

Sub Appendix: F Innovation Strategy

A19F



Sub Appendix A19:E

Purpose

The purpose of this sub appendix is to provide more detail on individual innovation projects and the benefits (outputs) they aim to deliver.



#	Project Title & Objectives	Commencement/ Duration/ Value	Deliverables	RIIO Outputs	Estimated Cost (£)	Collaboration Partners
1	<p>Low carbon economy initiatives alternative fuels for vehicles</p> <p>Investigate ways of significantly reducing NGNs carbon footprint by procuring 60 biomethane fuelled vehicles and associated plant (fuel pumps, storage etc. and investigate other alternative fuels ie. electric vehicle technologies,hydrogen fuel cell vehicles.</p>	Apr 2013 5 years LOW	<p>Procurement of 60x biomethane powered vans in next procurement event.</p> <p>Approximately premium over 'normal' van cost of £5k per vehicle = £300K.</p> <p>Cost to procure biomethane tank and pump to facilitate refuelling= c.£300K.</p> <p>Total investment requirement = c.£600K.</p> <p>Efficiency Benefits Reduced fuel costs (by c.30%). Increased stability of fuel price, based on a negotiated fixed cost over the length of any contract.</p> <p>Customer Impact Environmental emission reductions. Improvement in NGNs profile, both local and national.</p> <p>Defined Learning There may be the need for learning on the storage and transportation of biomethane. Briefings rather than training on the use of vehicles.</p> <p>Changed Methodology/Codes Codes of practice for the transport and storage of biomethane should be very similar to those for natural gas, but this will need to be confirmed.</p>	<p>Reliability</p> <p>Social Obligations</p> <p>Environment</p> <p>Other - Defined Learning</p>	£665,000	Producer of liquid methane fuel using gas created by the decomposition of biomass, LAs and businesses.
2	<p>Gas conditioning study (MEG)</p> <p>To optimise the use of Monoethylene Glycol (MEG) as a joint swellent on the network and maximise the benefit that is achieved through the use of MEG.</p>	Apr 2013 2 years LOW	<p>Environmental Reduce the amount of waste MEG disposed of annually by the Network. Optimising its use to reduce leakage and impact on environment.</p> <p>Safety Reduction in escapes.</p> <p>Efficiency Benefits Reduction in cost associated with repairs.</p>	<p>Safety</p> <p>Asset Management</p> <p>Environment</p>	£75,000	Suppliers of equipment and material, UK and internationally.
3	<p>Turbo expanders energy generation</p> <p>Wherever gas flows, a Turbo expander-Generator can carry out processing tasks while helping to recover energy. Virtually any high-temperature or high-pressure gas is a potential resource for energy recovery. Generator-loaded expanders can be custom engineered</p>	Apr 2013 4 years HIGH	<p>Efficiency Benefits Providing sustainable electricity supply to the network facility reducing the requirement for external supply.</p> <p>Reduce the asset maintenance requirements for existing pressure letdown equipment at multiple sites.</p>	<p>Safety</p> <p>Customer & People</p> <p>Operational Efficiency</p>	£14,300,000	Industry technical research specialists, specialist consultant engineers, manufacturers, development teams and pipeline engineers, energy companies, other GDNs

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	<p>to recover the maximum amount of useful energy available within any process.</p> <p>The two key benefits of using Turbo expanders within the network are as follows;</p> <p>Waste heat recovery and conversion to power</p> <p>Pressure letdown – Alternative to existing means</p>		<p>Providing a scalable solution outside the regulatory ring fence which could be marketed to other UK networks.</p> <p>Becoming the most pioneering network in this area.</p> <p>Good PR for the business.</p>	Environment		and companies already using the technology.
5	<p>Reduced carbonisation of natural gas</p> <p>Supplying biomethane/bio-gas/hydrogen/natural gas mix into the network.</p> <p>Using Smart Grid technologies to deliver mixed gas.</p> <p>Impact on network of mixed system, corrosion, deposits of regulators, damage to equipment.</p> <p>Spare energy from wind farm produces hydrogen which can be injected into the network, what is the impact?</p> <p>Act as a major industry leading in the area of renewable supplies to the network. Undertake testing and development of products, process and procedures that will improve rapid access to the network under a safe, reliable and consistent framework. Assist in promoting the technology development in this area, increasing industry competition, which should result in lower capital costs of gas quality monitoring and control equipment.</p> <p>Investigating different connection opportunities, localised storage requirements, meeting low point demands and working with stakeholders to increase connections to the network. Exploring the possibility of creating additional demand, and hence capacity, by using dedicated compression to pump gas back into higher pressure tiers at low demand times using automatic controls.</p>	<p>Apr 2013</p> <p>7 years</p> <p>HIGH</p>	<p>Efficiency Benefits Increase the countries use of renewable gas supplies</p> <p>Customer Impact Strong environmental benefits can be achieved through the recycling of waste which would otherwise be deposited in land fill sites.</p> <p>Defined Learning Work alongside suppliers to develop new products in gas quality field analysis.</p>	<p>Asset Management</p> <p>Operational Efficiency</p> <p>Environment</p> <p>Other - Defined Learning</p>	£1,600,000	Suppliers, producers, specialist technical research companies, specialist engineering companies, technical consultants, biomethane producers (waste management companies etc.), LAs, farms and food manufacturing.
6	<p>Carbon monoxide awareness and safety through alliances.</p> <p>To continue mitigating the risks presented to society by carbon monoxide (CO); this will be through increasing levels of awareness and vigilance amongst the public as well as physically reducing the risk of exposure to carbon</p>	<p>April 2012</p> <p>3 years</p> <p>LOW</p>	<p>Efficiency Benefits: Reduction in cost of rolling out CO monitors to all customers and the wider public.</p> <p>Customer Impact: Improved safety across the network and reduced risk of a CO</p>	<p>Safety</p> <p>Customer & People</p> <p>Operational Efficiency</p>	£300,000	LAs, schools and the public, customer organisations, PR specialists and suppliers.

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	monoxide and improving detection of it. Alliances refer to any partnership NGN can form with LAs, health authorities and retailers in order to promote awareness and provide customers with affordable access to preventative measures, such as CO monitors.		related incidents because it is detected earlier.	Environment		
8	Alternative aerial/satellite surveillance and gas detection The use of geographic information systems and modern satellite navigation systems allowing automatic measurement beam positioning and clear geographic allocation of the reported locations. To investigate the feasibility of using helicopter or satellites to track leakage from pipelines. To investigate the feasibility of using light unmanned aerial vehicle with visible/infra red/thermal cameras and automated image processing for monitoring pipelines and detect possible interference. A small plane, < 12 kg with an autopilot flight control based on GPS and inertial sensors to follow the flight path. Using helicopter or satellites to track leakage from pipelines	Apr 2017 3 years HIGH	Safety Remote natural gas detection during aerial survey by helicopter, particularly in built-up areas. Inspection altitude: 80-150m. Efficiency Benefits Travelling speed: 70-100km/hr. Width of pipeline corridor covered: up to 18m, typically 8m (26 ft). Measuring rate: 100 measuring points per second Automatic measurement beam positioning onto the pipeline route. Environment Automatic entry of leak position into reporting system.	Safety Customer & People Environment	£600,000	Industry technical research specialists, specialist consultant engineers, manufacturers, development teams and pipeline engineers, energy companies, other GDNs and companies already using the technology.
9	Local Authority, Utilities and Highways alliances To test the feasibility and quantify the cost and time impact of co-ordinating replacement programmes across organisations (LAs, the Highways Agency or other utilities) so that NGN can return to customers and make them aware of the impact on price. In theory it is more efficient to co-ordinate programmes and stakeholder engagement has shown a frustration that companies and authorities don't work together but the reality is a potential increase in programme costs	Apr 2012 2 years LOW	Efficiency Benefits: Potential reduction in Repex shared across all parties (single excavation, repatriation etc). Customer Impact: Improved customer service and fewer interruptions (disconnection of utilities, road closures etc). Potentially demonstrates that combining replacement programmes increases the cost. Defined Learning: Absolute evidence on the business case for/against combining replacement programmes with other parties on some or all of the network. Changed methodologies/codes: Potential change in the approach to replacement programme planning.	Customer & People Operational Efficiency	£200,000	LAs, Highways Agency and other utility companies.
10	Customer interface platform NGN has a desire to improve service and lower	Q3 2013	A four Phase Delivery of Business Cases covering,	Customer & People	£1,530,000	LAs, gas suppliers/shippers and the public, customer

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	operational costs through empowering their customers and service providers with greater usage of web technology. This is in strong alignment with the new RIIO regulatory framework. Connections activities present NGN with considerable demands for customer engagement. Through developing a series of web applications for managing connections activity, NGN has the opportunity to generate major operational efficiencies, improve customer service and increase its installed asset base.	4 years MEDIUM	Phase 1 Connections related activities Phase 2 On line forms DR4/Ofgem questionnaires Phase 3 Chargeable plant protection enquiries Phase 4 Renewable gas assessment services Commercial Benefits are as follows: <ul style="list-style-type: none"> Reduced Opex spend; Customer empowerment; Delivery lead time improvements; and Process enhancements and alignments. 	Environment Other -Increase Installed Assets		organisations, PR specialists.
13	Remote monitoring and control To optimise governor pressure settings to meet demand based on short term forecasting and actually recorded pressure profiles. Remotely manage district pressures without the need to visit site, use fixed network pressure recorders to profile network demands over hourly, weekly and monthly settings.	Apr 2013 4 years MEDIUM	Efficiency Benefits Ensures pressures delivered from source best meet customer demand for a given period and forecasted conditions. Reduces pressure within network during off peak periods, reducing average system pressure and leakage. Customer Impact Optimisation of pressure monitoring, ensuring statutory minimum pressures are not breached. Defined Learning Combine with RCM to review maintenance frequencies. Changed methodologies/codes Centralised control of pressure management based on actual data collected over very short timescales.	Safety Customer & People Environment Other -Defined Learning	£8,100,000	Industry technical research specialists, specialist consultant engineers, manufacturers, development teams and pipeline engineers, energy companies, other GDNs and companies already using the technology.
14	Configuring for and managing assets on a smart grid The use of demand response to address network constraints is a potential example of this misalignment of incentives. There might be circumstances where it would be beneficial to use demand response as an alternative to network reinforcement to alleviate congestion, but this can be made more difficult by the fact that the suppliers own this resource under the 'supplier hub' concept. In principle, it should be possible to realign incentives through transactions and contracts between the network operator and the parties connected to the network (the idea of smart grids being 'transactive grids').	Apr 2015 2 years HIGH	Efficiency Benefits Accurate modelling of networks based on live localised actual data. Customer Impact Defer or remove the need for physical assets to be installed to reinforce network due to potential supply loss. Safety Reduce likelihood of loss of supply by design based on actual demand rather than modelled theoretical scenarios. Asset Management Manage networks based on actual demand targeted replacement and maintenance based on customer data.	Safety Asset Management Customer & People Environment	£300,000	Industry technical research specialists, Specialist consultant engineers, manufacturers, development teams and pipeline engineers, Energy companies, other GDNs and companies already using the technology.

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15	<p>Developing strategies for storage and leakage</p> <p>Optimise the use of Opex and connections workload records to link into Repex spend. Using a graphical based system to track repairs, poor pressures, water ingress and mechanical failures to assist planning decisions when undertaking capital projects. Access to Connections to inform on sales opportunities for new connections.</p> <p>Develop data models which collect leakage and repairs data along with operational cost data so that it can be used to inform the Asset Strategy. This will take the work that Network Planning has done to date forward so that a policy for asset replacement/maintenance can be developed and more robust data used to inform the Repex/Capex/Opex balance of investment.</p> <p>Investigate proprietary products available on predictive analytics to improve asset maintenance.</p>	<p>April 2013</p> <p>2 years</p> <p>LOW</p>	<p>Efficiency Benefits</p> <p>A more significant improvement in asset health delivered for the same investment value and a quantitative analysis of the balance between Repex, Capex and Opex.</p> <p>Customer Impact</p> <p>Better value for money from asset investment – a greater reduction in Opex need (FCO response, repair work) because of the impact of the Repex programme.</p> <p>Changed methodologies/codes</p> <p>A different approach to Repex, Capex and Opex based on quantitative measures as well as engineering design.</p>	<p>Safety</p> <p>Asset Management</p> <p>Operational Efficiency</p>	£480,000	Industry technical research specialists, specialist consultant engineers, manufacturers, development teams and pipeline engineers, energy companies, other GDNs and companies already using the technology.
19	<p>System control operation simulator</p> <p>To design and develop a software programme which simulates the daily system control operation of North and North East LDZ.</p>	<p>Jun 2012</p> <p>3 years</p> <p>LOW</p>	<p>Asset Management</p> <p>The ability to accept live SCADA data and simulate the impact of changes to network parameters and present the information to System Control to enable safe and efficient operation of each LDZ.</p> <p>Asset Management</p> <p>To re-run specific gas days and modify actions taken to analysis outcomes. Safety: To take into account NGN Safety Case and UNC obligations and subsequent commercial incentives.</p> <p>Safety</p> <p>To enable the competency assessed of staff in line with HSE expectations.</p> <p>Defined Learning</p> <p>To provide control engineers with the experience of operational failure in a simulated environment.</p>	<p>Safety</p> <p>Asset Management</p> <p>Other -Defined Learning</p>	£5,050,000	Specialist consultant engineers, manufacturers, development teams and pipeline engineers, energy companies, other GDNs and companies already using the technology.
21	<p>Planning Smart Meter data capture, using to inform the leakage model</p> <p>Smart meters will record and transmit usage data to</p>	<p>Aug 2014</p> <p>3 years</p> <p>MEIDUM</p>	<p>Efficiency Benefits</p> <p>Accurately predict energy usage and patterns improving accuracy of demand forecasts and statements. Develop network models</p>	<p>Safety</p> <p>Asset Management</p>	£275,000	Meter and system designers/manufacturers, consultant groups, shippers,



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	suppliers through a centrally licensed Data Communications Company (DCC) in accordance with user permissions contained within the Smart Energy Code (SEC). From a Transmission point of view, NGN should look at the potential benefits of using this information to inform the demand forecasting processed by utilising, amongst other things, trend data.		<p>which could be used for many purposes.</p> <p>Customer Impact Customer impacts from this can be identified for both NGN customers - shippers, and end consumers.</p> <p>Shipper Impacts Better allocation of energy allowing continuous improvement, evolving energy settlement regimes which are being developed through xoserve, targeting costs more closely to consumption in a timely way. Possibly reducing on the level of reconciliation which has a financial impact for shippers.</p> <p>Defined Learning: Changed methodology/codes: uniform network code, smart energy code, xoserve operating procedures and the agency services agreement.</p>	Customer & People		suppliers and all parties who liaise through xoserve.
24	<p>Automation of supply chain reporting</p> <p>To initially test the feasibility and enthusiasm for a joint reporting platform between all main Repex contractors and NGN. If feasibility is agreed this would go onto the procurement, development and implementation of a reporting system for all parties to report time, cost, quality and other KPIs against so there is a single, auditable report easily available.</p>	<p>Apr 2013</p> <p>2 years</p> <p>LOW</p>	<p>Efficiency Benefits Reduction in cost and reporting errors leading to more accurate charging between parties.</p> <p>Reduces/eliminates need for audits/checks and makes them more efficient when they do happen.</p> <p>Reduced overhead costs associated with reporting for all parties.</p>	<p>Asset Management</p> <p>Customer & People</p>	£75,000	Software engineers, consultant groups, other GDNs and companies already using the software. Software suppliers.
25	<p>Innovative excavation and reinstatement technologies</p> <p>Introduction of existing/new technologies and techniques that reduce our time within the highway. It will also focus on maximising the use of recycled material. This will include new plant location equipment, technologies that help assist pointing escapes and maximise the use of non-intrusive repairs.</p>	<p>Aug 2014</p> <p>3 years</p> <p>LOW</p>	<p>Efficiency Benefits Extending the use of existing recycling plant and investigation further growth. Minimising the potential loss of productivity with permit schemes. Reducing the cost of imported new reinstatement material.</p> <p>Customer Impact Shorten periods when serious traffic disruption occurs. Working with supply chain to developing and implementing new technologies. Increasing positive relationship with Local Authorities.</p> <p>Defined Learning Changing leak detection techniques, increased usage of internal leak location and repair.</p>	<p>Customer & People</p> <p>Operational Efficiency</p> <p>Environment</p>	£550,000	Specialist consultant engineers, manufacturers, development teams and pipeline/ highways engineers, energy companies, other GDNs and companies already using the technology. Highways Authorities and local government bodies.

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28	<p>CCTV inspections</p> <p>To write a business case for CCTV to replace regular manual inspection of gas gasholders in collaboration with other networks; eliminating the need for manual inspection of above ground assets that are not being decommissioned in the near future could deliver operational savings.</p> <p>Feasibility of using CCTV for inspecting other assets, for example PRS and offtakes.</p>	<p>Aug 2013</p> <p>4 years</p> <p>MEDIUM</p>	<p>Efficiency Benefits Reduction in Opex delivering a payback of the CCTV investment and then financial benefits.</p> <p>Defined Learning: Level of detail and assurance that can be achieved from a remote inspection.</p> <p>Changed methodologies/codes: Change in the approach to maintenance of Above Ground Installations (AGIs) that can be rolled out across the industry and made a standard.</p>	Safety	£75,000	Specialist consultant engineers, manufacturers, development teams and design engineers.
30	<p>Enhanced smartphone technologies direct updates</p> <p>Rapid network-wide communication system, ultimately able to transmit/receive almost any data in a wide range of formats, between a desk in any office and a smartphone at any location. Text, photos, GPS, survey data, forms - essentially any written, graphical or electronic data - could be generated, agreed, transferred and confirmed, for any required purpose.</p> <p>The prime motivator for establishing smartphone technologies is to provide rapid reliable reporting, to record and confirm that site circumstances satisfy all safety, statutory or regulatory requirements, various escapes, complaints or other non-routine events can be handled. Include job completion and payments systems.</p>	<p>Aug 2013</p> <p>2 years</p> <p>LOW</p>	<p>Efficiency Benefits Simplification in the collection and provision of data. Standardisation of data formats to suit business. Empowering staff to request, revise or originate data.</p> <p>Asset Management Embedding geographic, photographic, identity, security or regulatory data in any form.</p> <p>Customer Impact: Providing rapid link from all locations to any person - from any desk to all worksites.</p> <p>Safety Expanded into all areas of the business including Asset Management, Compliance, Audit and Safety records.</p>	<p>Safety</p> <p>Asset Management</p> <p>Customer & People</p>	£200,000	Communication engineers/consultants software integration specialists.
31	<p>Post smart metering Emergency Meterwork for Suppliers (PEMS)</p> <p>Training must be sourced, procured and implemented to ensure that FCOs can carry out their responsibilities under PEMS when confronted with a smart meter and associated installation.</p>	<p>Aug 2013</p> <p>1 year</p> <p>MEDIUM</p>	<p>Efficiency Benefits Potential growth giving access to new customers. Continuation of service for existing customers. Reducing risk.</p> <p>Customer Impact Increased likelihood of gas supply beyond meter not being interrupted.</p> <p>Defined Learning Specific courses/qualifications being finalised by Government.</p> <p>Changed methodologies/codes New meter installations may mean a change in the Codes of Practice. New meter installations may require new pricing, which in turn may require new job Outcome Codes etc.</p>	<p>Safety</p> <p>Asset Management</p> <p>Customer & People</p>	£160,000	Consultants, Suppliers, xoserve logistics companies, other GDNs and consumer forums.

Figure A19F.1: Innovation detailed project innovation matrix



