Gas Network Innovation Competition 2013 Report and Recommendations

Prepared for
The Gas & Electricity Markets Authority

By

Gas Network Innovation Competition Expert Panel

November 2013

1 Introduction

1.1 This report is prepared by the Gas Network Innovation Competition (NIC) Expert Panel (the Panel) and sets out the Panel's recommendations to the Gas and Electricity Markets Authority on the portfolio of Projects to be funded in the 2013 funding round. The members of the Expert Panel are as follows:

- **Ron Chapman**
- **Sharon Darcy**
- **Miriam Greenwood OBE DL (Chair)**
- **Prof. David Newbery**
- **Sean Sutcliffe**

1.2 We received six submissions. Full details of each submission will be available on the Ofgem website. The names of the companies, titles of the submissions and the amount requested from the Gas NIC are as follows (the values in brackets indicate the total cost of the Projects).

- **Opening up the Gas Market - Scotland Gas Networks - £1,866k requested (£2,122k in total)**
- **Robotics - Southern Gas Networks - £6,640k requested (£7,378k in total)**
- **Clean Energy Balance (CEB) - Hydrogen Injection for Carbon Displacement - Wales & West Utilities Limited - £3,565k requested (£4,290k in total)**
- **BioSNG Demonstration Project - National Grid Gas Distribution - £1,875k requested (£4,251k in total)**
- **Variable Envelope Compressors: Trial Optimisation and Review (VECTOR) - National Grid Gas plc. (Transmission) - £7,628k requested (£9,253k in total)**

- **Low Carbon Gas Pre-heating - Northern Gas Networks Limited - £4,842k requested (£6,332k in total)**

1.3 The Panel followed the evaluation process set out in the Gas NIC Governance Document version 1 (1st February 2013). Initial submissions were received by Ofgem and were screened by Ofgem staff for compliance with the requirements set out for the Initial Screening Process. Consultants were appointed by Ofgem to review the Full Submissions (the consultants' reports will be published in full). The Panel met the Network Licensees (NLs) early in the evaluation process to allow the Project teams to present their submissions. During the period up to the completion of the consultants' reports and prior to the second NL meeting, the consultants and the Panel sent each of the NLs a number of questions with the purpose of clarifying the submissions and highlighting areas of concern.

Following those meetings, the Panel met to review each of the submissions in the context of the criteria set out in the Governance Document. In evaluating the submissions, the Panel took into account all of the documents which had been made available: the submissions, their appendices, the consultants' reports as well as any additional information which had been submitted via Ofgem or the consultants from the NLs. They also took account of information from meetings which were held with the NLs and any material provided during those meetings. Based on this evaluation, the Panel reviewed the Projects against the criteria. This report sets out the Panel's recommendations to the Authority.

1.4 This report should be read together with the consultants' reports, the NLs' submissions and the other information that is published concurrently with it on the Ofgem website. This report sets out the results of the Panel's deliberations and its recommendations to the Authority. As such it is primarily concerned

with the views of the Panel; all the details of the Projects and the technical evaluations undertaken by the consultants are contained in the other published documents.

2 Evaluation Criteria

2.1 The criteria that the Panel is required to take into account in the evaluation process are set out in the Gas NIC Governance Document.

In this section we list the evaluation criteria and briefly discuss a number of points which arose during the evaluation process and which provide some context to the evaluation of the Projects described in the following section. A full description of the criteria is set out in the Governance Document.

2.2 (a) Accelerates the development of a low carbon energy sector and/or delivers environmental benefits whilst having the potential to deliver net financial benefits to future and/or existing customers.

The NL needed to demonstrate that the proposed Project Solution has the potential to accelerate the development of the low carbon energy sector, or deliver wider environmental benefits to customers, or deliver a combination of both. In addition, the NL was required to demonstrate that the Project has the potential to deliver net financial benefits to existing and/or future customers.

In setting out the potential benefits of a wider rollout, the NLs should recognise that a partial rollout could be a realistic scenario.

2.3 (b) Provides value for money to gas customers.

The NIC is focused on Projects which can deliver benefits and resultant learning applicable to the gas transportation system, taking into account the

level of funding requested. Projects which minimised the cost of demonstrating this and maximised the value of the learning gained were ranked highly against this criterion.

The Panel did not see much evidence of genuinely competitive tendering within the Projects although it was recognised that where there is a consortium of partners, it is not always possible to undertake market testing.

The Panel was concerned that customers should not be charged twice where Projects were replacing investments already funded or fundable under the current regulatory price control.

The NLs need to ensure their Projects are demonstrably best value for money.

2.4 (c) Generates knowledge that can be shared amongst all relevant NLs.

A principal objective of the NIC is the generation and sharing of knowledge from the Projects. The Panel paid particular attention to the plans to disseminate learning from each Project, both to other NLs and to other interested parties. Credit has been given to innovative plans, tools and techniques which enable learning to be shared openly and accessibly with other NLs and in a timely way.

Whilst there was evidence that some of the Projects were using learning from previous Innovation Funding Incentive (IFI) and Low Carbon Networks Fund work, the Panel considered that there should have been more evidence that the teams had learned both from previous Projects (successes and failures) and perhaps as importantly from the considerable amount of learning from Europe and the rest of the world.

2.5 (d) Is innovative (i.e. not business as usual) and has an unproven business case where the innovation risk warrants a limited Development or Demonstration Project to demonstrate its effectiveness.

The NIC is specifically targeted at innovative Projects that a NL would not undertake in its normal course of business where the technical, operational, regulatory or commercial risks associated with the Project are so significant that they cannot be funded either by shareholders or through the price control.

The NL is required to demonstrate that the Project is innovative, untested at the scale at which it will be deployed and that new learning will result from the Project. The Panel wishes to make it clear that NIC funding is not for proven and previously deployed technologies.

2.6 (e) Involvement of other Project Partners and External Funding.

Collaboration between NLs and other parties in the energy supply chain is a central objective of the NIC. The Panel expects the NLs to both explore and raise additional (or part) funding where this is available. Project Partners should, where possible, be expected to make a contribution particularly if they stand to gain commercially.

The Panel was largely satisfied with the Project Partners who were seen to make significant contributions to the presentations. The Panel noted the absence of academic partners in the Project teams. In the future, the Panel would like to see greater clarity in the process by which Project Partners were sought and chosen.

2.7 (f) Relevance and timing.

When evaluating how Projects performed against this criterion, consideration was given to the appropriateness of the timing of the proposed Project in terms

of its readiness for deployment if successful and the timing of the potential market challenge it seeks to meet.

The Panel did not consider that it was its role to decide on the likelihood of widespread adoption of particular technologies over the coming years. It recognised that the Low Carbon transition would involve a range of new technologies which could and would present different challenges to the NLs. However, the Panel did take into account the likely scale of the impact on the gas transportation system of these technologies and the associated timescale should they prove successful.

2.8 (g) Demonstration of a robust methodology and that the Project is ready to implement.

The Panel and the Authority must be confident that the NL can reasonably be expected to deliver the Project.

The Panel recognises that it is difficult at the start of a Project designed to develop new learning to define fully all of the subsequent stages – particularly where these will be determined by the results of the earlier work. However, in several of the
Projects, the Panel considered that additional go/no-go stage gates would have reduced the level of risk of NIC funds being wasted. The Panel found Projects which were built on previous IFI funded studies had the clearest and best developed plans.

For a number of the Projects, the Panel was not entirely satisfied with the Successful Delivery Reward Criteria and would like to see more emphasis on milestones for learning gained from outcomes, be they positive or negative, as well as on process.

2.9 Comments on process

The Panel met the NLs twice during the evaluation process. Prior to the second meeting the Panel sent a list of questions they wished to see answered at the second presentation. All of the NLs built their second presentation around answering these questions which was helpful. Clear answers inevitably give the Panel confidence that the team has fully thought through the proposed work and possible issues and is able to answer and deal with Panel concerns. The Panel was more convinced by resubmissions that clarified bids rather than those that simply removed assertions that had been challenged. In future it would be helpful if there was a longer period of time between the resubmissions and the Panel's report so that these could be properly assimilated and evaluated.

The questions that the Panel raises are intended to provide clarification and to highlight areas where the bid may cause concerns. NLs who approached the question sessions with an open mind and who were prepared to admit to areas of uncertainty and sought to address these, were more convincing than those who simply sought to defend their original submission. The Panel would, in the future, like to see a greater recognition that partial learning or even failure may have a value provided that this is made available to others.

3 Evaluation of submissions

3.1 Opening up the Gas Market - Scotland Gas Networks - £1,866k requested (£2,122k in total)

Gas supplies into GB are currently constrained by content and characteristics that are specified by the Gas Safety (Management) Regulations (GS(M)R) to ensure that gas can be safely transported and safely utilised. In the case of safe utilisation, these characteristics include the Wobbe Index (WI). Future gas supplies from more diverse sources including LNG, shale, biomethane and hydrogen, would be greatly facilitated if the gas quality specification was widened both at the higher and lower end of the range.

The trial proposed will take place in Oban, one of the Scottish Independent Undertakings (SIU), which is a physically isolated distribution network. SGN will procure a suitable source of gas, inject this into the network and measure the performance of some 2,500 appliances in 1,104 homes, over a period of one year. This will be preceded by inspecting all appliances, replacing appliances that will not be suitable, formulating special test gases, setting test conditions and then monitoring appliances periodically throughout the trial period using a trained team with specially equipped vehicles containing mobile test equipment. There will be an associated programme of customer and stakeholder consultation and communication.

If it can be demonstrated that gas with a wider range of WI can be transported and utilised safely for Oban cost-effectively then the potential for wider application in GB will be clearer. This could be in relation to SIUs, gas injection into local distribution zones or across GB as a whole. The feasibility of wider application is influenced by the number or percentage of appliances that would not be suitable for a wider gas quality specification, which is unknown, and the cost of identifying and replacing these appliances. The Project would provide a basis for making the case for partial or full application to the whole of GB.

Low carbon and/or environmental and financial benefits.

The Project will seek to demonstrate that gases which meet the wider European Association for the Streamlining of Energy Exchange -Gas (EASEE Gas) standard can be safely used in Oban. It will identify the scale and cost of appliance replacement that will be required. The data will be collected in a way that will support an assessment of the costs of wider application to some of or the entire GB network. This will provide carbon and net financial benefits to the SIUs but, more importantly, could be a significant step towards opening up the GB network to a wider range of low carbon gas sources.

Overall the Panel considered that by using the unique opportunity that Oban offers the Project could offer a significant step towards accelerating the development of a low carbon energy sector.

Value for Money.

This Project has been well constructed and makes use of a unique opportunity in Oban to achieve its goals with adequate provision for engaging with customers.

Overall the Panel considered this Project represents good value for money.

The net financial benefits of a successful delivery of the Project are estimated at £1.2m by SGN under their worst case assumptions and if the method could be rolled out to the whole of GB then the savings from not ballasting LNG are estimated at £60m p.a. This would justify the costs of replacing up to 3% of

appliances in GB. Opening the market to other gas supplies such as biomethane and unconventional gas could potentially lower gas prices even further.

Generates knowledge for the NLs.

This Project should provide significant new knowledge which will be applicable to all NLs. The data relating to households must be collected in a way that maximises its applicability to the whole of GB and involves the Health & Safety Executive (HSE). A key piece of learning will be the customer engagement process which will include dealing with vacant properties. Trials will be halted if the number of appliances needing replacement is higher than expected.

The Panel considered that the dissemination of knowledge methods were appropriate.

Innovation.

The Project is clearly innovative. It is also clear that this work would not be undertaken in the normal course of business.

Partners and funding.

There is no involvement of other funding partners. The consultants to the Project are well briefed on wider European initiatives and on the requirements of the HSE. The Project would have been strengthened by a greater involvement of suppliers and installers. However, the Project team had previously had discussions with numerous suppliers and manufacturers.

Relevance and timing.

The Project is highly relevant and timely in addressing a key obstacle to the development of alternative gas sources to the GB network. If this work provides the basis to broaden the gas specification then a future low carbon energy sector will be much closer.

Methodology.

The Panel was satisfied that the Project was well designed after having received clarification on the approach to making the case for a GB wide relaxation of the gas standards. The approval of the HSE for the Project and its relevance to GB, the ability of SGN legally to cut off supply to properties to which they cannot gain access and an assessment of the likely scale of appliance replacement needs to be proven early on in the Project

Panel Conclusions.

Overall the Panel considered this to be a well-designed Project which takes advantage of the uniqueness of the Oban network to make the case for a broader relaxation of the current gas standards which could significantly accelerate the development of a low carbon energy sector. The programme of

data collection needs to be carefully focused on the wider scope for application across GB for the Project to be successful.

The prospect of clarifying whether the costs of achieving the stated benefits, primarily by checking appliances, are realistic makes this an attractive investment.

3.2 Robotics - Southern Gas Networks

- £6,640k requested (£7,378k in total)

Gas leakage to ground or atmosphere as a result of iron gas mains or joint failure is responsible for the majority of the greenhouse gas footprint of the NLs. Disruption and high levels of expenditure result from current maintenance and replacement practices which typically involve extensive highway excavation and traffic obstruction.

To reduce greenhouse gas emissions and environmental impacts, SGN proposes to develop robotic equipment which can be inserted into and remotely operated within a live gas distribution main. The robots would acquire condition data and perform maintenance operations on large diameter (Tier 2 and Tier 3) mains. A second type of robot would be developed to connect services to a replacement main inserted in small diameter
(Tier 1) mains.

Low carbon and/or environmental and financial benefits.

It is clear that the Project could potentially deliver carbon and environmental benefits. However, the scale and cost-effectiveness of these will be unproven until the Project is complete. The development of a cost-effective robot to operate in the Tier 1 mains is likely to be challenging. The Cost Benefit Analysis (CBA) suggests that the method could lower Tier 1 costs by 11% and for both Scotland and Southern networks this could amount to £4.4m p.a. The estimated savings applied to Tiers 2 and 3 for the two networks might be £9.75m p.a. of which about 60% would be for Tier 2 and 40% for Tier 3. Of these savings, 36% would be passed back to the customers. If the methods were successfully rolled out over GB the annual customer benefits are claimed to cover the full cost of the Project in the first year and the total benefit over the remainder of the RIIO period might be as high as £74m. At GB scale carbon savings of 18,000 tonnes

(worth £0.45m at £25/tonne CO_2) might be realised over the remainder of the RIIO period. These benefits have had to be derived from the SGN submission and should have been more clearly stated.

Significant environmental and carbon benefits could be realised from the reduction in street works if the Project is successful.

Value for Money.

The Panel were unconvinced by the current case for the Tier 1 robot given the risk/reward profile and concerned that most of the funding for all of the robots would be committed before any field trials were undertaken.

Generates knowledge for the NLs.

The currently available techniques for maintaining and replacing Tier 2 and Tier 3 mains are highly disruptive and expensive. Developing robotic solutions, which would avoid excavations or even defer the work altogether, would be highly relevant to all NLs. The development of a robotic solution to reconnect services to relined Tier 1 mains would also provide broad environmental benefits.

SGN will need to involve the other NLs at an early stage in trials if the full potential benefit to GB is to be achieved. It will be important that the lessons of any failures are also shared and that this is reflected in the SDRC.

Innovation.

The Project is clearly innovative. It is also clear that this work would not be carried out in the normal course of business

Partners and funding.

The technical robotics development partner organisation brings good technical know-how to the Project and has committed to make a contribution in kind to facilitate technology roll-out.

Relevance and timing.

The Project is highly relevant and timely in addressing the issue of Tier 2 and Tier 3 pipes where the NLs are now being asked to assess and manage the risk of failure rather than automatically replace iron mains. There remains a significant amount of iron mains, of all sizes, to replace within the RIIO-GD1 price control period and beyond.

Methodology.

The Panel was persuaded that the Project was well designed following the question sessions where the stage gates were explained in more detail. The fact that the Project builds on earlier work funded under the IFI added confidence.

Panel Conclusions.

Overall the Panel considered that the significant potential carbon and environmental benefits justified the scope of the development programme for the Tier 2 and Tier 3 mains robots. The Expert Panel considered that, until results and learning from this work are available, the Tier 1 robot development would have a significantly lower chance of success and thus would not provide best value for money.

3.3 Clean Energy Balance (CEB) - Hydrogen Injection for Carbon Displacement - Wales & West Utilities Limited - £3,565k requested (£4,290k in total)

Although hydrogen has been identified by DECC as a low carbon source of gas that could displace natural gas, suitable injection technology has not been demonstrated in the UK. In addition, the volume of hydrogen currently permitted in the natural gas network, at 0.1% by volume, is too low to offer a material contribution to the displacement of natural gas.

A Network Innovation Allowance (NIA) strand is proposed to obtain an exemption from the (GS(M)R) to allow levels of hydrogen up to 2% to be injected into the Wadebridge medium pressure network on a trial basis. The hydrogen and natural gas mixture will then be utilised by gas consumers for heating or electricity generation.

The Project will demonstrate gas storage and mixing by drawing natural gas from the medium pressure local network and hydrogen from pressurised storage. The mixed gas will then be injected into the gas network and kept below the 2% limit by a control system.

Low carbon and/or environmental and financial benefits.

The Panel was not convinced that the Project would make a significant contribution to the reduction of greenhouse gas emissions. The Panel questioned whether hydrogen production from surplus wind for injection into the gas network would prove a commercially viable technique within the next decade or so, and therefore had doubts about the economics of the Project which were predicated on the availability of free electricity from an oversized wind farm.

The resubmission presented costs and benefits related to a 10% hydrogen injection level which was not the level of injection proposed in the Project.

Value for Money.

The Panel considered that, given the existence of similar gas storage and injection facilities in Germany, the new learning from the Project would be small in relation to the costs.

Generates knowledge for the NLs.

The knowledge that would be gained by injecting hydrogen at up to 2% is unlikely to be very useful in making the case for the much higher levels of injection that would be needed to make a significant contribution to decarbonisation.

Innovation.

Whilst the injection of stored hydrogen has not been demonstrated in GB, it is not new technology.

It is clear that this work would not be carried out in the normal course of business.

Partners and funding.

This is a diverse group of partners who are making significant financial contributions to the wider Project. The Panel was pleased to see a local community energy group involved. However, some of the answers given to the Panel indicated that the team might not be well integrated nor have the experience/depth of understanding of the issues to ensure successful Project delivery.

Relevance and timing.

The Panel considered that, whilst the Project addressed some of potential long-term issues around the Carbon Plan and utilisation of the gas network, it was premature. The Panel also considered that learning from previously unsuccessful Projects had not adequately been taken on board or addressed.

Methodology.

The Panel considered that the issues around customer engagement, such as gathering data on older appliances and not being able to gain access to some properties, had been significantly under-estimated and were inadequately answered in the Panel session. Attempts to address this in the resubmission lacked detail and were still unconvincing as for example, the approach to dealing with vacant properties.

Panel Conclusions.

Overall the Panel considered that the likelihood of the Project delivering significant benefits was low.

3.4 BioSNG Demonstration Project - National Grid Gas Distribution - £1,875k requested (£4,251k in total)

Decarbonising the 50% of final energy use accounted for by heat demand is challenging in view of the highly variable nature of heat demand between summer and winter. Electrification of heat is possible, but is a high-cost option. Other solutions based on biomass or heat networks are not scalable across the full range of consumer types. Continuation of gas usage for heating, using the existing gas network, but substituting a proportion of fossil gas with renewable gas could be a good solution if sufficient cost-effective production of renewable gas is possible. The existing proven method of producing renewable gas by anaerobic digestion of food and other green wastes would not provide sufficient volumes to achieve the required GHG reductions. The production of renewable gas from more general waste by thermal gasification could, theoretically, provide much larger volumes, but the end-to-end process for this has not been demonstrated. The absence of such technical demonstration is an impediment to investment by the market in the large-scale commercial plants which would be required to produce sufficient renewable gas. The proposed method is to demonstrate the technical and economic feasibility of thermal gasification of waste to renewable gas (BioSNG) through the construction and operation of a demonstration plant to take an existing stream of waste-derived syngas and upgrade it to pipeline quality (GS(M)R standard) gas.

Production of high-quality syngas from waste is already a commercial proposition. However, at present it is most likely that such syngas would be used for electricity generation. A technical and economic feasibility study of thermal gasification of waste to BioSNG was carried out in 2010. In addition, a development programme for the design of a BioSNG demonstration plant was carried out under IFI79 by a consortium comprising the current proposed Project Partners. The output from this work was a process design concept and an economic model for a full-scale plant, together with a detailed design of a

demonstration plant. The work demonstrated that a prototype waste-derived facility at a 50MWh scale would be commercially viable under prevailing support regimes under the Renewable Heat Incentive (RHI), and that future production plant could produce BioSNG at competitive prices.

The proposal is to build on the previous work to take the BioSNG concept to the next stage of practical production

Low carbon and/or environmental and financial benefits.

This Project has the potential to prove the economic case for utilising the gas stream from general waste more efficiently which would have significant carbon benefits. To the extent that it offers a viable alternative to more expensive heat decarbonisation methods it could make a useful contribution, probably post-2020. The economic analysis is conducted with and without the RHI biogas subsidy, which at £71/MWh is over three times the value of natural gas. Once costs have come down (n-th of a kind) then it is projected that a large BioSNG plant could earn an 8% return on investment if it could sell the renewable gas for £39/MWh (77% above the current gas price). The carbon benefit might be worth an additional £15 by 2030 (at £70/tonne CO_2) so this is certainly within the range of some gas price projections allowing for the carbon credit, but that is looking 15 years ahead.

Value for Money.

The Project represents good value in respect of the proportion of funding requested from the NIC and in respect of the potential long-term benefits to customers.

Generates knowledge for the NLs.

The Project would demonstrate the end-to-end process of waste gasification to GS(M)R standard for the first time. This would be relevant to all of the NLs and of broad interest to all potential renewable gas producers.

Innovation.

The Project is clearly innovative. It is also clear that this work would not be carried out in the normal course of business.

Partners and funding.

The Project involves a strong team of partners who have worked together well in previous Projects. The Project had a strong drive to find further external funding which has minimised NIC funding requested.

Relevance and timing.

The Project is highly relevant and timely. If successful then full scale commercial plants could be in place in time to assist meeting the GB GHG commitments in 2020.

Methodology.

The Panel was satisfied that the methodology was robust and that the track record of the Project team gave confidence. The involvement of the team in the earlier IFI Project was sound support for this proposal.

Panel Conclusions.

Overall the Panel considered this to be a well-designed Project which built on earlier work under the IFI. The potential benefits are tangible and realistic.

The Project team had a good breadth of expertise which was well integrated leading to a clear presentation of their plans. The balance between funding and expected benefits was critical in the assessment of the Project's value for money.

The Panel noted that, if there is a shortfall in the planned external funding then the requested NIC funding will not increase and the Project would still be required to deliver the full scope and benefits of the proposal.

3.5 Variable Envelope Compressors: Trial Optimisation and Review (VECTOR) - National Grid Gas plc. (Transmission) - £7,628k requested (£9,253k in total)

The flow of gas on the National Gas Transmission System (NTS) is facilitated by a fleet of 68 compressors at 24 compressor sites. Compressors enable onward transmission of gas and are also used to boost gas pressure for delivery to distribution networks and other directly connected loads such as gas fired power stations. Many of these compressors are now operating outside their optimal range because of the changing demands on the NTS caused by changes in the demand pattern.

The most common way of changing the performance of gas compressors is to run at different rotational speeds. The operating envelope is limited at low flow by a 'surge' line, at high flow by 'choke' and by the maximum and minimum speed curves. Further variation of the compressor's performance has historically been achieved through re-design (referred to as re-wheeling), which permanently changes aerodynamic performance.

To address the problem, NGGT intends to develop and demonstrate a solution using variable inlet guide vane technology (VIGV) in combination with variable speed control to enable compressors to operate stably and more efficiently over a wider range flow and pressure conditions than is currently possible.

Low carbon and/or environmental and financial benefits.

The Panel considered that the carbon savings that could be achieved were small in comparison to the cost of the Project and the fuel cost savings of £0.25m per site. The capital savings that could be achieved were likewise modest at possibly £2.4m per compressor successfully adapted over its entire life (if it did indeed avoid three rewheelings) but it is not clear how many sites would benefit from this Project nor over what time period the cost savings

would be delivered. The main benefit of the Project was seen as the increased operational flexibility but as the NL itself said "At the moment we are unable to quantify the benefit to our customers of providing the operational flexibility and ramp rates they require".

Value for Money.

The Panel considered that the cost of the Project was large in relation to the learning that could be achieved.

Generates knowledge for the NLs.

Projects underway in Alberta and Slovakia could provide relevant data. However, the Project would be the first demonstration of VIGV, combined with variable speed control, as a retro-fit.

We noted that Rolls Royce would retain foreground IPR. If no other OEM becomes involved in the Project, these two aspects would significantly limit the replicability of the Project.

Innovation.

It only emerged under questioning that there are examples of VIGV in operation both as new build and as retro-fits so the potential degree of innovation is considered limited.

Partners and funding.

There are no external funding partners. Rolls Royce will not charge for its design work in order to retain ownership of IPR.

Relevance and timing.

The Project is relevant and timely as the flexibility demanded of the NTS is growing and will continue to grow as the energy sector decarbonises.

Methodology.

The Panel was satisfied that the methodology was robust and that the Project team demonstrated a thorough grasp of the risks involved.

Panel Conclusions.

Overall the Panel considered that this was a well-designed and presented Project. The resubmission identified some cost savings. However, the inability to quantify the benefits of additional flexibility made the cost-benefit case weak and unprovable. Moreover, the existence around the world of related technology in operation suggested that the knowledge that could be gained would be small in relation to the cost of the Project.

3.6 Low Carbon Gas Pre-heating - Northern Gas Networks Limited - £4,917k requested (£6,332k in total)

Gas pre-heating is required at pressure reduction stations (where expansion results in a fall in temperature) to avoid freezing the outlet pipework and ensure continuity of supply. The existing water bath preheaters located on the transmission network are a mature technology. The options for the application of alternative preheating technologies are currently limited. Reliable data on the efficiency or carbon emissions of current or alternative preheating technologies in a live operating environment are not available. Potential carbon emissions benefits from network operational flexibility are inhibited by lack of accurate emissions information. NGN proposes to select a broad range of representative existing sites with waterbath or boiler house preheating systems and to install monitoring equipment to obtain energy performance information under a range of operating conditions. Two new alternative technologies will be installed in parallel with the existing plant and monitored in the same way. The data gathered will allow the existing plant to be operated more efficiently and may identify new technologies with lower carbon footprints and costs.

Low carbon and/or environmental and financial benefits.

The Project offers the potential for modest carbon and more appreciable cost saving benefits which will be applicable to all NLs. If successful and deployed in all NLs the potential savings are claimed at £1.5-5m per year. The main benefit of this Project is greater clarity as to the most cost-effective solutions, and more accurate information about the energy costs of gas heating.

Value for Money.

The Project has been realistically costed and is good value in relation to the knowledge that will be gained and the benefits that may accrue. NGN set out

very clearly how the cost estimates had been challenged and driven down and this gave the Panel confidence in their negotiations and costings.

Generates knowledge for the NLs.

This Project will develop a comprehensive data set on the economic and environmental costs of gas preheating which, for a range of reasons, has never been done before. This knowledge will be very valuable to all NLs.

The NGN proposals for dissemination of this knowledge are exemplary.

Innovation.

The Project will assess two novel technologies alongside the existing technologies that will allow their relative performance and costs to be examined so that future investment decisions can be soundly based. NGN are aware of the work underway by other NLs under the NIA in this area and this Project will provide more comprehensive and significant results.

It is clear that this Project is not business as usual.

Partners and funding.

There is no partner funding for the Project. A comprehensive feasibility study was carried out by a specialist heating engineering consultancy that screened the technologies available worldwide to identify the two potential new technologies. Both of these companies have agreed to collaborate as partners. This comprehensive feasibility work gave the Panel confidence in the Project.

Relevance and timing.

The Project seems highly relevant and perhaps long overdue.

Methodology.

The Project methodology appears robust and the Project team gave comprehensive answers to all the questions. The commitment of the senior management of NGN to the Project was clear as was their enthusiasm for the work. All the members of the Project team showed a refreshing openness in response to questions and the enthusiasm of the team was evident. This approach gave the Panel confidence that the Project would be successfully delivered.

Panel Conclusions.

Overall this was a Project which was strong across all the criteria. Amongst a number of strong bids, this one stood out. The Project was well justified and thought through and the presentation team showed a united passion for the work. The team responded openly to questions and was honest about what they did or did not know.

The Panel would like to commend this Project as exemplary.

4 Recommendations to the Authority

4.1 We set out below our recommendations to the Authority on the funding of the 2013 Projects.

4.2 The Panel recommends that the following are funded without any conditions:

- **BioSNG Demonstration Project - National Grid Gas Distribution - £1,875k requested (£4,251k in total)**
- **Low Carbon Gas Pre-heating - Northern Gas Networks Limited - £4,917k requested (£6,332k in total)**

4.3 The Panel recommends that the following Project is funded with the following conditions to be met before the full funding is committed –

a) that the HSE exemption is secured; and

b) that a route to access all properties has been secured.

In addition, as appliance testing progresses, forecasts of overall appliance failure should be updated. If these forecasts surpass the budgeted failure rate, the project should be suspended:

- **Opening up the Gas Market - Scotland Gas Networks - £1,866k requested (£2,122k in total)**

4.4 The Panel recommends that the following Project is funded but that the development of the Tier 1 robot is delayed until after the successful completion of the Tier 2 and Tier 3 robots. Ofgem should review progress at this key stage in order to agree whether the Project should continue:

- **Robotics - Southern Gas Networks - £6,640k requested (£7,378k in total)**

4.5 The Panel recommends that the Authority does NOT fund the following Projects:

- **Clean Energy Balance (CEB) Hydrogen Injection for Carbon Displacement - Wales & West Utilities Limited - £3,565k requested (£4,290k in total)**
- **Variable Envelope Compressors: Trial Optimisation and Review (VECTOR) - National Grid Gas plc. (Transmission) - £7,628k requested (£9,253k in total)**

4.6 In Section 2, we have set out a number of concerns and issues that arose during the evaluation. While there are no proposals for a full review of the scheme during this next year, the Authority should consider offering further guidance on the following points (see Section 2 for more detail).

- The NLs must show clear evidence that they and their partners and contractors are undertaking the work at a competitive price. This evidence may take the form of the results of tendering, market testing or benchmarking of costs.
- Where partners are potentially sharing the benefit from the outcome of the Project, there should be greater clarity in ensuring that the costs of the Project are shared in relation to the potential benefits and there should be greater clarity on how the potential benefits will flow back to gas customers.
- The assumptions underlying the CBA should be clearly set out and justified.
- The NIC should not be expected to pay for work that could be considered "business as usual" – the cost of such activities should be excluded from the overall Project costs; the Panel would like to see better justification for internal NL man power costs and clarification of the tasks being undertaken.

- Given that one of the goals is to encourage wider engagement in innovation in this sector, encouragement should be given to involving a wider range and type of partners including academic institutions and other parts of the supply chain where possible; and there are potential benefits from increased diversity in the teams.
- The Panel would like to reiterate its concerns about Successful Delivery Reward Criteria: these should be tied to outcomes, be they positive or negative, and not just stages in the process.
- Consideration should be given to clarifying the process of releasing the funding in stages; the Panel is aware that all the funds are released to the NLs at the outset of the Project and that Ofgem can agree whether or not specific work streams are undertaken – and where these do not proceed, the money is returned. However, the Panel believes that this process should be clarified and the NLs encouraged to identify a limited number of specific points in the trials where decisions to proceed would be required.
- The Panel would like to see evidence that the submission teams have reviewed and built on the work in the area that is being undertaken outside the UK and in other parts of the energy sector. The bids which were built upon earlier scoping studies were most successful in this regard.

4.7 Overall the Panel members were pleased with the quality and breadth of the bids submitted for this, the first, Gas NIC.

The Panel would like to thank the Project Teams for their hard work and for their engagement during the evaluation process; we would also like to thank the external consultants and the Ofgem team for all of the support and assistance that was provided.

THE END