoidance of wholesale PE replacement in future years based on design life of 50years. The work is expected to allow asset life to be extended for many decades thereby avoiding major construction activity.
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Strong alignment. The principal objectives of this work are to provide tools and methodologies to allow condition assessment and risk management of PE mains and service assets to be undertaken. This may lead to targeted replacement where risk dictates.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Introduction and development of novel retrieval methods for small PE samples (slivers & coupons). o Development of chemical and physical characterisation methods of determining condition assessment and residual life prediction from small samples. o Introducing new test methods to qualify the long term service performance of recovered sections of pipes and joints. o Developing a PE materials database and software tools for predicting the residual life of PE systems.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Significant	Significant	26	7	19

Expected benefits of project	New test methods for PE integrity and life that may be used to provide improved tests to specify new PE products. Understanding the risks posed by the PE asset to at least the same level of confidence as is currently the case for metallic mains.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2014	10 yrs	25%	£1,553,707

Potential for achieving expected benefits	Expected benefits are on track to be delivered.
Project Progress	Collection of historical resin and installation data on PE systems UK & EU has been completed. Development of novel testing techniques, particularly for small samples resulting from coupons and/or 'fingerprints' and gathering of a sufficient number of samples from the field of the early PE pipes and fittings such that the existing and novel tests can be checked on real pipe data.
Collab' Partners	**Provider(s)** MACAW

(IFI64) New Intervals Methodology for In-Line Inspection

Year: 2010/11

Project Description

Development of the revised methodology for the scheduling of in-line inspections of high pressure pipelines for consistent compliance with Pipeline Safety Regulations and IGEM/TD/1.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£7,954.00	£0.00	£0.00	
External	£55,325.00	£0.00	£0.00	£63,278.50
Materials	£0.00	£0.00	£0.00	
Total	£63,279.00	£0.00	£0.00	

Status	
Approved	
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ 1 Low Carbon Economy	
☐ 2 Eradicating Fuel Poverty	
☐ 3 Promoting Energy Savings	
☑ 4 Safe, Reliable Network	This work will enable the network operators to develop a risk based approach for the scheduling of in-line inspections, and thus target maintenance and investment effectively for piggable high pressure pipelines.
☑ 5 Protecting the Environment	Mitigating against potential incidents will also mitigate against loss of gas to the atmosphere as a result.
Technological area / issue addressed by project	o Enhanced tool that caters for 30% and 50% SYMS pipelines in Gas Distribution Networks. o Better/closer link between Cathodic Protection, Close Interval Potential Surveys (CIPs) and scheduling of in-line inspections o Common methodology and consistent application of in-line inspections across gas pipeline operators within the UK.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	15	-8	23

Expected benefits of project

High pressure pipeline failures could potentially lead to costs of £100m. Such failures have the potential to cause multiple fatalities as seen in Belgium in 2004 when over 25 people were killed. In-line inspection is an important element to the integrity management of high pressure pipelines.

Reduce the potential release of gas from corroding pipes.

The revised methodology based upon the risk based approach will allow GDN's to focus investment effectively ensuring that remedial action is prioritised on those pipeline most at need.

By not using a risk based criteria approach this could mean that GDN's would have to revert to the IGEM/TD/1 recommended inspection intervals. This would result in a maximum interval frequency of 10 years whereas the majority of pipelines are on a higher interval.

This could increase operating expenditure for GDN's by 50% for inspection activities. The average number of inspections per geographic network is approximately 4 per year costing anywhere between £50k to £150k to complete. If a conservative value of £70k is used as the average inspection cost then the average budget per geograhic network will be in the region of £280k. The cost avoided assumed from undertaking this work is £94k pa (i.e 1/3 of £280k). For NPV purposes that value has been multiplied by 5 (£470k) to cover the avoided costs for one formula period only.

The other major benefit is that the project costs will be shared between the GDN's thus creating a good leverage ratio for each collaborator.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	5 yrs	50%	£115,029

(IFI64) New Intervals Methodology for In-Line Inspection

Year: 2010/11

Potential for achieving expected benefits	The completed output will now enable GDN's to target specific problems and focus investment via a prioritised approach. In the short term pigging frequencies will increase, but once the residual issues (new risks identified) have been resolved financial benefits may accrue but it is not possible to quantify these at this stage. From a safety perspective the project will deliver the anticipated benefit. The GDN's have gained credibility through the project as the HSE reviewed the output from stage 1 in November 2010. Feedback received to date has been extremely positive to the extent that they see the output as driving improvements in corrosion management. In addition to the above, each GDN will have benefited from this collaboration as knowledge concerning known technical issues was shared leading to a common understanding that in part has been codified in the output.
Project Progress	The project has delivered an enhanced intervals inspection tool that can be used by Gas Distribution Network operators for pipelines operating at 30% and 50% SMYS. The output contains: - Improved methodology which takes account of lower stress in pipelines - A Model that takes into account CP and CIPS in a more robust manor - Clear and consistent assumptions agreed by all GDN's and National Grid Transmission - Improved data entry incorporated as an enhancement, and alignment in engineering assumptions with Tx model i.e. defect distribution levels. - Additional enhancements include secure sign in facility; pipeline selection from displayed list; provision of log of changes; inclusion of Inspection history records; associated notes & records and listing of inspection schedules for pipelines all of which enable the tool to be a more flexible and user friendly to use for intervals/inspection management

Collab' Partners	NGN, SGN, WWU	**Provider(s)**	PB Rune

(IFI65) Operational & Integrity Challenges (Small Projects) 2010/11

Year: 2010/11

Project Description	To facilitate utilisation of innovative tools, techniques and processes across Operations, Coalitions and Alliance work activities that result in safety, efficiency, and environmental improvements

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£24,832.00	£0.00	£0.00	
External	£177,761.00	£0.00	£0.00	£222,343.01
Materials	£19,750.00	£0.00	£0.00	
Total	£222,343.00	£0.00	£0.00	

Status	
Approved	
Draft	14/06/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, 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
☑ **5 Protecting the Environment**	Minor alignment. Minimising leakage and waste

Technological area / issue addressed by project

- Grundamat insulation
- Robotics
- Riser Repair
- ECV Stop Tap
- BT vented covers
- Flowstop Bag Improvements
- Large diameter PE Thin wall development
- Mains breaker
- Bagging Saddle
- Water and Gas Extraction Unit
- Hand Held Vac
- PE repair review
- Pneumatic pressure test recorder
- Waste Heat heating project

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	15	-2	17

Expected benefits of project

- Adoption of knowledge via an indepentent appraisal that will determine whether an innovation opportunity can be quickly developed and thus implemented into the business as efficiently as possible. The knowledge gained will also enable the efficient development of project scopes should any one of the small projects need to be developed into a more substantial project.

- A number of projects will investigate how to reduce safety risks as part of the day-to-day operations. For those projects that result in a solution/prototype these are:

Breaker bars
The main driver for this project is operational safety. There have been a number of serious injuries caused by mains breaking bars deflecting off mains and hitting the user on the side of the head. Over the last two years 2 operatives have suffered fractured skulls; one of whom was advised to rest for several weeks.

Hand held vac
Improved safety as the tool maximises the use of air and reduces the risk of cable strikes and other 3rd party damage.
It can be operated on all types of excavation by a traditional team with the minimum amount of training.

(IFI65) Operational & Integrity Challenges (Small Projects) 2010/11

Year: 2010/11

- WAGE)
Reducing the noise pollution created by the current equipment
Utilisation of the vehicle engine to power the unit as opposed to the current need to run both the vehicle and the unit
Delivering a multipoint barhole evacuation unit to improve the performance of gas leakage location thus reducing the methane released into the atmosphere
Be adaptable to allow use for the reclamation of gas from mains being abandoned. It is not possible to quantify benefits at this stage.
- A number of projects will investigate how to resolve current operational and technical issues that will avoid alternative options. For those projects that result in a soultion/prototype the benefits are:

Large Diameter PE Thin Wall development
Recent estimates indicate that there are approx 550km of 24 inch metallic mains to be replaced over the remaining 22 years of the 30/30 programme. If 25% of these mains could be inserted with large diamter PE instead of open cut then this gives an annual replacement figure of approx 6km/annum. This could equate to £3m saving per annum.

Breaker bars
The new tool, if commercialised, may be cheaper to purchase compared against Podgar bars that are currently in use at present although this cannot be quantified at this stage

Improved Flow Stopping Bag
This bag enables the market for drilling equipement to be opened up. It is not possible to quantify benifits at this time but more competition in the market is likely to lead to lower prices in due course.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2012	1 yrs	25%	£434,090

Potential for achieving expected benefits

Robots
The project has delivered in accordance with the stated objectives

Riser Repair
Confidence is high that it will achieve benefits

ECV
Benefits have been achieved, the second site visit has been avoided

BT vented cover
Benefits have been achieved, a tender process is being progressed

Imrpoved Flowstopping Bag
Benefits have been achieved

Water and Gas extraction unit
Initial testing has indicated that the solution will achieve the objectives

Hand held vac
Uncertain due to factors relating to the existing vehicle configuration

Waste heat heating project
The project is on track to achieve the stated benefits

Pneumatic pressure test recorder
The project is on track to achieve the stated benefits

PE repair review.
The project is on track to achieve the stated benefits

Project Progress

Robots
Draft report received a number of techniques have been highlighted that offer potential for internal repair. Clarity is being sort on a number of the techniques.

Riser Repairs
Prototype has been built but not tested

ECV

(IFI65) Operational & Integrity Challenges (Small Projects) 2010/11

Year: 2010/11

Testing has been done and approval given. Implemented into the business

BT vented covers
Designs for use throughout NGG operating area have been tested for load bearing capability.
Report has been delivered

Improved Flowstopping Bag
Lab tests and field trials completed to enable bags to be used in the field.
Also enabled the approval of the Pipetech flow stop equipment bringing competition to the market.
Supplied evidence to allow a trial for single bag flow stop for PE.

Large Diameter PE Thin Wall Development
A single LP job in WM has been carried out. Inserted into a 24”
Rapid crack test failed but pipe can still be used on LP. An alternative solution is being investigated

Mains breaking tool.
A prototype has been delivered. A trial is being organized.

Water and Gas extraction unit
A prototype unit has been built and workshop testing is being carried out.

Hand held vac
Initial prototype built. Limited success. Further study of power outputs is being undertaken.
Pulsating of air method was tested to enable the breaking up of clay and this appeared promising.

Waste heat heating project
The initial feasibility report has been undertaken following detailed discussions with the CHP plant developers and site owners. The report indicates that there will be adequate hot water available from the wood gasification plant to meet the requirements of the heating load at the Blackrod plant.

Pneumatic pressure test recorder
A requirements specification has been delivered.

PE repair review.
A report has been delivered that provides a small number of potential techniques. These are now being considered for future trials.

Bagging saddle
Work has been deferred into the 2011/12 reporting year.

Collab' Partners		**Provider(s)**	Various

(IFI66) Orifice Plate Deformation

Year: 2010/11

Project Description	To recommend a reliable and accurate method for assessing orifice plate deformation at typical National Grid Gas Distribution operating conditions.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£1,293.00	£0.00	£1,921.00	
External	£10,917.00	£0.00	£11,040.00	£25,800.00
Materials	£0.00	£0.00	£0.00	
Total	£12,210.00	£0.00	£12,961.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Good alignment. 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.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	o Survey of existing technical literature to establish current status of orifice plate deformation calculation. o Establish the causes of the differences between the Jeplast routine within HPMIS and elsewhere. o Use computational fluid dynamics (CFD) to calculate the actual load distribution on the orifice plate. o Use finite element analysis (FEA) to calculate the behaviour of the orifice plate under the load distribution calculated from the CFD. o Repeat the CFD and FEA calculations for a range of plate sizes, beta ratios, seal and mounting types. o Recommend a method of calculating orifice plate deformation that can be implemented by National Grid Gas Distribution in IFI:27 and elsewhere.

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	10	4	6

Expected benefits of project	The main benefit to arise from the initial stage of this work will be ascertaining of knowledge in determining whether the current assessment tools are fit for purpose.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	0 yrs	25%	£25,073

Potential for achieving expected benefits	The expected benefit remains unchanged.
Project Progress	This project started in February 2011 and orifice plate details have been captured. The project will continue into 2011/12.
Collab' Partners	**Provider(s)** GL Noble Denton

(IFI67) Pipeline Industry Research Club [PIRC]

Year: 2010/11

Project Description	Assessment, prevention and investigation of PE threats and opportunities via collaborative research.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£1,291.00	£0.00	£1,760.00	
External	£5,833.00	£0.00	£10,000.00	£35,280.00
Materials	£0.00	£0.00	£0.00	
Total	£7,124.00	£0.00	£11,760.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☐ **2 Eradicating Fuel Poverty**	
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	PIRC undertakes jointly funded pipeline research to mitigate issues and risks associated with PE pipes. The group also provides opportunities for sharing information on best practice and incidents with other 8 other Water Companies
☐ **5 Protecting the Environment**	

Technological area / issue addressed by project

The intended course of research over the next 12 months (some of which will continue into the following year) is as follows;

o Butt Fusion Welding using forced-cooling to reduce welding cycles by up to one third without sacrificing quality, in collaboration with equipment manufacturers, thereby providing very real cost savings to the Industry.
o Coil Straightener a modular unit which can be attached to a coil trailer straightening and re-rounding coiled pipe in the process. The major benefits would be significant improvement in both joint quality and safety for relatively low cost.
o Rehabilitation Guidance a critical assessment of various rehabilitation techniques, including Rolldown, Swagelining and Polyflex, with practical guidance and advice to minimize avoidable risks.
o NDT of fusion joints - establishment of specific pass/failure criteria for the welds by correlation of NDT results obtained from the field with mechanical testing where appropriate, ultimately providing reliable reassurance.
5) Large Diameter EF Couplers (>630mm) Various jointing issues (including Reversion of pipe ends) are exaggerated in larger diameter fittings. Exova conduct approval testing and analysis to prevent problems occurring in the field.

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

Expected benefits of project

Improved system integrity knowledge.

The primary benefit from this programme is collaboration on projects that will help to maintain the integrity of PE pipes and demonstrate to the HSE and other stakeholders that NG is actively engaged at an Industry level.

Significant research leverage benefits

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2011	0 yrs	25%	£32,985

Potential for achieving expected benefits

Benefits as stated

(IFI67) Pipeline Industry Research Club [PIRC]

Year: 2010/11

Project Progress	Butt Fusion Welding - using forced-cooling to reduce welding cycles The sampling plan has been agreed. Coil Straightener - a modular unit which can be attached to a coil trailer straightening and re-rounding Coiled pipe in the process. - unit undergoing design enhancements for use in conjunction with coil trailer NDT of fusion joints - work continues on the establishment of specific pass/failure criteria for the welds by correlation of NDT results obtained from the field
Collab' Partners	United Utilities, Thames Water, Severn Trent Water, Yorkshire Water, Veolia Water, Northern Ireland Water, South West Water, Bristol Water, Sutton and East Surrey Water & Northumbrian Water. The current membership for 10/11 is to be confirmed but is likely to exceed 8.
Provider(s)	PIRC

(IFI68) Model Maintenance Improvements

Year: 2010/11

Project Description	To develop enhancements and efficiency improvements to the model maintenance applications that are used to model and analyse gas distribution systems with the aim to enable better integration with the business systems proposed under the GDFO programme.

	Expenditure for Current FY	Expenditure for Prev' FY	Expenditure for Next FY	Total Project Costs
Internal	£4,715.00	£0.00	£15,400.00	
External	£31,500.00	£0.00	£87,500.00	£266,952.00
Materials	£0.00	£0.00	£0.00	
Total	£36,215.00	£0.00	£102,900.00	

Status	
Approved	
Draft	27/04/2011
Final	16/06/2011
Approved	07/07/2011

Alignment with IFI/SD

☐ **1 Low Carbon Economy**	
☑ **2 Eradicating Fuel Poverty**	Good Alignment. The network analysis models are used to make operational and strategic decisions for the business, the swifter updates will remove the potential disparity between the models and reality removing the probability of loss of supply and thus protecting venerable customers.
☐ **3 Promoting Energy Savings**	
☑ **4 Safe, Reliable Network**	Good Alignment. The network analysis models are used to make operational and strategic decisions for the business, the swifter updates will remove the potential disparity between the models and reality removing the probability of loss of supply and ensuring that these models align to reality.
☐ **5 Protecting the Environment**	
Technological area / issue addressed by project	

Innovation Type	SD Rating	Benefits Rating	Residual Risk	Overall Score
Incremental	Medium	11	2	9

Expected benefits of project	The proposed enhancements will reduce the manual effort required to maintain and update models, which in turn will reduce the potential for errors occurring in the network models. Therefore there will be an expected increase in both efficient working and quality of the network models.

Adoption (Year)	Duration of Benefits	Prob' of Success	Project NPV
2013	3 yrs	25%	£236,925

Potential for achieving expected benefits	The benefits are on track to deliver.
Project Progress	Succesful delivery of the first phase of improvements to the model maintenance process.
Collab' Partners	**Provider(s)** GL Noble Denton

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