Innovation Funding Incentive

For

Sustainable Development

(IFI/SD)

Report

Wales & West Utilities Ltd.

For period 1st of April 2012

To

31st of March 2013

Wales & West Utilities R&D Programme – Contents:

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1. Executive Summary

During the period 1st April 2012 to 31st March 2013, Wales & West Limited (WWU) has invested in a total of twenty one innovate projects of which 5 were sole WWU projects.

Wherever practicable, WWU has participated in collaborative research and development with other organisations through the Gas Networks Collaboration Forum who share common objectives as well as maximising the benefit of IFI/SD money for end consumers through working with the other GDNs – National Grid, Scotia Gas Networks and Northern Gas Networks.

The following table is a summary of total WWU expenditure per project and actual allowance under the Ofgem IFI scheme as detailed in section 2 of this paper:

Projects title	Cost
EA Technology CBRM > 7 Bar work	£ 13,000
Domestic Heater Study	£ 7,884
Pipe Condition Assessment Phase 1	£ 39,696
Corrosion Aspects of Non-Conventional Gas	-£ 36,565
Stand-alone bio-methane project	£ 174,117
< 7 Bar RCM Review	£ 20,220
MRPS Stage 5	£ 9,548
Tier 2 MRPS work prioritisation methodology	£ 14,695
WWU NPD Layers	£ 18,780
EMIB Support - Dave Lander	£ 360
Gas Quality Support - Dave Lander	£ 888
Hazardous area zone classification	£ 8,921
WRC PLC - CIPP	£ 8,560
Diurnal Storage Project	£ 10,833
Self-Purge and relight project	£ 2,259
Pipe Condition Assessment Phase 2	£ 75,906
New Intervals methodology for in-line Inspection	£ 13,831
Development of DANINT FWACV software: Gas Chromatograph	£56,366
Development of E pipe smaller diameter pipe lining system	£ 18,147
Assessing threat of Internal Stress Corrosion.	£ 40,027
TIER 2 - MRPS (Examination to identify high consequence tier 2 pipes)	£ 2,244
Total 2012/2013 IFI expenditure	£ 499,717

The total amount of Expenditure Wales & West Utilities Ltd has claimed under IFI in 2012 /2013 is £399,774.

2. Introduction

Distribution networks have a requirement to provide Ofgem with an annual report by 31st July detailing its IFI/SD project activity.

Each project must satisfy one of the eligibility criteria's of Technical Development, Degree of Innovation and Customer Value and align with one or more of Ofgem's five Sustainable Development Themes :-

1. Managing the transition to a low carbon economy

2. Eradicating fuel poverty and protecting vulnerable customers

3. Promoting energy saving

4. Ensuring a secure and reliable gas and electricity supply

5. Supporting improvement in all aspects of the environment

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

• A GDN is allowed to spend up to 0.5% annually of its Distribution Network Transportation Activity Revenue on eligible IFI/SD projects.

• All projects should align with one or more of Ofgem's five Sustainable Development Themes.

• GDNs IFI/SD internal expenditure will be allowed as part of the total IFI/SD expenditure up to a maximum level of 15% of project cost

• The GDN is allowed to recover 80% of its eligible project expenditure

• A partial carryover of up to 50% of unspent eligible IFI/SD expenditure is allowed from one year to the next.

• GDNs will have to openly report their IFI/SD activities on an annual basis in accordance with the Good Practice Guide. These reports will be published on the Ofgem website.

• Ofgem reserves the right to audit IFI/SD activities

The scheme for GDNs is the Innovation Funding Incentive for Sustainable Development (IFI/SD). The aim of this incentive is to encourage GDNs to apply innovation on technical development of the networks and to deliver value (e.g. safety, quality of supply, environmental, financial) to end consumers. A Good Practice Guide (Gas Distribution IFI/SD Good Practice Guide December 2008) to support WWU and other GDN's involvement in

IFI projects has been produced and published by the Energy Networks Association.

Open reporting of IFI projects is practised by Ofgem. In line with this, WWU will publish their IFI/SD report on:

http://www.wwutilities.co.uk.

The report will also be available on Ofgem's website:

www.ofgem.gov.uk.

3. Project summaries:

Project Title	**Above 7 bar Asset – CBRM application**		
Description of project	WWU have created a Condition Based Risk Model (CBRM) to determine the health and risk of its district governor population. The outputs of the model have been entered into a cost benefit analysis model to determine the most efficient and effective whole life cost intervention solution for each Pressure reduction installation.		
Project type:	**Internal []**		
	External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	**Internal:**		
	External: £13,000		
Total project cost	**TOTAL : £13,000**		
Alignment with Sustainable themes	Ensuring a secure and reliable gas and electricity supply		
Issues / Technologies gap addressed by project	This project has allowed WWU to determine the most cost effective intervention to undertake on each of its above 7 bar pressure reduction assets and when to undertake the intervention.		
Type(s) of innovation involved	Decision support tool		
Project benefit rating	Project Residual risk	Overall project Score	
	NONE	NA	
Expected benefits			
Expected timescales of adoption	**1 Year**	**Duration of benefits once achieved**	**4 Years**
Probability of success	**Complete**	**Project NPV (PV Benefits – PC Costs) x Probability of Success**	**Complete**
Potential for achieving expected benefits & future dependencies	This project is complete and benefits of using this DST have been identified.		
Project Progress	**Complete**		
Collaborative partners	**None**		
Service providers	**EA TEchnologt**		

Project Title	**Domestic Heater Study**		
Description of project	A study to identify the best appliance choices based on known and emerging heating technology, the impact to consumers & the impact to gas & electricity distribution networks out to 2050.		
Project type:	Internal []		
	External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £0		
	External: £7,884		
Total project cost	TOTAL COLLABORATION: £63,072		
	WWU: £7,884		
Alignment with Sustainable themes	Managing the transition to a low carbon economy		
Issues / Technologies gap addressed by project	To assess the optimal domestic heating pathways that will enable the UK to meet its carbon and renewable targets out to 2050.		
Type(s) of innovation involved	The output to the study will be a paper that will define the credibility of various outlooks for domestic heating up to 2050 for full electrification, hybrid approach & the potential continued role for domestic gas usage.		
Project benefit rating	Project Residual risk	Overall project Score	
	-5	13	
Expected benefits	Developed knowledge and understanding of known or emerging heating technology and its effects.		
Expected timescales of adoption	2 Year	Duration of benefits once achieved	5 - 10 Years
Probability of success	COMPLETE	Project NPV (PV Benefits – PC Costs) x Probability of Success	£82,908
Potential for achieving expected benefits & future dependencies	The report will take into account: • Known and emerging heating technologies • Highlight the impact on consumers, both costs and the impacts of behavioural changes • The potential load changes on the gas and electricity distribution networks out to 2050. Key questions that will be answered are: • What are the potential low-carbon technologies that can reduce the carbon intensity of domestic heat? • What barriers do these technologies face? e.g. Technical, Consumer, Economic • The role of gas in the future space and water heating scenarios • The practicality of fully electrified domestic heating? • What potential appliance mixes are suitable up to 2050 in light of policy targets? • What are the impacts on customers regarding potential domestic heat changes? • What are the different heating solutions for different kinds of property?		
Project Progress	This project has been completed in 2012/2013.		
Collaborative partners	National Grid Distribution, National Grid Transmission, Wales and West Utilities, Northern Gas Networks, Scotia Gas Networks, ENA, Inexus and GTC		
Service providers	Delta		
Project Title	**Pipe Condition Assessment System – Phase 1**		

Description of project	At the end of this project it will be possible to "see" through the metallic pipe walls to determine and quantify: 1. The size and depth of corrosion damage and defects on the inside (nearside) pipe wall 2. The size and depth of corrosion damage and defects on the outside (far side) pipe wall 3. Induced strain within the pipe wall 4. Detect the position of stress raisers acting on the pipeline		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: £38,100		
Total project cost	TOTAL COLLABORATION £150,000 - (stage 1) WWU - £75,600		
Alignment with Sustainable themes	Ensuring a secure and reliable gas supply The system will potentially enable the pipeline owner to gain complete and accurate knowledge of the condition of the entire asset and therefore predict the likelihood of the pipe failing allowing for informed and cost efficient interventions to be realised at the most appropriate time in a pipelines 'life'.		
Issues / Technologies gap addressed by project	• Provides a first working system for use on the mains network • A feasibility report that allows GDN's to make a fully informed technical/business decision to move to the next stage with the proof of concept being demonstrated and documented		
Type(s) of innovation involved	In summary, the technology has the capability to enable the pipeline owner to target both capital replacement expenditure and operational expenditure to exact points on the pipeline network where works are required. This capability will enable considerable efficiency and cost savings to be made along with reduction in shrinkage and supply interruptions.		
Project benefit rating	Project Residual risk	Overall project Score	
	-2	17	
Expected benefits	• Proof of concept and demonstration of the primary system capability to move from bench top to field use.		
Expected timescales of adoption	1 Year	Duration of benefits once achieved	5 Years
Probability of success	100%	Project NPV (PV Benefits – PC Costs) x Probability of Success	
Potential for achieving expected benefits & future dependencies	Phase 1 successful. Next Phase to include: • Development of tool from proof of concept demonstration tool to early prototype including the improvement of: •survey speeds, pipe wall coverage, sensor accuracy, data collection and interpretation and maximum survey length. Other phase to run concurrently to include: • Development of a Code of Practice for data interpretation. • Procurement of skills to undertake a procurement event to source and commission independent experts • Code of Practice to be developed with oversight by the HSE.		
Project Progress	Phase 1 completed in Quarter 3. Proof of concept tool tested in an 85 m length of abandoned 10" spun iron main. Tool was successfully tested and demonstrated the ability to detect corrosion and defects (both naturally occurring and machined (for purposes of demonstration)) as well as the strain in the pipe (again both naturally occurring as well as some induced for the purposes of demonstration).		
Collaborative partners	NGG		
Service providers	DVS TECHNOLOGY LTD		

Project Title	**Stand alone Bio-Methane Projects**		
Description of project	To assess the utilisation of bio-methane gas production and bringing to grid technology. This may introduce options for customers who do not have mains gas availability.		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 4,117 External: £170,000		
Total project cost	TOTAL COLLABORATION £ 170,000 WWU - £174,117		
Alignment with Sustainable themes	Managing the transition to a low carbon economy The purpose of this project is to comply with the desire for a more diverse, low carbon energy source by researching a method of bio-methane production to ensure that it meets environmental targets and provides security of supply.		
Issues / Technologies gap addressed by project	A technical report detailing the ability to supply low carbon gas to customers from anaerobic digestion.		
Type(s) of innovation involved	A study to further understand and bring us one step closer to being able to define what is needed to provide a renewable, low carbon energy.		
Project benefit rating	Project Residual risk	Overall project Score	
	-4	17	
Expected benefits	The ability to define what outputs are needed to successfully connect bio-methane to grid for customer use.		
Expected timescales of adoption	3 Year	Duration of benefits once achieved	5 - 10 Years
Probability of success	55%	Project NPV (PV Benefits – PC Costs) x Probability of Success	N/A – R&D project
Potential for achieving expected benefits & future dependencies	The project has completed successfully and concluded that injecting Bio-methane to grid is achievable with significant investment. A series of technical drawings are now available to enable further development of this project should it be desirable.		
Project Progress	The Proof of concept Validation Study has concluded with specific recommendations to this Dairy site in Gloucester to demonstrate the viability of the project. The conclusions are: a) The construction of a new, independent, dedicated biomethane gas network to supply a small cluster of villages is viable by the construction of a Biomethane to grid facility b) Major modifications and capital investment is required to the site to provide a safe and secure supply c) Due to the geographical location of the project, when coupled with the potential gas supply requirements, a connecting pipeline to the existing WWU infrastructure is desirable Feasibility study and technical drawings have been produced.		
Collaborative partners	None		
Service providers	Ove Arup & partners Ltd		

Project Title	**<7 Bar Assets RCM Review**		
Description of project	A review of the Reliability Centred Maintenance (RCM) on all below 7 bar District Governor installations.		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: £20,220		
Total project cost	TOTAL COLLABORATION £0 WWU - £20,220		
Alignment with Sustainable themes	Ensuring a secure and reliable gas supply		
Issues / Technologies gap addressed by project	With new or upgraded installations, some using new gas regulating equipment, a review of WWU's current RCM practices is required.		
Type(s) of innovation involved	The use of fault data to inform & support engineering decisions for future maintenance frequencies.		
Project benefit rating	Project Residual risk	Overall project Score	
	-1	14	
Expected benefits	• A database to manage WWU RCM & fault data requirements • New RCM templates for newly installed District Governors		
Expected timescales of adoption	3 months	Duration of benefits once achieved	2 Years
Probability of success	100%	Project NPV (PV Benefits – PC Costs) x Probability of Success	-£60,000
Potential for achieving expected benefits & future dependencies	Benefits achieved - no future dependencies		
Project Progress	The project has been completed and the business is using the maintenance support tool database for its District Governor population.		
Collaborative partners	None		
Service providers	GL Noble Denton		

Project Title	**Improvements to the MRPS risk model (Stage 5)**		
Description of project	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. This will enhance safety to gas employees and the general public whilst also complying with HSE legislation.		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: £9,548		
Total project cost	TOTAL COLLABORATION £76,384 WWU - £9,548		
Alignment with Sustainable themes	Ensuring a secure and reliable gas supply This project will investigate possible enhancements to the methodology including 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 has been costed over a 5 year period.		
Issues / Technologies gap addressed by project	The key objective of this project is to develop improvements to the MRPS model to efficiently identify mains that are likely to leak in hazardous situations and therefore reduce the risk of fire/explosion from any potential escape, to enhance safety to gas employees and the general public whilst complying to HSE legislation.		
Type(s) of innovation involved	The key objective of this project is to develop improvements to the MRPS model to efficiently identify mains that are likely to leak in hazardous situations and therefore reduce the risk of fire/explosion from any potential escape, to enhance safety to gas employees and the general public whilst complying to HSE legislation.		
Project benefit rating	Project Residual risk	Overall project Score	
	0	17	
Expected benefits	The results of these tasks will be an assessment of the feasibility of improving the way in which MRPS currently identifies mains for replacement, based primarily upon a measure of risk. Tasks which have shown the likelihood of improving MRPS can then be selected for inclusion in MRPS the following year as part of the update process. Any improvements in the way in which MRPS selects mains for replacement should manifest itself in changes to the failure rate, gas in building rate and incident rate for the UK as a whole. These statistics will be examined each year as part of the trend analysis so the effectiveness of the programme can be monitored.		
Expected timescales of adoption	1 Year	Duration of benefits once achieved	8 Years
Probability of success	100%	Project NPV (PV Benefits – PC Costs) x Probability of Success	-£65,856
Potential for achieving expected benefits & future dependencies	MRPS has been endorsed by the HSE as a method to allow for prioritisation of mains replacement that effectively reduces the risk of incident. However MRPS must be continuously developed using the most recent available data to ensure that the models reflect recent leakage activity. This project will enable each GDN to demonstrate compliance with safety legislation in this respect. Stage 5 of this project has successfully provided an updated trend analysis, both in terms of overall trends & in significantly more detail by month, leak type & GDN.		
Project Progress	The more detailed analysis carried out this year identified some anomalies in the trends in failures and GiBs, which were attributed to particular GDNs over particular time periods. The impact analysis of applying an alternative methodology for calculating the risk from services has shown that the risk from the first 30m of a long service (100m for example) is diluted by the current methodology and would be captured more accurately by the alternative methodology. The results of applying this known change to the real population of services has indicated that		

	a significant number of services will be affected by the alternative approach and hence the priority for replacement is likely to change. This should improve the correct identification of ferrous services for replacement.
Collaborative partners	NGN, NGG, SGN
Service providers	GL Noble Denton

Project Title	**Tier 2 MRPS Work Prioritisation Methodology**		
Description of project	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. This will enhance safety to gas employees and the general public whilst also complying with HSE legislation.		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: 14,695		
Total project cost	TOTAL COLLABORATION £56,000 WWU - £14,695		
Alignment with Sustainable themes	Ensuring a secure and reliable gas supply This project will investigate possible enhancements to the methodology including 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 has been costed over a 5 year period.		
Issues / Technologies gap addressed by project	The key objective of this project is to develop improvements to the MRPS model to efficiently identify mains that are likely to leak in hazardous situations and therefore reduce the risk of fire/explosion from any potential escape, to enhance safety to gas employees and the general public whilst complying to HSE legislation.		
Type(s) of innovation involved	The key objective of this project is to develop improvements to the MRPS model to efficiently identify mains that are likely to leak in hazardous situations and therefore reduce the risk of fire/explosion from any potential escape, to enhance safety to gas employees and the general public whilst complying to HSE legislation.		
Project benefit rating	Project Residual risk	Overall project Score	
	0	17	
Expected benefits	The MRPS risk model will be enhanced to include new profiling factors that did not exist before i.e. Corrosion of spun cast and age of pit cast, plus a significant update to >12" model. The results of these tasks will be an assessment of the feasibility of improving the way in which MRPS currently identifies mains for replacement, based primarily upon a measure of risk. Tasks which have shown the likelihood of improving MRPS can then be selected for inclusion in MRPS the following year as part of the update process. Any improvements in the way in which MRPS selects mains for replacement should manifest itself in changes to the failure rate, gas in building rate and incident rate for the UK as a whole. These statistics will be examined each year as part of the trend analysis so the effectiveness of the programme can be monitored.		
Expected timescales of adoption	1 Year	Duration of benefits once achieved	5 Years
Probability of success	100%	Project NPV (PV Benefits – PC Costs) x Probability of Success	-£65,856
Potential for achieving expected benefits & future dependencies	MRPS has been endorsed by the HSE as a method to allow for prioritisation of mains replacement that effectively reduces the risk of incident. However MRPS must be continuously developed using the most recent available data to ensure that the models reflect recent leakage activity. This project will enable each GDN to demonstrate compliance with safety legislation in this respect. Stage 5 of this project has successfully provided an updated trend analysis, both in terms of overall trends & in significantly more detail by month, leak type & GDN.		
Project Progress	• Examination of Gas Ingress Factors, Cast Iron Mains Fracture Factor and Ductile Iron Scaling Factor using augmented data sets (partial coefficient update) • Five year drop off analysis to consider alternatives to the present methodology for using historical data on previous fractures. • Re-review of the corrosion history against future fracture rates for pit and spun cast mains.		

	• Feasibility/validation into the new 3 tier approach as proposed by the HSE • Gap Analysis to determine the fitness for purpose and extendibility of the current MRPS. • Annual Trend Analysis • Research into Tier 3 uncertainties following review and feedback from the HSE.
Collaborative partners	NGN, NGG, SGN
Service providers	GL Noble Denton

Project Title	**NPD Layers**		
Description of project	To document an accurate population density around all of the Tier 2 iron gas pipes in order to apply a methodology to determine if a pipe is to be replaced or not. Under a maintenance programme.		
Project type:	Internal []		
	External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0		
	External: £18,780		
Total project cost	TOTAL COLLABORATION £18,780		
	WWU - £18,780		
Alignment with Sustainable themes	Ensuring a secure and reliable gas supply		
	This project will investigate possible enhancements to the methodology used, to determine whether a metallic main is to be replaced by providing population data within 30m of a gas main.		
Issues / Technologies gap addressed by project	A concise breakdown of the population within a 30m buffer zone of each pipe & an understanding of night time & day time populations to support the decision making on mains replacement by enhancing the demographic knowledge of Wales & West utilities geographical area.		
Type(s) of innovation involved	Further analysis of Health & Safety Laboratories' NPD (National Population Database) which provides estimates of population density & distribution.		
Project benefit rating	Project Residual risk	Overall project Score	
	0	18	
Expected benefits	The results of this tasks will be to increase sophistication in assessing the criticality of the assets in terms of the consequence of failure of the mains.		
Expected timescales of adoption	1 Year	Duration of benefits once achieved	1 – 5 years
Probability of success	100%	Project NPV (PV Benefits – PC Costs) x Probability of Success	N/a – R&D Project
Potential for achieving expected benefits & future dependencies	Project achieved with no dependencies.		
Project Progress	Successful completion detailing night time and day time populations for use in mains investment prioritisation		
Collaborative partners	None		
Service providers	HSL		

Project Title	**Technical support on Energy Market Issues for Biomethane Projects (EMIB)**		
Description of project	A project representing all GDN's to review & develop a standard for Biomethane		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: £360		
Total project cost	TOTAL COLLABORATION £ WWU - £360		
Alignment with Sustainable themes	Managing the transition to a low carbon economy		
Issues / Technologies gap addressed by project	A standard for use when assessing the appropriateness of Biomethane		
Type(s) of innovation involved	R & D		
Project benefit rating	Project Residual risk 0	Overall project Score 8	
Expected benefits	A technical document detailing - The most appropriate level of accuracy of CV determination Devices employed for relatively small flows of biomethane injected into Gas Distribution Systems - Measurement risk assessment - Functional specification for biomethane Network Entry Facilities		
Expected timescales of adoption	2 Year	Duration of benefits once achieved	5 Years
Probability of success	100%	Project NPV (PV Benefits – PC Costs) x Probability of Success	N/a – R&D Project
Potential for achieving expected benefits & future dependencies	Key technical/commercial obstacles to injection of biomethane are being addressed: • Technical justification for lower standards of accuracy for low flows of biomethane has been provided with the recommendation that Ofgem should approve lower performance for CVDDs used for biomethane. This should pave the way to the use of lower cost devices. • Generic risk assessment has shown that a risk-based approach to measurement can reduce the use of costly instruments to measure parameters that are not significant for biomethane. The functional specification will provide reassurance that essential minimum standards for biomethane network entry facilities are maintained, but allow flexibility and innovation in choice of equipment so as to ensure cost-effective solutions are developed.		
Project Progress	▪ Technical support has been provided to the EMIB Review Group in the following areas: o The appropriate level of accuracy of CV Determination Devices employed for the relatively small flows of biomethane injected into Gas Distribution Systems; o Measurement risk assessment; o Functional specification for biomethane Network Entry Facilities. ▪ A technical report has been produced that assesses and recommends appropriate standards of accuracy ▪ A measurement risk assessment has been conducted in a two-day workshop for a generic biomethane network entry facility and the outcome and recommendations incorporated into a technical report ▪ A functional specification has been produced that sets out the minimum functionality that is required of a biomethane network entry facility.		
Collaborative partners	NGN, NGG,SGN		
Service providers	Dave Lander Consulting		

Project Title	**Gas Quality research**		
Description of project	To brief the UK gas industry on international and European developments in standardisation and energy measurement. The main objectives will be a) Provide reports and updates on an agreed list of key working groups b) Facilitate an agreed position and UK input into the agreed list of key working groups		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: £888		
Total project cost	TOTAL COLLABORATION £8000 WWU - £888		
Alignment with Sustainable themes	Ensuring a safe and secure reliable gas supply Ensuring a safe and secure reliable gas supply in line with the potential changes European legislation or directive may bring as a result of changes within UK gas industry.		
Issues / Technologies gap addressed by project	DL consulting to cover representation on an agreed list of working groups covering key standards. The benefits to the UK gas industry under such a mechanism were to enable GDNs to receive regular reports and updates including commentary on potential impacts; consultation prior to any meetings to ensure that any issues from individual GDNs are raised at the meeting; to ensure that UK input recognises any special circumstances within individual GDNs & the ability to influence the UK requirements.		
Type(s) of innovation involved	As well as the alignment with sustainable themes identified above, this project is of a technical nature and related to enhancing the technical performance of GDN networks.		
Project benefit rating	Project Residual risk	Overall project Score	
	-4	17	
Expected benefits	Ensure a continued secure and reliable gas supply in line with the potential changes European legislation or directive may bring as a result of changes within the UK gas industry based upon decisions made at European working groups.		
Expected timescales of adoption	2 Year	Duration of benefits once achieved	5 Years
Probability of success	60%	Project NPV (PV Benefits – PC Costs) x Probability of Success	N/A R&D project
Potential for achieving expected benefits & future dependencies	The standards selected for representation on are: - ISO 6974 Natural Gas – determination of composition with defined uncertainty - ISO 6976 Natural Gas – Calculation of calorific value, density, relative density and Wobbe index from composition - ISO 10723 Natural Gas – Analysis of natural gas – Performance evaluation - European Harmonised Gas Quality Standard		
Project Progress	Continued support and representation.		
Collaborative partners	NGN, NGG,SGN		
Service providers	Dave Lander Consulting		

Project Title	**Hazardous Area Zone Classification**		
Description of project	To categorise the hazardous areas that are encountered by a First Call Operative when undertaking pressure testing at properties.		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: £8,921		
Total project cost	TOTAL COLLABORATION £ WWU - £8,921		
Alignment with Sustainable themes	Ensuring a safe and secure reliable gas supply		
Issues / Technologies gap addressed by project	The outcome from this hazardous zone assessment will provide WWU with task specific information to enable consideration to be given to appropriate equipment selection to meet the requirements of the Equipment and Protective Systems intended for Use in Potentially Explosive Atmosphere Regulations and Selection of Equipment and Protective Systems Regulations and ensure correct equipment categorisation relative to hazardous zone classification is applied to comply with the ATEX Equipment Directive .		
Type(s) of innovation involved			
Project benefit rating	Project Residual risk	Overall project Score	
	1	18	
Expected benefits	In assessing the extent of hazardous area zoning, consideration will systematically be given to identifying the work processes relative to the operating environment to ensure the obligations of the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) are met to eliminate or control risks from explosive atmospheres in the workplace. Particular consideration will be given to known vulnerable locations in domestic situations such as meter positioning in confined space under-stair cupboards and unventilated garages where the presence of other volatile products could constitute a hazardous situation. Consideration will also be given to typical commercial/industrial locations such as dry cleaning locations and manufacturing/ processing plants handling fine organic dust such as grain flour or wood.		
Expected timescales of adoption	2 Year	Duration of benefits once achieved	5 – 10 Years
Probability of success	65%	Project NPV (PV Benefits – PC Costs) x Probability of Success	- £2421
Potential for achieving expected benefits & future dependencies	On completion of the project will receive a detailed report on the hazardous area zoning assessment for consideration.		
Project Progress	Complete		
Collaborative partners	None		
Service providers	GL Noble Denton		

Project Title	**CIPP – Cure in place polyethylene project – lining project**		
Description of project	The project addresses the specific challenge of demonstrating liner-based pipeline remediation and risk management technologies for use on the GDNs' iron mains population.		
Project type:	Internal []		
	External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: NIL		
	External: £ 8,560		
Total project cost	TOTAL COLABORATION: £222,414		
Alignment with Sustainable themes	Managing the transition to the low carbon economy - thinner wall solutions over PE, that are easier to transport and install		
	Ensuring a secure and reliable gas supply - Leads to a significant improvement in large diameter replacement		
	Supporting improved environmental performance - Reduction in excavation due to reduced pipe entries and ability to replace longer lengths.		
Issues / Technologies gap addressed by project	This project will seek to establish an alternative technique to mains replacement by insertion.		
Type(s) of innovation involved	Developing a spray lining technique for the Gas industry that will provide a cost effective alternative to the current techniques.		
Project benefit rating	**Project Residual risk**	**Overall project Score**	
	1	**20**	
Expected benefits			
Expected timescales of adoption	**3 Year**	**Duration of benefits once achieved**	**To be defined during stage 2**
Probability of success	50%	**Project NPV (PV Benefits – PC Costs) x Probability of Success**	**To be defined during stage 2**
Potential for achieving expected benefits & future dependencies	This type of technique is well established within the UK water industry and has been applied to gas pipes in Asia and Europe. Following development of a good practise guide and identification of suitable suppliers and locations to undertake a trial there is a dependency to undertake successful filed trials.		
Project Progress	**Stage 1 complete – Stage 2 2013/2014**		
Collaborative partners	NGN, SGN & NGG		
Service providers	Water Research Council (WRc)		

Project Title	**Diurnal Storage**		
Description of project	Diurnal storage provision is a key component of the Gas Distribution Network (GDN) design requirements and significant capital and revenue expenditure is invested to support the maintenance of low pressure (LP) holders and the provision of storage within the high pressure (HP) distribution network as line pack. This is driven mainly by the assumption that for design purposes the take from the National off takes operating in a volumetric control mode. This constant in feed combined with the downstream demand varying in a diurnal profile requires the GDN HP Distribution system to absorb the variation in flow. The current Unified Network Code (UNC) arrangements via the Offtake Capacity statements allow for the GDN to book a maximum off take rate from the upstream provider (the NTS) made up of the daily flat rate / 24 plus an amount of flex. On any supply day the DNCC has to ensure that sufficient storage is available to meet the customer requirements, taking account of any forecast errors and minimising the storage take from the NTS.		
Project type:	Internal []		
	External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0		
	External: £10,833		
Total project cost	TOTAL COLLABORATION £98,890.00		
	WWU - £10,833		
Alignment with Sustainable themes	Ensuring a safe and secure reliable gas supply		
	The key benefit of this research is in improved diurnal storage requirement modelling capability to ensure GDN's are able to make efficient investments or flex bookings in demonstrating regulatory compliance.		
Issues / Technologies gap addressed by project	The key areas this project looks to address is in improved diurnal storage requirement modelling capability to ensure the GDNs are able to make efficient investments or Flex bookings in demonstrating regulatory compliance.		
Type(s) of innovation involved	The current Storage Simulation Module (SSM) software tool was designed for determining the long term diurnal storage requirements. Developing a new tool and extending the scope to support both system & new Commercial Operation activities will require significant innovation.		
Project benefit rating	Project Residual risk	Overall project Score	
	-2	14	
Expected benefits	Each distribution network has to demonstrate its ability to identify and meet 1 in 20 storage requirements. Developing a solution to meet these requirements will deliver an improved network planning performance; improved information available to DN System Operations & improved diurnal storage efficiencies.		
Expected timescales of adoption	3 Year	Duration of benefits once achieved	5 Years
Probability of success	60%	Project NPV (PV Benefits – PC Costs) x Probability of Success	£17k
Potential for achieving expected benefits & future dependencies	There is a good expectation of planned benefits being achieved		
Project Progress	The project is progressing well. The Phase 2 element started in Feb 2013 with a planned duration of 9 months.		
Collaborative partners	None		
Service providers	GL Noble Denton		

Project Title	**Customer Self Isolation & Restoration Risk Assessment R&D**		
Description of project	This project is to develop a risk assessment model that would be included in the gas supply emergency procedures for all DNs, that would determine the optimal approach to take to customer self-isolation & restoration.		
Project type:	Internal []		
	External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: NIL		
	External: £ 2259		
Total project cost	TOTAL COLABORATION: £29,897		
Alignment with Sustainable themes	**Eradicating fuel poverty and protecting vulnerable customers** This proposal enables GDNs to focus its resources on vulnerable customers in an incident rather than across the whole customer population for a shorter duration.		
	Promoting energy savings By reducing the incident duration, fewer (fuel inefficient) electric heaters will need to be issued, and will be in use		
	Ensuring a secure and reliable gas supply This proposal will enable the gas network to be restores much quicker than under current arrangements.		
Issues / Technologies gap addressed by project	The main deliverable of this work was a report from GL Noble Denton which provided two risk graphs (gas incident casualty probabilities & inadequate heating casualty probabilities). All DNs will include these risk graphs in their gas supply emergency procedures. They will be used to determine the optimal approach to take to customer isolation & restoration during a gas supply failure incident.		
Type(s) of innovation involved	Studies have been carried out to investigate whether consummers could carry out their own isolation and restoration in a protracted supply failure in order to reduce the duration of the incident. It has been concluded that this approach would be beneficial under certain circumstances, and the HSE, DECC and other stakeholders are broadly supportive of this approach. However, they require comprehensive risk assessments to be carried out as part of the decision making process. The risk assessment requirements are to consider the risk of casualties from a gas incident versus the risk of casualties from insufficient heating during a supply failure. These risks can be considered for the use of competent persons versus the use of consumers to carry out isolation and restoration. The approach with the lowest overall risk can then be used as the optimal approach for that incident.		
Project benefit rating	**Project Residual risk**	**Overall project Score**	
	ZERO	**COMPLETE**	
Expected benefits			
Expected timescales of adoption	**2 Year**	**Duration of benefits once achieved**	**1- 5 years**
Probability of success	COMPLETE	**Project NPV (PV Benefits – PC Costs) x Probability of Success**	£34,011

Potential for achieving expected benefits & future dependencies	This work has been completed and the decision support tool developed. The HSE have reviewed the risk assessment and have concluded it is sound (although there are some recommendations which will be followed up in due course). Work is currently on going to integrate this decision support tool into industry emergency procedures and to develop the wider customer self-isolation & restoration process.
Project Progress	**COMPLETE**
Collaborative partners	NGN, SGN & NGG
Service providers	GLND

Project Title	**Pipe Condition Assessment System – Phase 2**		
Description of project	At the end of this project it will be possible to "see" through the metallic pipe walls to determine and quantify: 1. The size and depth of corrosion damage and defects on the inside (nearside) pipe wall 2. The size and depth of corrosion damage and defects on the outside (far side) pipe wall 3. Induced strain within the pipe wall 4. Detect the position of stress raisers acting on the pipeline This will allow for informed interventions as and when required at the most cost effective point in the asset lives.		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: £75,000		
Total project cost	TOTAL COLLABORATION £300,000 WWU - £150,000		
Alignment with Sustainable themes	Ensuring a secure and reliable gas supply The system will potentially enable the pipeline owner to gain complete and accurate knowledge of the condition of the entire asset and therefore predict the likelihood of the pipe failing, allowing for informed and cost efficient interventions to be realised at the most appropriate time in a pipelines 'life'.		
Issues / Technologies gap addressed by project	• Addresses issues with proof of concept tool to make use of final tool as cost effective as possible with the survey speed, increased number of and sensitivity of sensitivity of sensors, improved data gathering and interpretation speed and software, increased possible survey length. • A feasibility report that allows GDN's to make a fully informed technical/business decision to move to the next stage		
Type(s) of innovation involved	In summary, the technology has the capability to enable the pipeline owner to target both capital replacement expenditure and operational expenditure to exact points on the pipeline network where works are required. This capability will enable considerable efficiency and cost savings to be made along with reduction in shrinkage and supply interruptions.		
Project benefit rating	Project Residual risk	Overall project Score	
	-4	26	
Expected benefits	• Demonstration that the prototype is capable of detecting strain and defects in the pipe wall, to a suitable level of accuracy, at speeds and continuous lengths of main that would allow the implementation of the finished tool to be cost efficient.		
Expected timescales of adoption	1 Year	Duration of benefits once achieved	5 Years
Probability of success	80%	Project NPV (PV Benefits – PC Costs) x Probability of Success	
Potential for achieving expected benefits & future dependencies	Future phases are dependent on the success of Phase 2. Next Phase (3) is to develop the tool and entry system to permit cost efficient live entry into the tier 2 and 3 network to be used in live gas conditions. The conclusion of this phase will result in a tool that is ready to be utilised on the live network and will therefore be the last prototype. The trial and demonstration of this phase will take part on the live network. Other phase to run concurrently to include: • Development of a Code of Practice for data interpretation. • Procurement of skills to undertake a procurement event to source and commission independent experts • Code of Practice to be developed with oversight by the HSE.		
Project Progress	Phase 2 is in progress and nearing completion of the build of the prototype tool. Trial site has been selected: ~200 m abandoned 12" spun iron main. Testing and demonstration to be completed in quarter 1 2013/14		
Collaborative partners	NGG		
Service providers	DVS TECHNOLOGY LTD		

Project Title	**(IFI64) New Intervals Methodology for In-Line Inspection**		
Description of project	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.		
Project type:	Internal []		
	External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: NIL		
	External: £ 13,831		
Total project cost	TOTAL COLABORATION: £ 110,650.00		
Alignment with Sustainable themes	**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.		
	Protecting the environment - Mitigating against potential incidents will also mitigate against loss of gas to the atmosphere as a result.		
Issues / Technologies gap addressed by project	• Enhanced tool that caters for 30% and 50% SYMS pipelines in Gas Distribution Networks. • Better/closer link between Cathodic Protection, Close Interval Potential Surveys (CIPs) and scheduling of in-line inspections • Common methodology and consistent application of in-line inspections across gas pipeline operators within the UK.		
Type(s) of innovation involved	**Incremental**		
Project benefit rating	**Project Residual risk**	**Overall project Score**	
	-8	23	
Expected benefits	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. Inline 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 pipelines 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 than the average budget per geographic 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.		
Expected timescales of adoption	**1 Year**	**Duration of benefits once achieved**	**1- 5 years**
Probability of success	50%	**Project NPV (PV Benefits – PC Costs) x Probability of Success**	£115,029
Potential for achieving expected benefits	The completed output will now enable GDN's to target specific problems and		

& future dependencies	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
Collaborative partners	NGN, SGN & NGG
Service providers	PB RUNE

Project Title	**Development of DANINT FWAVC software for New Gas Chromatograph**		
Description of project	This project seeks to improve the data management of gas composition, calorific value and volume data in relation to metering errors by reviewing and trialling new software This project will look at a robust method of monitoring CV for the billing process and monitoring metering and gas quality data for detection and reconciliation of errors ensuring that there is a reliable gas supply [by being commercially viable] which is in line with one of Ofgem's sustainable development themes. Importantly full resilience testing including simulations will test various scenarios This will mitigate against errors for custody transfer measurements, avoiding issues of non-compliance leading to loss of reputation and possible challenge by third parties		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0 External: £20,190		
Total project cost	TOTAL COLLABORATION £144,169 WWU - £20,190		
Alignment with Sustainable themes	Ensuring a safe and secure reliable gas supply		
Issues / Technologies gap addressed by project	A design study will be undertaken to investigate the options for different analyzers to link/integrate into the DANINT based system.		
Type(s) of innovation involved	The DANINT software will be developed by incremental innovation and tested to demonstrate compliance, for example configuration of the FWACV system and upgrade of the DANINT software will be undertaken to facilitate the adoption of Ethernet technology and communication with other gas chromatographs and gas property measurement technologies, whilst preserving backward capability.		
Project benefit rating	Project Residual risk	Overall project Score	
	0	19	
Expected benefits	By providing a robust method of monitoring CV for the billing process and monitoring metering and gas quality data for detection and reconciliation of errors it ensures that there is a reliable gas supply, importantly full resilience testing including simulations will test various scenarios, this will mitigate against errors for custody transfer measurements, avoiding issues of non-compliance leading to a loss of reputation and possible challenge by third parties. The new software and equipment will be more efficient by at least 65%, it is expected that the cost will reduce from £64,400 to £22, 540.		
3	1 Year	Duration of benefits once achieved	3 Years
Probability of success	60%	Project NPV (PV Benefits – PC Costs) x Probability of Success	- £5,000
Potential for achieving expected benefits & future dependencies	There will be two solutions available for operator use, the model 700 solution will be more cost effective than the model 500 and will also enhance the viability of injecting other gas sources. The software can be pre-loaded when a new model 700 analyser is installed. The software is also compatible with existing systems when fitted with the new processor card.		
Project Progress	Stage one of this project was completed in December 2010 and comprised of two elements, the outcome of which was the development of DANINT 12c which enables the Ofgem approved Daniel 2350A controller with a new processor card and the model 700 gas chromatograph to be installed at the site. Two further stages are scoped which will consist of site acceptance testing, purchase and commissioning of equipment, installation reports, compliance configuration, testing of 12c, building and testing of 12d, specialist		

	investigations and developments, concept of design study, codification of knowledge, documentation development, training material and user guides.
Collaborative partners	SGN, NGG, NGN, EIC
Service providers	GL Noble Denton

Project Title	**Development of E pipe smaller diameter pipe lining system**		
Description of project	An innovative technology which has previously never been used in the UK gas sector. It's historical use elsewhere in the world for lining water pipes in multi-storey buildings means that the technology lends itself to multi occupancy and high rise properties with domestic gas services.		
Project type:	Internal [] External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: NIL External: £14,337		
WWU project cost 2012/2013	£14,337		
Total project cost	TOTAL COLLABORATION: £403,810.00		
Alignment with Sustainable themes	Technical Development –this project is of a technical nature and related to enhancing the technical performance of a Network Operator's network; Customer value –potential to deliver a financial benefit to end consumers if the project is successful. Ensuring a secure and reliable gas and electricity supply		
Issues / Technologies gap addressed by project	It is hoped that this project will address the current issues associated with the replacement of multi occupancy and high rise buildings		
Type(s) of innovation involved	Developing a small diameter pipe replacement lining technique		
Project benefit rating	**Project Residual risk**	**Overall project Score**	
	-2	**23**	
Expected benefits	**Customer** Reduced customer impact and disconnection periods resulting in an enhanced customer experience **3. Safety** a. Eliminates the risk of damage or working from height arising from replacement of risers and laterals b. ePIPE can be applied to lead, copper, steel or plastic pipes and will seal leaking joints and blow holes **4. Environmental** a. Offers lower carbon footprint than replacement		
Expected timescales of adoption	**3 Year**	**Duration of benefits once achieved**	**Years**
Probability of success	65%	**Project NPV (PV Benefits – PC Costs) x Probability of Success**	-£50,476
Potential for achieving expected benefits & future dependencies	This project has a reasonable potential for achieving the potential benefits identified. Risk and likelihood of success will be quantified at each stage following the Technology Readiness Level Assessment. This will be considered alongside the estimated financial and non-financial (indirect savings).		
Project Progress	**Project duration – 2 years Project commenced – March 2013**		
Collaborative partners	NGN, SGN & NGG		
Service providers	Morrison's Utilities Ltd		

Project Title	**Internal Stress Corrosion Cracking (ISCC) Assessment Work**		
Description of project	High pressure pipelines that were previously used to transport manufactured gas (e.g. town gas or reformer gas) can be subject to Internal Stress Corrosion Cracking (ISCC). There are currently no practicable industry guidelines for identifying whether a pipeline has the potential to contain ISCC and to assess the significance of any cracking found, this project will assess the extent of the threat of ISCC to the pipelines owned and operating by the participating GDN's, which will enable the requirements and benefits of further research to be confirmed.		
Project type:	Internal []		
	External / Collaborative [X]		
WWU Expenditure for financial year 2012/2013	Internal: £ 0		
	External: £6,500		
Total project cost	TOTAL COLLABORATION £36,020		
	WWU - £6,500		
Alignment with Sustainable themes	Ensuring a safe and secure reliable gas supply		
Issues / Technologies gap addressed by project	There are currently no practicable industry guidelines for identifying whether a pipeline has the potential to contain ISCC and to assess the significance of any cracking found, this project will assess the extent of the threat of ISCC to the pipelines owned and operating by the participating GDN's, which will enable the requirements and benefits of further research to be confirmed.		
Type(s) of innovation involved	This project will undertake internal inspection of pipe samples retrieved from Lamesley to confirm the presence of ISCC and use the results to develop a threat assessment algorithm to enable identification of those pipelines that are most likely to contain ISCC, along with guidelines to identify where along the pipeline route that the ISCC would most likely be located.		
Project benefit rating	Project Residual risk	Overall project Score	
	-2	14	
Expected benefits	The aim of this project is to understand and develop a method to assess the threat of internal stress corrosion cracking (ISCC) in pipelines previously used to transport manufactured gas.		
Expected timescales of adoption	2 Year	Duration of benefits once achieved	unknown
Probability of success	55%	Project NPV (PV Benefits – PC Costs) x Probability of Success	Unknown – R&D project
Potential for achieving expected benefits & future dependencies	Success of this project will be the development of a methodology to identify whether a pipeline has the potential to contain ISCC. In addition this should provide information on the different types of manufactured gas, and identify, where possible, which areas manufactured what type of gas in the UK. This project will result in new learning around the threat of ISCC on the distribution network in order to provide a better understanding of the testing of stress measurement within a pipeline, and provide the ability to predict pipelines at risk.		
Project Progress	This is a 12 months project starting in March 2013. Progress is at expected levels.		
Collaborative partners	SGN, NGG, NGN		
Service providers	GL Noble Denton		