Gas Network Innovation Competition 2015 Report and Recommendations

Prepared for
The Gas & Electricity Markets Authority

By

Gas Network Innovation Competition Expert Panel

November 2015

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 2015 funding round. The members of the Expert Panel are as follows:

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

1.2 We received four 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 show the total cost of each of the projects).

- **Commercial BioSNG Demonstration Plant - National Grid Gas Distribution - £5,362k requested (£23,058k in total)**
- **Customer Low Cost Connections - National Grid Gas Transmission - £4,820k requested (£5,434k in total)**
- **The City CNG Project - Northern Gas Networks - £1,095k requested (£1,231k in total)**
- **Real-Time Networks – Scotia Gas Networks - £7,105k requested (£7,998k in total)**

1.3 The Panel followed the evaluation process set out in the Gas NIC Governance Document version 2.1 (28th July 2015). 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 submissions. The Panel and the Consultants met the Network Licensees (NLs) early in the evaluation process to allow the project teams to present their submissions. Prior to the second bilateral meeting the Panel sent each of the NLs a number of questions to clarify the submissions and highlight 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 provided which included: the submissions, their appendices, the consultants' comments as well as all additional information which had been submitted to Ofgem by the NLs. They also took account of information from meetings which were held with the NLs and materials provided during those meetings. Based on this evaluation, the Panel reviewed the projects against the criteria.

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

2 Evaluation Criteria

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

In this section we list the evaluation criteria and briefly discuss a number of points which arose during the evaluation process and which provide 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 itself.

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.

As the number of projects funded through the NIC grows it will be necessary for the NLs to demonstrate that any new projects will offer additional benefits, over earlier projects, to future or existing customers. It would also be helpful if potential benefits were expressed as a range around an expected outcome.

In calculating the expected financial and /or environmental benefits it would be useful to consider how they could also easily be explained to gas customers who are being asked to fund the project.

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

The Panel was pleased to note that the NLs are making more use of the Network Innovation Allowance (NIA) funding to develop projects to a point where they would be suitable for NIC funding.

The Panel also saw more evidence that the NLs are inviting ideas and participation from a wider range of partners. However, there is scope for

involving a much wider range of partners and whilst there have been improvements the NLs still lack a comprehensive grasp of developments in other countries.

The Panel would also like to see more involvement of universities where appropriate.

The NLs need to consider how to engage with consumer groups beyond those local to the project. This would generate more enthusiasm for the project and ensure that it was widely implemented and hence delivered more of the potential benefits.

Whilst, in general, the NLs appeared to be taking steps to ensure that bids represented value for money overall, some concerns remained as to whether this was the case in relation to each work package or cost element, which had the effect of damaging the overall credibility of some bids.

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

The Panel was encouraged to see more evidence that the project teams had learned from previous projects and were collaborating more in the formulation of project proposals.

The Panel would like to see more emphasis on developing solutions which were ready for implementation by the whole gas network. Such solutions are likely to deliver greater benefits more quickly and will be well regarded by the Panel.

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 Panel was pleased to see more evidence that the NLs were searching globally for new solutions to their business needs. However, the range of partners involved in the NIC bids is still too narrow and there is undoubtedly much more value to be realised by engaging the international supply chain and SMEs.

The Panel was pleased to note that the NLs demonstrated, in the bilateral meetings, a greater diversity in their project teams, and including the project managers. The wider visibility of the project management team helps to build confidence that the project can be successfully delivered. The Panel was pleased to see a mix of familiar and new faces in the presentation teams which gave confidence that experience in participation in the broader NIC process is being built up and shared.

The Panel felt that the NLs need to explain more carefully in their bids why a project is not considered business as usual.

The Panel wish to stress that innovation need not just be technical but could be commercial, regulatory or consumer engagement.

2.6 (e) Involvement of other project partners and external funding.

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

Only one of this year's bids included any significant external funding. The Panel recognise the challenges posed by the short NIC timetable and would encourage NLs to make suggestions for improvements in the process during the forthcoming Ofgem consultation.

NLs should consider consulting with a wide range stakeholders as this gives the Panel confidence that the project is well planned and can also provide support for the claims of the benefits that will accrue. Where the current viability of the project depends on government subsidies, it is important that the NLs either provide reasons why it is economically desirable that the subsidies should continue or that the project will become viable without the subsidy under reasonable projections.

2.7 (f) Relevance and timing.

The Panel requires an operational involvement in the project definition and delivery. This generates confidence that there is a real business need for the innovation and that the implementation will be timely.

The next RIIO price control process will begin in 2019 so it is timely for the NLs to be proposing demonstration projects that could help inform that process.

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

The Panel was impressed by the overall quality of the bids submitted. On the whole the project plans were well thought through and clearly explained.

Bids which have been carefully written give the Panel confidence that the bid has been well conceived. Bids that contain multiple errors and discrepancies do not.

In general, the project success criteria were relevant and based on the delivery of measurable project goals. Where there were significant project risks NLs indicated go/no-go points in the programmes. However, these were sometimes couched in a way that gave NLs considerable discretion, which could lead to potential uncertainty in the future as to whether the delivery requirements to move forward are indeed met.

2.9 Comments on process

The Panel met the NLs twice during the evaluation process. Prior to the second meeting the Panel provided the bidders with a list of questions they wished to see answered at the second bilateral. The Panel felt that the quality of the presentations was high and was pleased that the focus of the second bilaterals was in answering the Panel's questions.

The Panel recognises that innovation involves increasing levels of uncertainty in the later stages of projects. The questions which the Panel raises are intended to provide clarification and to highlight areas where the bid may cause concerns and to allow the NLs to explain how they intend to deal with unexpected outcomes. NLs who approached the question sessions with an open mind; 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 gives considerable thought to its questions and bidders should think carefully about their answers.

3 Evaluation of submissions

3.1 Commercial BioSNG Demonstration Plant - National Grid Gas Distribution - £5,362k requested (£23,058k in total)

BioSNG (bio-substitute natural gas) is an energy vector that can potentially deliver cost-effective, low carbon heat and transport using the existing gas network. National Grid Gas Distribution (NGGD), in partnership with Wales & West Utilities, Progressive Energy Ltd, CNG Services Ltd and Advanced Plasma Power propose to demonstrate, under commercial conditions, the conversion of waste through to delivery of renewable gas using thermal gasification and methanation. This will be sold to specific end users via the gas grid and will provide a national reference plant addressing commercial, legal and funding barriers. As such this project will facilitate investment in full scale operational plants, with the potential to increase the availability of renewable gas in the UK by 60-100TWh (the higher volumes requiring considerably more costly straw).

In 2013, the project partners successfully applied for £1.9m of NIC funding to construct a BioSNG Pilot Plant. That plant is now at the commissioning stage. The objective of the pilot plant is to prove the technical and economic feasibility of thermal gasification of waste to renewable gas.

Over the last year, the project partners focussed on commercialisation of the technology. The pilot plant business case envisaged that the next step in the development of the technology would be a large scale plant producing 300GWh/a of gas, funded commercially. However, it is now clear that the technical, economic and commercial risks associated with a full scale plant are such that an intermediate scale up factor is needed to demonstrate commercial viability and thus to obtain the finance and commercial contracts for a full

scale facility. The feedback from funders, waste suppliers and gas off-takers showed that they will only support this large scale plant if the technology is demonstrated at intermediate scale on an end – to - end basis, using representative feedstocks, on a continuous basis. The experiences of other waste to energy technologies such as those developed by Enerkem, Nexterra and AlterNRG show that the construction and operation of a demonstration plant at a scale of around 20–25GWh/a is an essential intermediate step in the commercialisation of the technology.

The timing of this bid was driven by the recent Department for Transport (DfT) Advanced Biofuels Demonstration Award. The project partners applied for funding from this competition. The DfT element of the project will produce compressed BioSNG (BioCNG) to be transported by road to CNG filling stations for use by Heavy Goods Vehicles (HGV). The BioSNG project was announced as a successful bidder by DfT during the NIC process.

One of the key advantages of natural gas as a transport fuel is the ability to exploit the existing gas network to take gas produced at plants located close to waste arisings and deliver it to appropriately sited filling stations. Analysis by NGGD shows that commercial scale BioSNG plants are likely to inject gas into the local transmission system; the volumes are too high for lower pressure tiers or for it all to be used in local truck filling stations. The DfT focus is primarily on the fuel production and its direct use, rather than on the needs of the distribution system. The project partners are seeking NIC funding to alter the design of the DfT facility so that it produces both BioCNG for direct fuelling of vehicles and BioSNG for injection into the grid.

While there are certainly potential technical and economic advantages to utilising methane from a BioSNG project directly into a local transport fleet, it may be that the additional costs associated with the clean up to achieve grid quality gas specifications could prove an advantage, in particular in decoupling

the physical location of the supply from the BioSNG use, and opening up a wider range of potential customers. In the longer term, if the technology proves successful, it would also facilitate much higher volumes of BioSNG to be utilised in the UK.

Low carbon and /or environmental and financial benefits.

This project has the scope to assist in the delivery of significant environmental benefits. The potential to deliver up to 40% of the domestic heat load from green gas, without re-engineering the home, and to reduce significantly the amount of waste going to landfill is important. Whether the renewable gas is used for domestic heating or for HGV fuel it will provide a significant contribution to reducing the UK's carbon footprint.

The availability of renewable gas also has the potential to reduce future fuel costs for both domestic heating and transportation.

Value for Money.

The Panel was convinced that the project represented good value for money for gas customers by leveraging some £17m of external funds from DfT and from Advanced Plasma Power.

The scale of the commercial demonstration plant is appropriate to provide a compelling commercial and technical case for private investment in a full-scale plant. The demonstration plant is also at a scale that can be confidently derived from the results of the pilot plant which is currently being commissioned with funding from the 2013 NIC.

Generates knowledge for the NLs.

The knowledge that will be generated by both the pilot plant and the demonstration plant will be useful for application to a range of gases in addition to the gas derived from plasma gasification of landfill waste. This will help a wider range of biogas producers to understand the costs of achieving different gas qualities which will maximise the development of renewable gas.

The demonstration of the potential commercial arrangements for continuous supply of grid gas will also be useful to a range of other types of biogas.

Innovation.

The technology to transform landfill waste into a continuous supply of grid gas is innovative and untested anywhere at the scale and under the commercial conditions proposed. The use of NIC funds to move the technology from the concept stage to a commercial demonstration is truly an innovation accelerator.

Enhancing the DfT funded demonstration of BioCNG for transport use by enabling it to be moved over the gas grid to wherever it is needed should also accelerate the adoption of the fuel.

Partners and funding.

The technical team has worked together for a number of years and each partner brings skills and expertise to the project. The team work well together as was demonstrated to the Panel during the bilaterals.

The project has secured £10.95m from DfT in addition to the £5.4m requested from the NIC and Advanced Plasma Power have committed in the bid to contribute £6.5m to the overall project.

Relevance and timing.

The Panel considered the project to be highly relevant. The availability of the DfT funding has driven the timing. While it makes sense to start this project now in order to undertake the relevant advance engineering and technical work, ideally the bulk of the capital commitment to the demonstration plant should only be made after a thorough validation of the end- to - end technology at the pilot level. Following discussions the project team amended stage gate SDRC 9.2 to ensure that the learnings from the pilot plant are available and taken into account before the design of the demonstration plant is finalised. However, the success criteria to move forward are not, and probably could not realistically be, set out to in detail to inform such a decision. Therefore, Ofgem should ensure that the review of this stage gate by the project team is thorough and based clearly on the successful performance of the pilot plant to ensure that the project does not continue if unjustified.

A grid connection demonstration will also provide a useful input to any policy debate around the mix of renewable fuel incentives.

Methodology.

The Panel was given confidence that the methodology was sound and that appropriate steps were being taken to mitigate the major risks. A site, with planning permission, has already been secured for the project. The partners have secured agreements with Swindon Borough Council for the waste and with Howard Tenens and CNG Services for the off-take of the gas. An experienced consultant, Otto Simons, has been appointed to manage the project. Amec Foster Wheeler (AFW) have also been identified as a potential supplier of the water gas shift and methanation stage, which they have

demonstrated in Nanjing, China processing 1.3MW of coal syngas, which has operated for 200 hours since construction in 2014. The positive experience that AFW have gained from their pilot significantly reduces the technical risks of the overall process.

Panel Conclusions.

The Panel was excited by this project which offers potential environmental benefits in the form of a significant renewable gas source which can be used for domestic heating (without the cost of conversion) or as a transport fuel. The beneficial re-use of large volumes of landfill waste will bring further environmental benefits.

The availability of this low carbon fuel should also reduce fuel prices to consumers as the UK seeks to meet its Greenhouse Gas targets.

This project which although critical in developing a technology which could have broad applicability across the gas network, is nevertheless not financeable through business as usual or conventional equity/ debt financing. As such it is encouraging that it been possible for the technology developers and NL to secure the funds from the NIC, DfT and equity providers to take this forward.

The project is well conceived and was clearly presented to the Panel by a strong team of partners.

3.2 Customer Low Cost Connections - National Grid Gas Transmission - £4,820k requested (£5,434k in total)

In the past, connections to the National Transmission System (NTS) were generally required to support projects such as liquefied natural gas terminals, gas fired power stations, storage sites and other similar large - sized projects which would be either injecting or off-taking gas over a long period of time. As such the time taken for the connection is not generally a constraint on project delivery, and for large projects the connection costs are a minor share of the total cost. More recently, however, customers are approaching National Grid Gas Transmission (NGGT) with a view to connecting much smaller projects to the NTS. If a customer wishes to connect to the NTS the actual costs payable for that connection are calculated based on the time and materials used to undertake the activity. For a Minimum Offtake Connection (MOC) at a greenfield site, the cost of the connection is generally about £2m and can take up to 3 years to deliver. The costs and timescales for more complex connections can be significantly higher than those for a MOC. Additionally connection assets are currently designed to cater for the full production flow rates (as this is ultimately what they need to support) and the cost and complexity of the connection are driven by these full production figures. However, the cost and timescale to support this can be prohibitive if it is not entirely certain whether the project will progress or that it will indeed produce gas at the initially conceived rate. As a consequence, the current application and connection process can be prohibitive for smaller projects. Additionally it does not particularly cater for projects whose needs, in terms of flow rates, are subject to change over time as the projects develop.

NGGT have now begun to see new types of connection customer for entry into the gas system. These include parties developing unconventional gas sources, in particular biogas and potentially, in the future, shale or other unconventional gas sources. There are also new types of exit connection

customers such as natural gas powered vehicle refuelling stations. The requirements of these new types of customers are often quite different from previous connection customers. Their projects are typically fast to market and the NTS connection cost can represent a significant proportion of the total development costs. NGGT, in partnership with Premtech, Protech and Aqua Consultants aim to develop a connection service that facilitates the unconventional gas connections market; specifically connection costs of below £1m and with a duration of less than one year. The envisaged solution has three key elements:

a. Optimised Commercial Processes designed to meet the requirements of non-traditional customers.

b. Innovative Connection Solutions tailored to the needs of unconventional gas connections at high pressure. This will encompass a global technology watch, concept designs and the field trial of the proposed engineering connection solutions.

c. A Visual Online Platform to provide customers with the information they need to choose between various connection options. The innovative tool will use geographical data and customer information to enable customers to compare and assess suitable options for an NTS connection.

Low carbon and /or environmental and financial benefits.

The project seeks to reduce the average cost of a connection from £2m to £1m, which will reduce the cost of developing unconventional gas sources and with these savings accruing to end customers. The Panel agreed that the project would assist in encouraging the development of biomethane which will undoubtedly help to reduce the UK's carbon footprint. Shale and other unconventional gas may offer only limited carbon benefits, in particular over

Liquefied Natural Gas, but are likely to be developed in larger volumes than the more carbon beneficial biomethane.

Value for Money.

The Panel considered that the project would represent good value for money for gas customers even if the number of connections were to be less than estimated.

The Panel also recognised that the project would develop technology that could be adapted to provide further benefits on lower pressure connections. The availability of a tool to enable rapid assessment of viable connection options should also ensure that the market for unconventional gases develops fully.

Generates knowledge for the NLs.

The Panel was pleased to see that NGGT had already engaged with a range of stakeholders and had received letters of support from them. The technical solutions to be developed for the NTS should also be able to be adapted for the lower pressure tiers.

The proposed dissemination plan was well thought through. The Panel would encourage NGGT and the NLs to consider if a single portal could be provided to allow developers to review all their connection options in one place.

Innovation.

The use of standard skid mounted units is a common solution to many industrial applications but has not been employed in the gas sector for connections. Aside from introducing skid units, the innovation in the project comes from equipping the modular units with new technologies. The Panel

agreed that the current regulatory regime does not incentivise NGGT to invest significantly in exploring new methods to reduce connection costs and the NIC is an appropriate mechanism to overcome this.

Partners and funding.

The process by which NGGT had identified business needs and then invited external contractors to offer solutions to these seemed to be delivering credible projects and including a wider range of companies. The use of NIA funding to investigate concepts before formulating a NIC bid was also good practice. The involvement of Premtech, Protech and Aqua Consultants was welcomed. The Panel noted the expertise and enthusiasm shown by all the project partners. The partner organisations bring good technical know-how and an innovative culture to the project. However, NGGT appear to be using a limited range of partners in their innovation projects which suggests that they should now look to broaden the reach and appeal of their challenges to the supply chain.

The project does not access any external funding.

Relevance and timing.

There is no doubt that this is a relevant and timely project in the context of considerable governmental support for the development of shale and other forms of unconventional gas.

NGGT are right to identify that their current connection process is unsuited to the changing demands of potential gas suppliers. The stakeholder engagement that has been carried out backs this up.

Methodology.

The Panel was convinced that the project was well designed following the question sessions where the potential new technologies to be employed within the skid mounted units were explained in more detail. The fact that the project builds on continuing technology watch work funded under the NIA added confidence. The availability of suitable test facilities to prove the solutions developed and to train operational staff in their implementation gave further reassurance to the Panel.

The project team seemed to be well integrated with each party clear and confident in their roles. Wider visibility of the project management team also helped to build confidence that the project can be successfully delivered. The project plan was well thought through and the team were enthusiastic and keen to start work.

Panel Conclusions.

The quality of the answers given to the questions on the original submission, in the second bilateral, served to convince the Panel that this was an innovative project.

Overall, the Panel considered the project was sound and offered the potential to deliver financial benefits to gas customers by reducing the costs of connecting unconventional gas sources. It should also accelerate the development of smaller scale gas sources by removing the current financial and time obstacles for connections.

The reduced connection cost will help optimise the development of lower carbon fuels.

3.3 The City CNG Project - Northern Gas Networks - £1,095k requested (£1,231k in total)

There are several small Compressed Natural Gas (CNG) fuelling stations around the UK which serve specific limited customer bases. These existing stations are predominantly for the use of dedicated long-distance HGV-type vehicles and small bus fleets. Currently no locations exist in the UK to accommodate the large scale conversion of city-based vehicles to CNG, although they are common in many countries such as the United States, Brazil, Argentina and India. These vehicles could potentially include any depot-based vehicles, for example refuse trucks, buses, local taxis, fleet vans as well as private vehicles.

The absence of large scale CNG fuelling stations in the UK, specifically for a mix of city-based vehicles, is limiting the opportunity to move vehicles from conventional fuel sources to CNG. This is obstructing the opportunity for significant reductions in operating costs, emissions and associated air quality and public health improvement. CNG offers the opportunity for a vehicle fuel that is cheaper (to a considerable extent because of the more favourable excise tax, but when stripping out all taxes, CNG is less than half the cost per MWh of the diesel it can replace) than diesel/petrol and proven to reduce Particle Matter (PM) by 100%, Nitrogen Oxide (NOx) by circa 90% and carbon emissions by circa 22% compared to diesel vehicles. Compressing biomethane for transport use offers considerably greater reductions in carbon emissions and would use the same technology.

A major obstacle to accelerating the step change towards CNG vehicles and the associated cost and emissions reduction is the absence of a proven economic business case to build large scale city-based CNG fuelling stations. Conversion costs for vehicles are high and so a secure fueling option is critical to the business case for vehicle conversion. Under the leadership of Leeds City

Council the City CNG Project will provide this business case as a UK proof of concept, accelerating private sector investment and encouraging the development of the CNG transport fuel market.

Currently, Northern Gas Networks (NGN) and the other NLs require the cost of any new connection to the gas distribution network to be paid for up-front. As this is a significant barrier for CNG stations, a novel commercial arrangement will be established by NGN under The City CNG Project. The up-front cost of the High Pressure (HP) connection will be funded via the NIC and repaid as the station becomes economically viable, with the level of repayment linked to throughput. This means that the funds associated with the HP connection costs of the fuelling station, subject to the station becoming economically viable, would be at zero cost to UK gas customers. In effect, the NIC funding would allow a deferred cost recovery arrangement to be tested.

The three key objectives of the project are to:

a: provide a 'build it and they will come' proof of concept for UK cities with the ambition of providing the business case for private sector investment in large scale city-based CNG stations.

b: explore a novel cost recovery arrangement and its regulatory implications so that it would become business as usual.

c: identify and resolve the associated technical complexities for design and build of HP connections associated with this type of infrastructure.

Low carbon and/or environmental and financial benefits.

The Panel was convinced that switching city depot-based vehicles from traditional fuels to CNG would bring significant environmental benefits with respect to air quality. It would also reduce the carbon footprint of these vehicles, which cannot currently be replaced by electric alternatives.

Should NGN convert its own fleet to CNG then some modest financial savings would accrue to its gas customers and NGN have now stated that they will commit to converting a minimum of 15 vans in the Leeds area if the NIC bid is successful and the station is built, subject to their satisfying their ability to continue to provide satisfactory emergency cover.

Value for Money.

Whilst the data presented were not conclusive, the Panel believed that the project could meet its objectives of demonstrating the viability of the cost recovery methodology and identifying a supportive regulatory approach by choosing a smaller scale site owned by LCC. This would reduce the cost of the connection and avoid the cost of the land purchase.

The Panel understand that there is no regulatory barrier preventing NGN from accepting delayed payment for the connection. The issue that requires resolution, in discussion with Ofgem, is how gas customers or shareholders should be fairly rewarded for taking the repayment risk.

Generates knowledge for the NLs.

The demonstration of a cost recovery mechanism and the contextual discussions with Ofgem on a suitable regulatory framework for reimbursing

gas customers for the risks they are taking would clearly be of interest to all the NLs. The learnings from this project would be applicable to a much wider range of gas related projects beyond just CNG.

The Panel felt that the project could have done more to clearly articulate the commercial / regulatory barriers that the project is seeking to explore and overcome in the gas charging arrangements. This is done, to some extent, in section 7 of the submission. However, the project submission would have benefited from improved clarity on the learning objectives and deliverables from the novel cost recovery arrangement. If this, or similar arrangements, are to be taken up more widely, other GDNs and Ofgem will need evidence and analysis of the existing problems and how this arrangement has worked, or presented new challenges. Clear presentation is an important element of the NIC and the Panel suggest that Ofgem should work with NGN to clarify its learning objectives and deliverables around the cost recovery arrangement before issuing any Funding Direction.

The learnings from this project may also inform the next price control.

Innovation.

The commercial arrangement that is proposed has not been used in the gas sector before and will raise issues that require engagement with Ofgem and potentially lead to innovation in the regulatory regime.

Partners and funding.

The Panel was impressed by the enthusiasm and commitment of LCC and by the desire of NGN to support them. However, the project lacks firm commitment from potential users and has yet to attract a third party to build

the filling station, recognising, however, that public procurement constraints had hampered the ability to do that in advance.

Relevance and timing.

There is no doubt that it is relevant and timely to look to switch to a cleaner fuel for use in city centres, many of which are experiencing unacceptable levels of air pollution. The Panel was in full agreement with the significance of the environmental benefits.

The Panel recognised that the proposed cost recovery arrangements could also be beneficial for a wide range of projects with incremental capacity requirements and further benefits could flow from enabling these.

Methodology.

The Panel felt that the project objectives of testing a new commercial methodology could be achieved at lower cost by building a smaller demonstration station. The Panel also felt that a full-scale website was not necessary for the successful demonstration of the new commercial arrangements. In addition the lack of a firm commitment from a third party to build the filling station was an issue.

Panel Conclusions.

The Panel was supportive of the aims of the overall project, which offer clear environmental benefits that could solve a significant health issue for city centres. The key objective of the NIC funded part of the project is to understand the potential amendments to the connection charging arrangements that would better facilitate the development of low carbon

technologies as set out in Section 7 of the bid. This project will allow NGN to take a leadership role, on behalf of all NLs, to engage with Ofgem on this issue.

The Panel felt that the project could be successfully delivered at one of the smaller sites and without the need for the web portal. The Panel can only justify funding the project, on behalf of gas customers, to cover the costs of a smaller connection, the meter and the marketing. If the project sponsors wish to continue with the larger demonstration then the additional funding will need to come from elsewhere.

3.4 Real-Time Networks – Scotia Gas Networks - £7,105k requested (£7,998k in total)

The GB gas industry network models underpin the design of all capital and replacement projects and are a significant driver of industry and network operating costs. The base assumptions for these models were taken from studies in the 1980s and applied to the network as a whole. Whilst this method has served the industry well it is now outdated.

First, data collection has been revolutionised; the advent of cloud storage and developments in sensing technologies have meant that the harvesting of data is becoming more accurate and cost-effective.

Secondly, it is becoming apparent that the existing planning assumptions may not be as accurate as possible, and the modern gas network is subject to greater changes in gas quality due to increased variation in the sources of gas; these include traditional North Sea gas, nitrogen ballasted Liquefied Natural Gas (LNG), embedded unconventional gases and some more unusual sources such as LNG boil-off gas. Each of these types of gas has different gas compositions, physical properties and energy content.

The potential now exists to develop network models that account for the energy content within the network and to understand the impact on demand at the outlets. Scotia Gas Networks (SGN), and their partner DNV GL aim to optimise gas network design and operation using novel flow and gas quality sensors installed in the network, together with consumer meter data, and connected in real-time to a data cloud solution. An understanding of energy, rather than volume, flow in the network in real-time and the impact of renewable and unconventional sources will enable the gas networks of the future to:

a: Be more responsive to demand changes

b: Facilitate connection of new supplies including unconventional gases

c: Connect new loads with greater confidence

d: Operate flexibly during maintenance, repair and upgrade operations

e: Design and size future pipework more accurately

f: Accommodate and understand changes in gas quality

g: Respond to demand changes caused by changing weather conditions

Low carbon and/or environmental and financial benefits.

The Panel agreed that the ability to model more accurately energy flows would lead to significant financial and environmental benefits. The largest financial savings would come from reduced replacement costs, lower exit capacity bookings and avoidance of ballasting of LNG with nitrogen before feeding it into the UK network. The largest environmental benefit would come from reduced operating pressures leading to lower leakage of methane into the atmosphere.

Value for Money.

The Panel was impressed with the way in which the NIA had been used to run a competitive process to identify the best partner.

The royalty arrangements that are envisaged gave the Panel confidence that gas customers would benefit from any software products and other IPR that are developed.

Generates knowledge for the NLs.

The Panel was pleased to see that SGN had already engaged with a range of stakeholders but were disappointed by the single letter of support only. The Panel would like to see all bids include a greater emphasis on involving a wide range of stakeholders to ensure the rapid implementation of successful projects across all NLs.

Innovation.

The project clearly has a number of innovative aspects. The update of the demand models, the ability to simulate energy flows and the understanding of the potential impact of downstream renewables will all be significant advances.

Partners and funding.

The use of the NIA funding to run a competition to identify the right partner was novel and commendable, as was the involvement of an external judge. The project team came across as well informed and presented to the Panel in a seamless manner. Given the criticality of the work, and the requirement that it be credible to planners across the network it was reassuring to the Panel to meet and understand the expertise of the technical work stream project leaders.

The project only has a nominal amount of external funding and this is disappointing given the potential value of participation in the project to the partner and to any equipment suppliers.

Relevance and timing.

There is no doubt that this is a relevant and timely project. The NLs are experiencing an unprecedented rate of change in demands on their networks and this project is designed to help meet those challenges.

The project will not be complete until 2019 so it is imperative that the other NLs are kept closely involved in progress. This will ensure that the new models are widely implemented as soon as is practicable.

Methodology.

The Panel was convinced that the project was well designed following the question sessions when the comprehensive go/no-go stage gates were explained in more detail. The fact that site survey work has already been carried out gave additional reassurance.

The project plan was very detailed and well thought out which gave the Panel confidence that the key risks had been identified.

The one area that the Panel felt had been underestimated was in the customer engagement plan. The successful execution of the project will be heavily dependent on the consumer demand data provided by loggers installed onto meters in domestic and non-domestic end- user premises. This is, in turn, dependent on consumer consent and co-operation. With regard to consumer engagement, SGN clearly demonstrated to us that they had learnt valuable lessons from their Oban-based "Opening up the Gas Market," project, funded by the NIC in 2013. However, the Panel felt that SGN needed to do more to understand the population specifics in the Medway area selected for the trial. The ensuing Customer Engagement Plan for the project will be critical and the

Panel expects SGN to submit a robust plan to Ofgem. It will be interesting to see just how much learning the project delivers in this respect but we expect SGN to give this aspect equal consideration to the rest of the project.

The project requires the use of meter loggers, given that it is not expected that Smart Meter data will be available during the timeframe of the project. The Panel asked, and was given assurance, on the transferability of the learning following the Smart Meter rollout.

Panel Conclusions.

Overall the Panel considered the project was exciting and offered the potential to deliver significant financial benefits to gas customers as well as clear environmental benefits.

The Panel was pleased to see the way in which the bid was based on earlier NIA projects as well as the NIC funded Oban project.

4 Recommendations to the Authority

4.1 We set out below our recommendations to the Authority on the funding of the 2015 projects.

4.2 The Panel recommends that the Authority part funds the following project.

- **The City CNG Project - Northern Gas Networks - £700k (£1,095k requested of £1,231k in total)**

4.3 The Panel recommends that the following projects are fully funded.

- **Commercial BioSNG Demonstration Plant - National Grid Gas Distribution - £5,362k requested (£23,058k in total)**
- **Customer Low Cost Connections - National Grid Gas Transmission - £4,820k requested (£5,434k in total)**
- **Real-Time Networks – Scotia Gas Networks - £7,105k requested (£7,998k in total)**

4.4 In Section 2, we have set out a number of observations on the evaluation process. Overall, the Panel was pleased with the number and the quality of the bids submitted compared to 2014. There is clear evidence that the NLs are learning from feedback on previous bids and that they are developing innovation processes based on customer need.

- All of the submissions had strong partners who greatly strengthened the bids. The NLs should continue to develop their innovation processes so that key business needs can be shared with a wide range of potential international partners. This would also help the NLs to be better

informed on global developments. If the current NIC timetable is constraining this then the Panel would encourage the NLs to suggest changes during the current consultation on the NIC governance. The NIC is anchored to delivering benefits for gas customers and any suggestions on how to improve this would be welcomed.

- The NLs are beginning to use the NIA to test concepts and to use it to develop well-grounded NIC bids. Some of the bidders have also begun to use the NIA to provide further input during the execution of the NIC funded project which is encouraging.

- The Panel was pleased to see a greater emphasis on engaging with a range of stakeholders. The NLs should continue to broaden their range of stakeholders both to provide better qualified benefit assessments and to ensure that successful projects are quickly implemented nationwide.

4.5 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.