GAS NIC Interrogation Report

T-Shale

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1. PROJECT SUMMARY

Northern Gas Networks (NGN) propose a project with a wide range of activities aimed at understanding the effect on NGNs network of an increased supply of unconventional gas. The propose to develop:

- A range of scenarios that simulate investment options;
- An economic model;
- A decision tool;
- A simulation tool;
- A scenario costing tool.

The work will also provide validation of an existing network flow model. Finally the project will define a regulatory and commercial framework to deliver scenarios identified.

The project aims to provide a software tool, accessible through a secure web-based portal that will be available to the wider industry to support investment decisions.

NGN is supported in this project by:

- Addleshaw Goddard;
- Aqua Consultants;
- Environmental Resources Management (ERM);
- Enzen Global Ltd;
- Ernst & Young (EY);
- Leeds University.

2. ASSESSMENT AGAINST CRITERIA

The criteria against which each submission will be assessed are outlined in the NIC Governance Document, as follows:

(a) Accelerates the development of a low carbon energy sector and/or delivers environmental benefits & has the potential to deliver net financial benefits to existing and/or future customers;

(b) Provides value for money to electricity/gas customers;

(c) Generates knowledge that can be shared amongst all (relevant) Network Licensees;

(d) Is innovative and has an unproven business case;

(e) Involvement of other partners and external funding;

(f) Relevance and timing;

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

2.1 CRITERION (A): ACCELERATES THE DEVELOPMENT OF THE LOW CARBON ENERGY SECTOR AND/OR DELIVERS ENVIRONMENTAL BENEFITS

2.1.1 Key statements

- T-Shale is an enabling technology that will accelerate a change over from coal to shale gas over the timeframe of 2020 to 2050.
- Enabling a rapid changeover from coal to shale gas will decrease the overall carbon footprint of the country.
- T-Shale will clarify the whole cycle costs for shale gas compared to other fuels.
- Variables considered will include:
  - Distance from source to injection point;
  - Pipeline material, size and construction;
  - Gas compression;
  - Network Operation.
- T-Shale will have wider environmental benefits through optimisation of transportation and better planning of new infrastructure.

2.1.2 Challenges and Potential Shortfalls

Criterion (A) – Accelerates the development of the low carbon energy sector and/or delivers environmental benefits and has the potential to deliver net financial benefits to existing and/or future customers;	
Sub-criterion (a.i) – Ability to facilitate the Carbon Plan through GB wide roll out.	**Challenge 1:** The Industrial Emissions Directive (IED), together with the associated derogations, mean that generation of electricity from coal is in decline. The most pessimistic scenario identified by National Grid assumes electricity generation from coal will be negligible from 2023. The claims made for T-Shale accelerating a low carbon economy by encouraging a changeover from coal to shale gas between 2020 and 2050 are therefore not sound. If T-Shale results in an increased take up of shale gas, then this will be at the expense of conventional gas, LNG import or EU-piped gas. Shale gas has a higher carbon footprint than many other forms of gas, so a changeover to shale gas could actually have a negative carbon impact.
	Answer 1: The T-Shale project is not looking to address if shale gas is / is not a low carbon alternative fuel compared to other forms of energy or indeed to make an argument for or against shale gas development. This project is based on the assumption that, if shale gas does become a reality, there is currently no understanding of the most beneficial transportation infrastructure required to facilitate it. A sub optimised transportation infrastructure could have significant impacts on both carbon / wider environmental factors (of the projects), customer bills and other issues around UK GVA.
	Conclusion 1: This answer is accepted; however the project is positioned not as a something that will provide a carbon benefit in itself, but rather something that might allow an evaluation of various future projects. An argument could therefore be made that the T-Shale project does not have a carbon benefit in itself.

Criterion (A) – Accelerates the development of the low carbon energy sector and/or delivers environmental benefits and has the potential to deliver net financial benefits to existing and/or future customers;	
Sub-criterion (a.ii) – Network Capacity released by the project	**Challenge 1**: A goal of the T-Shale project is to release network capacity. However, the case made for the benefit of the project is weak and unsubstantiated. The submission does not set out clearly how the network is currently constrained, nor how future supply and transportation is likely to impact the network. Therefore, there is not a clear statement of the problem that the project is trying to solve. Consequently no estimation of network capacity increase can be made.
	Answer 1: The T-Shale project is looking to address this issue; it is currently not understood if the network is a constraint or how future supply could affect the network. The aim of the project is to understand what the viable scenarios are for transportation infrastructure as this is currently unknown. The project does not propose to provide an estimate of increases in network capacity. As part of the scenarios that are developed there may be some associated increase in capacity of the UK gas network; for example if a scenario involves isolating Yorkshire as a shale gas network this would release capacity into the NTS.
	Conclusion 1: This response is accepted, but it is noted that no quantifiable case is made for the benefit of the project.
Sub-criterion (a.iii) – Environmental benefits delivered to customers	**Challenge 1:** The submission does not make any specific claims for environmental benefits. The proposed project will result in a planning tool to understand the environmental costs of various transportation options, but it will not deliver environmental benefits in itself.
	Answer 1: This is correct. This project will develop a full understanding of the transportation options available for shale gas; part of the analysis will be an evaluation of the environmental impact of each transportation option. Without this work a sub optimised transportation system could be developed with the consequential carbon and environmental impact of construction (and operation) being significant. This project will allow quantification of the environmental benefits of different transportation options available to the UK.
	Conclusion 1: This response is accepted, but it is noted that no quantifiable case is made for the benefit of the project.
Sub-criterion (a.iv) – Financial benefit delivered to customers	**Challenge 1**: The submission does not make any specific claims for financial benefits for customers. The proposed project will result in a planning tool to understand the costs of various transportation options, but it will not deliver financial benefits in itself.

Criterion (A) – Accelerates the development of the low carbon energy sector and/or delivers environmental benefits and has the potential to deliver net financial benefits to existing and/or future customers;	
	Answer 1: This is correct. This project will allow a full understanding of the transportation development options available for shale gas; part of the analysis will be an evaluation of the commercial impact of each transportation option. Without this work a sub optimised transportation system could be developed with the consequential whole life cost impact being significant. This project will allow quantification of the commercial benefits of different transportation options available to the UK and specifically the gas industry customers.
	Conclusion 1: This response is accepted, but it is noted that no quantifiable case is made for the benefit of the project.

2.2 CRITERION (B): PROVIDES VALUE FOR MONEY TO APPLICABLE CUSTOMERS

2.2.1 Key Statements

- The project would deliver a better technical, regulatory and commercial framework for the development of shale gas.
- The project will include wider issues such as:
  - Socio-economic, including fuel poverty;
  - Off-gas energy users;
  - Carbon impact of capital investments and operations;
  - Sustainability.
- The project will review:
  - Existing policy and regulation;
  - Current industry processes;
  - Storage and intake planning.

2.2.2 Challenges and Potential Shortfalls

Criterion (B) – Provides value for money to applicable customers;	
Sub-criterion (b.i) – Potential direct impact on Network licensee's network	**Challenge 1**: The T-Shale project could have a large and beneficial effect on NGN's network operations in the future. However, the likely impact is not quantified or even indicated in the submission. The submission does not set out clearly how the network is currently constrained, nor how future supply and transportation is likely to impact the network. Therefore, there is not a clear statement of the problem that the project is trying to solve. Consequently no estimation of impact on the network can be made.
	Answer 1: Agreed, the introduction of alternative sources of gas could have an effect on NGN's network operation, but this is currently unknown. The objective of this project is to understand the different viable transportation infrastructure options for shale gas. In particular, as there is currently no robust model of available capacity for injection into a network at periods of low demand, the information that the GDNs are able to provide to potential connectees is uncertain. Until this is completed i.e. this project is undertaken, it is not possible to assess the impact on the network or its operation.
	Conclusion 1: It is accepted that it is difficult to assess the impact on the network at this stage, and that the project would provide an understanding of this. However, it is very difficult to recommend the project for NIC funding given that any potential benefit is unknown. A smaller desktop study, perhaps funded under the NIA, that provided an understanding of the network impacts and constraints would allow more educated decision-making regarding significant NIC funding decisions.

Criterion (B) – Provides value for money to applicable customers;	
Sub-criterion (b.ii) – Justification that the scale/cost is appropriate	**Challenge 1**: Section 4.2 discusses vague arguments for how the project might provide value for money for customers. However, no justification for the high cost of the project is made. The submission does not attempt to present any form of cost/benefit analysis, nor does it attempt to present a case for the impact of not progressing the project.
	Answer 1: We feel that a credible CBA is not feasible because transportation has not been attempted on a significant scale in the UK yet so is not understood (i.e. there is no cost baseline). The project will provide a CBA analysis for a range of transportation scenarios, which will then allow transportation costs to be translated into an impact on customers' bills. Noting the shale gas industry is estimated to be worth billions with the transportation infrastructure likely to cost hundreds of millions, NGN feel the project represents value for money by enabling some informed decision making. We do accept that day rates for EY's deliverables are high and agree to review this.
	Conclusion 1: It is accepted that it is difficult to assess the CBA at this stage, and that the project would provide an understanding of this. However, it is very difficult to recommend the project for NIC funding given that the CBA is not understood. It would be informative to have specific examples of benefits, even if these were based on engineering judgement or best guess. The review of rates is recognised and appreciated.
Sub-criterion (b.iii) – The project is delivered at competitive cost	**Challenge 1:** The submission details costs for each aspect of the project. Several of these costs are for consultancy performed by project partners. These costs appear very high and no attempt is made in the submission to justify these costs. In the current political climate, this aspect of the submission may come under intense scrutiny.
	Answer 1: NGN are needing to rely on partners with specific experience and expertise to deliver T-Shale because we do not have it within our organisation. The project partners have committed to a significant reduction in their standard rate (see pages 4/5 appendix B). The key drivers behind partners selection has been the quality and credibility of the partner to undertake the task, the commitment of the partner to support the bid and the commitment from senior level management within all the partners. Whilst NGN have negotiated a significant reduction on standard rates for some senior individuals (up to 50% in some cases), we will agree to review the EY rates.
	Conclusion 1: This is a satisfactory response that addresses some of the concerns raised, but not all.

Criterion (B) – Provides value for money to applicable customers;	
	Challenge 2: The management structure and associated overhead costs for the project are high (£1,195,000). While it is recognised that strong management is key to the success of a project of this size, it is not clear how this management overhead is justified when the majority of the effort is performed by project partners and separate project management is identified for specific deliverables.
	Answer 2: The bid has specific deliverables that are completed by partners which have been individually identified, and we discussed that some of these are large enough to be projects in themselves. The core team is critical to pulling all sections/deliverables of the project together by managing partners and ensuring the project progresses efficiently and effectively. In particular combining all of the deliverables into the T-Shale web tool to conclude the project. This small core team consists of high quality individuals who can manage and coordinate a project of this scale with as many partners and multi-functional elements. The core tem will be in place for the entire project (three years) and the rates are based on NGN's professional services framework rates for these individuals. This framework was competitively tendered under OJEU regulations and NGN believe the core team cost are both competitive and based on a minimum size team to manage such a complex project. Within the core team costs there is also £150k for office facilities and £100k that will be removed on re submission as it is part of the T-Shale web platform development as identified in Deliverable 4 (previously clarified in question 14)
	Conclusion 2: The clarification of the costs for office facilities and web platform costs are welcomed. It is understood that the rates for individuals are based on NGN's professional services framework. However, the original challenge raised was principally around the time allocated for project management that seems high. For a project where large parts of the work are sub-contracted (and where those sub-contractors are therefore responsible for managing their own packages of work) the headline project management costs remain high.
Sub-criterion (b.iv) – The proportion of the benefits that accrue to other parts of the supply chain	**Challenge 1**: The submission discusses qualitative benefits to Network Licensees, but makes no specific claims as to the proportion of the benefits that accrue to other parts of the supply chain.
	Answer 1: The magnitude or proportion of benefits that the development of transportation infrastructure brings to the supply chain, will depend on the specific transportation scenario. Part of the scope of the project is to quantify the potential benefits of different scenarios to local communities and the supply chain (GVA).

Criterion (B) – Provides value for money to applicable customers;	
	Conclusion 1: As discussed above, it is understood that the benefits are difficult to quantify. However, in turn this means that the submission cannot demonstrate the benefits of the project.
Sub-criterion (b.v) – How project partners have been identified and selected	**Challenge 1**: Project partners have been selected on the basis of track record, experience and capability. A good case is presented for each partner having the skills to deliver their part of the project. However, given the high costs for the project, it is important that the submission presents the case that the partners have been selected to provide value for money. It is not clear how potential partners were short-listed and the criteria by which they were selected.
	Answer 1: The key drivers behind partners selection has been the quality and credibility of the partner to undertake the task, the commitment of the partner to support the bid and the commitment from senior level management within all the partners. On top of this NGN have negotiated a significant reduction on standards rates for individuals (up to 50% in some cases.) In addition to the above, partners have been selected based on the following reasons: • Specific software system (Aqua – S-gas); • Are a current NGN framework partner assigned to their specific framework via an OJEU tender (Aqua, Enzen – IT framework); • They have specific sector knowledge that is critical for the bid: o EY – Authors of the 'getting ready for UK shale gas report' commissioned by UKOOG; o Addleshaw Goddard – Detailed understanding of the regulatory and legal obstacles for shale – the T-shale idea was originally debated between ADG/ERM & NGN at one of ADG's/ERM seminars; o ERM – Detailed understanding of the environmental obstacles for shale – the T-shale idea was originally debated between ADG/ERM & NGN at one of ADG's/ERM seminars; o UKOOG – The UK Onshore Oil and Gas Group will ensure the producers are at the initial meetings to develop viable scenarios to model. • Leeds University – a key member of the N8 university group providing access to multiple north of England universities. NGN have also been developing close relationships with this university for the past few years.
	Conclusion 1: The answer presents a small amount of additional information over and above the original submission. The individual partners have important skills and in several cases they are uniquely qualified to provide support to the project. The original submission discusses reduction in standard day rates. However, the original challenge stands, in that the submission does not present a case that the project has been optimised for cost.

Criterion (B) – Provides value for money to applicable customers;	
Sub-criterion (b.vi) – Costs associated with protection from incentives	**Challenge 1**: The submission does not include a discussion of protection from incentives.
	Answer 1: The T-shale project will not have any impact (positive or detrimental) on NGN's reliability outputs or incentives in RIIO-GD1. Our main challenge in Reliability is customer supply interruptions and meeting the 1 in 20 winter peak demand. None of the T-shale scope concerns the reliability of peak supply or delivers any protection for NGN against any incentive within RIIO-GD1.
	Conclusion 1: This is a satisfactory response.

2.3 CRITERION (C) GENERATES KNOWLEDGE THAT CAN BE SHARED AMONGST ALL RELEVANT NETWORK LICENSEES

2.3.1 Key Statements

The project will generate:

- An economic model to allow comparison of transportation options;
- A model to calculate the time required to develop transportation options;
- A model to calculate the carbon costs of transportation models;
- A framework for socio-economic impacts;
- A review of existing regulation and industry processes.

2.3.2 Challenges and Potential Shortfalls

Criterion (C) – Generates knowledge that can be shared amongst all relevant Network Licensees;	
Sub-criterion (c.i) – The level of incremental knowledge to be provided by the project.	**Challenge 1**: The submission discusses incremental knowledge, but does not articulate the likely benefits of that knowledge. No clear statements are made regarding the impact of this knowledge to network operation are made. This is an important omission as it means that an objective assessment of the benefits of the project is not possible.
	Answer 1: At each stage of the project incremental knowledge will be generated to the benefit of the industry. This will include: Scenario development (1) The UK gas transportation industry and the UK shale exploration industry will have a much clearer understanding of the modes of operation and a mutual understanding of each other's operational parameters. Flow Trials (3A) At each stage of the flow trails (summer one, two and three) more evidence will be available to substantiate low flow modelling assumptions (see Question c.ii below for more detail) – this will immediately benefit the bio-methane industry. S-Gas (3 B&C) Development of the S-Gas platform will immediately support the gas industry in investment decision analysis and providing a consistent cost estimate to potential connectees.
	Conclusion 1: This response is clear, but it does not address the original challenge. The project may deliver a benefit, but insufficient work has been done for the benefit of the project to be quantified.
Sub-criterion (c.ii) – Applicability of new learning to other Network	**Challenge 1**:A large part of the project is developing an understanding of the NGN network. The largest single part of the project is instrumenting the network in order to validate a model. It is unclear how applicable the benefits of this model will be to other Licensees.

Criterion (C) – Generates knowledge that can be shared amongst all relevant Network Licensees;	
Licensees	**Answer 1**: Over many years, a lot of research and physical trials were carried out to develop models and relationships under high demand conditions based on connected load types (different housing mix, non-domestic, commercial, industrial, etc.) and how these mixes of loads are diversified so that we are able to accurately forecast actual peak load rather than just theoretical, given that not everybody will have everything switched on at the same time, even in 1:20 conditions. This assessment for peak loads (winter loads) provided what is now known as the diversification model. This diversification model is critical to network planning and ensuring customers' value for money. If the accurate load diversification model did not exist, networks would have installed an over specified network "just in case" everybody switched everything on at the same time. The cost of this unnecessary upsizing would have been very significant. Validation of Network Analysis models is carried out by collecting flow and pressure information at periods of high demand. As we have an accurate high-demand diversification model we can accurately allocate the flow across our individual networks and given that we know the pipe configurations and source pressures of individual governors we can use the network analysis tool to forecast pressures at any point on the network. These can be then compared with the actual pressures at these points (as measured by data loggers) to confirm that, for known flow conditions, we are accurately modelling the actual performance of the network. This then allows us to use the network analysis model to accurately predict what pressures would be throughout the network under peak demand conditions and confirm that the network will be able to satisfy this demand whilst maintaining adequate pressures at all points in the network – or to trigger investment if this will not be the case. For low demand conditions, neither of these situations exist. There is no "low load" diversification model, this project will provide a practical basis for a low flow diversification model that will be transferable to other networks and, crucially to the T-shale project, will ensure development and assessment of realistic transportation scenarios. We have chosen 12 very diverse networks (within NGN's network) to capture data from, which will improve the reliability of the model when transferred to other networks.
	Conclusion 1: This additional discussion is very welcome. The original submission did not present this information and the focus on low load demand curves was only apparent at the first bilateral meeting. It is important to note that this is a serious failing of the original submission. Given the nature of the problem presented at the bilateral meeting it is not clear which parts of the project will be applicable to other network licensees; in particular, what knowledge generated would be specific to NGN's network and what knowledge is generic and applicable to many networks. This should be understood better to inform any funding decision.

Criterion (C) – Generates knowledge that can be shared amongst all relevant Network Licensees;	
Sub-criterion (c.iii) – Plans to disseminate learning.	**Challenge 1**: The principal mechanism for dissemination of learning is the development of a web portal. This has advantages in that it provides an excellent platform for engaging the wider industry. However, a web portal can be expensive to set up. It also requires ongoing funding beyond the scope of the project to keep it running. A web interface allows an IP holder to carefully control access to fundamental algorithms that can he hidden from the user of the portal. This is a distinct advantage in commercial applications. However, for a NIC funded project it raises important questions about controls on information and the ownership of deliverables from the project. For example, the wider industry will have access to the web portal as a user, but the algorithms and data behind the scenes may be proprietary. It is also not clear whether this service will be provided for a fee.
	Answer 1: We agree that ongoing costs for the 'web platform' need to be considered and will be as the T-Shale tool is being developed; it is currently not possible to quantify these costs or agree who will be accountable for them. The information within the platform i.e. the foreground data will be freely available to the gas industry. Any algorithm developed as part of the bid would be available to the industry but any background algorithm which is part of a partner's existing IP would be retained by the partner.
	Conclusion 1: This is a fair response to the challenge. However, if a key mechanism for dissemination (the web platform) cannot be costed at this stage then this is a failing of the submission.
Sub-criterion (c.iv) – Robustness of the methodology to capture learning.	**Challenge 1**: See comment (c.iii) above.
	Answer 1: See answer (c.iii) above.
	Conclusion 1: See conclusion (c.iii) above.
Sub-criterion (c.v) – Treatment of IPR.	**Challenge 1**: See comment (c.iii) above.
	Answer 1: See answer (c.iii) above.
	Conclusion 1: See conclusion (c.iii) above.

2.4 CRITERION (D) IS INNOVATIVE AND HAS AN UNPROVEN BUSINESS CASE

2.4.1 Key Statements

No key statements made.

2.4.2 Challenges and Potential Shortfalls

Criterion (D) – is innovative and has an unproven business case;	
Sub-criterion (d.i) – Justification why the project is innovative	**Challenge 1**: The submission makes no arguments for the project being innovative, nor reasons why the project qualifies for innovation funding. The submission describes a requirement for work to be done and states that NIC funding would allow this work to be completed. However, no arguments are presented as to why this project should be funded through an innovation framework.
	Answer 1: NGN believe this is the most innovative project conceived by the network. This is both in-terms of the individual constituent parts and the overall output of the project and the issue it will address. A detailed evaluation to understand the impact for significant injection of alternative sources of gas (in this case shale) and the associated transportation options have never been considered before; it is a problem the industry is facing. Furthermore low flow modelling has never been undertaken before and currently there is no obligation for a network to invest in this type of analysis, other than to support the non-conventional gas industry. The S-gas system is also a totally new concept for the gas industry that would provide significant benefit as a scoping, cost, carbon and schedule estimate tool. NGN as a transporter is funded to maintain security of supply to its customers through its transportation network. This project will address an issue outside of NGN's mandatory obligations and, without NIC funding it would not be undertaken by the network.
	Conclusion 1: This is a robust response and the points raised are accepted. However, the case is not made that that this work should be funded under an innovation framework. Why, for example, is an understanding of the supply and demand to and from the network not "business as usual" for a network operator. A project of this kind could be innovative if a (speculative) investment now could provide a (potential) large benefit in the future. However, the case is not made for this project because no attempt has been made to characterise whether there actually is a constraint on the network, nor what the benefit of better low flow modelling would be. A CBA for the project has not been attempted.
Sub-criterion (d.ii) – Why the Network Licensee will not fund through price	**Challenge 1**: No arguments are presented and this is an important omission.
	Answer 1: As a gas transporter, NGN is funded to maintain security of supply to its customers through its transportation network. This project will address a

control	much wider issue than NGN's mandatory obligations and without NIC funding it would not be undertaken by the network. Whilst there is nothing in NGN's current regulatory RIIO business allowance for any work of this nature, we believe investing 10% (£625,719) of is very worthwhile in beginning to prepare for alternative sources of gas, namely shale.
	Conclusion 1: See d.i above.
Sub-criterion (d.iii) – Why the project can only be undertaken with the support of the NIC	**Challenge 1**: No arguments are presented and this is an important omission.
	Answer 1: See answers d.i and d.ii above
	Conclusion 1: See d.i above.

2.5 CRITERION (E) INVOLVEMENT OF OTHER PARTNERS AND EXTERNAL FUNDING

2.5.1 Key Statements

Key partners have been identified as:

- Addleshaw Goddard (Legal Expertise);
- Aqua Consultants (Modelling and simulation);
- Environmental Resources Management (Environmental policy);
- Enzen Global Ltd (Web portal);
- Ernst & Young (Socio-economic impact));
- National Grid Transmission (Modelling of the NTS);
- UKOOG (Initial scenario development).

2.5.2 Challenges and Potential Shortfalls

Criterion (E) – Involvement of other partners and external funding;	
Sub-criterion (e.i) – Collaborators involved in the project	**Challenge 1**: Project partners have been selected on the basis of track record, experience and capability. A good case is presented for each partner having the skills to deliver their part of the project.
	Answer 1: N/A
	Conclusion 1: N/A
Sub-criterion (e.ii) – Steps taken to identify potential partners and ideas.	**Challenge 1**: Project partners have been selected on the basis of track record, experience and capability. A good case is presented for each partner having the skills to deliver their part of the project. However, given the high costs for the project, it is important that the submission presents the case that the partners have been selected to provide value for money. It is not clear how potential partners were short-listed and the criteria by which they were selected.
	Answer 1: The key drivers behind partners selection has been the quality and credibility of the partner to undertake the task, the commitment of the partner to support the bid and the commitment from senior level management within all the partners. On top of this NGN have negotiated a significant reduction on standards rates for individuals (up to 50% in some cases.) In addition to the above partners have been selected based on the following reasons: • Specific software system (Aqua – S-gas), • Are an current NGN framework partner assigned to their specific framework via an OJEU tender (Aqua, Enzen – IT framework), • They have specific sector knowledge that is critical for the bid: o EY – Authors of the 'getting ready for UK shale gas report' commissioned by UKOOG; o Addleshaw Goddard – Detailed understanding of the regulatory and legal obstacles for shale – the T-shale idea

Criterion (E) – Involvement of other partners and external funding;	
	was originally debated between ADG/ERM & NGN at one of ADG's/ERM seminars; o ERM – Detailed understanding of the environmental obstacles for shale – the T-shale idea was originally debated between ADG/ERM & NGN at one of ADG's/ERM seminars; o UKOOG – The UK Onshore Oil and Gas Group will ensure the producers are at the initial meetings to develop viable scenarios to model. • Leeds University – a key member of the N8 university group providing access to multiple north of England universities. NGN have also been developing close relationships with this university for the past few years.
	Conclusion 1: This is a satisfactory response.
Sub-criterion (e.iii) – Control of project partners	**Challenge 1**: The project partners are principally responsible for delivering separate sub-projects. Appropriate control of project partners is in place.
	Answer 1: N/A
	Conclusion 1: N/A
Sub-criterion (e.iv) – External funding for the project.	**Challenge 1**: The submission is clear on external funding for the project. No challenge.
	Answer 1: N/A
	Conclusion 1: N/A
Sub-criterion (e.v) – How secure external funding is.	**Challenge 1**: The submission is clear on external funding for the project. No challenge.
	Answer 1: N/A
	Conclusion 1: N/A

2.6 CRITERION (F) RELEVANCE AND TIMING

2.6.1 Key Statements

- Shale gas export within 10-15 years;
- Requirement planning is required in the next 3-5 years.

2.6.2 Challenges and Potential Shortfalls

Criterion (F) – Relevance and Timing;	
Sub-criterion (f.i) – The relevance of the solution to the move to a low carbon economy	**Challenge 1**: The Industrial Emissions Directive (IED), together with the associated derogations, mean that generation of electricity from coal is in decline. The most pessimistic scenario identified by National Grid assumes electricity generation from coal will be negligible from 2023. The claims made for T-Shale accelerating a low carbon economy are therefore not sound. Shale gas has a higher carbon footprint than some other forms of gas, so a changeover to shale gas could have a negative carbon impact.
	Answer 1: The T-Shale project is not looking to address if shale gas is / is not a low carbon alternative fuel compared to other forms of energy or indeed to make an argument for or against shale gas development. This project is based on the assumption that, if shale gas does become a reality, there is currently no understanding of the most beneficial transportation infrastructure required to facilitate it. A sub optimised transportation infrastructure could have significant impacts on both carbon / wider environmental factors (of the projects), customer bills and other issues around UK GVA.
	Conclusion 1: This answer is accepted, however the project is positioned not as a something that will provide a carbon benefit in itself, but rather something that might allow an evaluation of various future projects. An argument could therefore be made that the T-Shale project does not have a carbon benefit in itself.
Sub-criterion (f.ii) – How the method will be used as part of future business planning.	**Challenge 1:** The project sets out aspirations to define a framework for evaluation of transportation options. However, the submission does not make any concrete statements on the benefits. It is unclear how the project would affect future business planning. This is an important omission.
	Answer 1: Assuming shale gas is likely to happen, this project will provide insight on how the existing regulatory frameworks and policies could impact on the development of the most beneficial transportation scenarios. It will also help inform whether networks should be investing in new infrastructure now, to enable shale gas should it come online; this would impact on business planning.

	Conclusion 1: The original comment still stands. The project would undoubtedly provide some insight, but no case is presented to quantify the impact on business planning.

2.7 CRITERION (G) DEMONSTRATE A ROBUST METHODOLOGY AND THAT THE PROJECT IS READY TO IMPLEMENT

2.7.1 Key Statements

- Framework agreements are not in place, but preparatory work has been done;
- A project plan has been prepared and agreed between partners;
- A management system is in place;
- Good practice will be employed, such as risk workshops;
- Active project progress and governance is in place;
- A T-Shale steering group will be formed;
- Independent verification of information in the proposal has been completed;
- If shale gas does not come to market, there are significant other benefits from the project.

2.7.2 Challenges and Potential Shortfalls

Criterion (G) – Demonstrate a robust methodology and that the project is ready to implement;	
Sub-criterion (g.i) – Detailed project plan	**Challenge 1**: A summary project plan is presented in the form of a Gantt Chart together with supporting Risk & Opportunity register. No challenge.
	Answer 1: N/A
	Conclusion 1: N/A
Sub-criterion (g.ii) – Resources to deliver the project	**Challenge 1**: Project partners have been identified and are available to perform their tasks. No challenge.
	Answer 1: N/A
	Conclusion 1: N/A
Sub-criterion (g.iii) – Project can be started in a timely manner	**Challenge 1**: Project partners have been identified and are available to perform their tasks. No challenge.
	Answer 1: N/A
	Conclusion 1: N/A

Criterion (G) – Demonstrate a robust methodology and that the project is ready to implement;	
Sub-criterion (g.iv) – Customer impact and planned mitigations	**Challenge 1**: Customer impact would be minimal. No Challenge.
	Answer 1: N/A
	Conclusion 1: N/A
Sub-criterion (g.v) – Costs reasonably estimated	**Challenge 1**: Project costs are presented. As discussed above (b.iii & e.ii), the project costs appear high and the submission must justify the scope of work associated with each cost, the deliverable and how the cost has been optimised. This is an important omission.
	Answer 1: We agree to review the EY rates/project costs. The other project costs for each element have been based on rates as follows: CORE TEAM: Rates from NGNs OJEU tendered Professional Services framework (as stated on page one appendix B) 2A/B/C – Negotiated rates with Addleshaw Goddards, ERM and EY providing up to 50% reduction on standard rates as commitment to the project. (see page 3 & 4 appendix B) 3A Flow trials: Budget estimates for meter procurement form numerous suppliers supplemented by installation estimates using NGNs Main work contractors' rates for street works (OJEU tendered rates). Sub team Rates from NGNs OJEU tendered Professional Services framework. 3B&C – S-Gas OJEU tendered rates from NGNs professional services framework 4 – T-Shale platform estimated using comparable project assessments via NGN's IT department against OJEU tendered rates for NGNs IT framework.
	Conclusion 1: It is accepted that the costs are understood and that rates have been agreed where appropriate. However, the original challenge was that the submission must justify the scope of work associated with each cost and this has not been done.
Sub-criterion (g.vi) – Contingency funding for cost over-runs	**Challenge 1**: Contingency planning is presented, although this is fiscal contingency only. No challenge.
	Answer 1: N/A
	Conclusion 1: N/A
Sub-criterion (g.vii) –	**Challenge 1**: The project is comprised of several largely independent projects. Although

Criterion (G) – Demonstrate a robust methodology and that the project is ready to implement;	
Robustness of proposed methodology	the submission presents an overall 'plan', the plans for the individual parts are superficial. This is an important omission. For example, for the validation of the network model the submission describes that 53 flow meters will be installed at 12 sites, followed by 30 hired flow loggers. No information is provided to describe exactly what is to be measured, how it is to be measured and to what accuracy, contingency for instrument or telemetry failure and data reduction. How is the installation to be done, how will network operations be affected, how will the instrumentation be removed? Is it necessary to instrument the entire network all at once or has a rolling programme of instrumenting sub-networks been considered? We would expect a plan and risk register for this task, together with an understanding of how that plan was derived and how the cost/benefit was optimised. The level of detail presented is not consistent with a £2,334,000 task.
	Answer 1: We feel the plan suitably robust for the bid stage and a detailed risk register is provided in Appendix 4 – a significant amount of the risks listed are associated with part 3A of the bid. As with any project once approved this plan would be developed further as per the Major Projects management system, but the existing plan is ambitious but achievable. Data accuracy for low flow meters will be as per other measurements taken on our network.
	Conclusion 1: The level of detail presented is not consistent with a £2,334,000 task.
Sub-criterion (g.viii) – Quality of success criteria	**Challenge 1**: The submission includes firm, clear, milestones that agree with the project plan presented. However, these success criteria monitor progress of the project, not success. For example, the success criteria include milestones for installation of flow meters and availability of the results - the submission does not include criteria for the quality of those results. The success criteria should reflect the accuracy of the results, the level of network coverage achieved over what period of time and the 'usefulness' of the testing with regards to model validation. This is an important omission.

Criterion (G) – Demonstrate a robust methodology and that the project is ready to implement;	
	Answer 1: The flow meters have been selected to provide an acceptable level of accuracy, the metering points and networks have been selected as the minimum number to give a reasonable representation of a wide variety of network configurations. The data collected will be used to develop low flow models who's accuracy will be verified (or otherwise) by forecasting and then measuring future performance in the later stages of the project. By its nature as an innovation project, the accuracy of its outcome cannot be guaranteed but in either case much valuable knowledge and learning will have been gained and shared.
	Conclusion 1: The response is accepted, but the original comment still stands.
Sub-criterion (g.ix) – Verification of all information in the proposal	**Challenge 1**: The submission includes a statement on verification. No challenge.
	Answer 1: N/A
	Conclusion 1: N/A
Sub-criterion (g.x) – Risk mitigation process	**Challenge 1**: The submission presents a good summary of risks and opportunities and a good estimation of contingency funding. However, it does not include a formal risk register, or a plan to mitigate those risks over the project.
	Answer 1: A risk register is included in appendix four and, as with any major project, a mitigation plan would be developed on starting the project. Awareness of the key risks was important in creating the bid, planning overall project delivery and selecting project partners.
	Conclusion 1: This is a satisfactory response.
Sub-criterion (g.xi) – Processes for suspension of	**Challenge 1**: The submission includes a discussion regarding partial or complete suspension of the project. However, no specific milestones or gates are presented to control the project.

Criterion (G) – Demonstrate a robust methodology and that the project is ready to implement;	
the project	**Answer 1**: The steering group will monitor the project and the project will progress in line with NGN's investment policy and Major Projects IMS. This ensures all investment projects are reviewed monthly and costs/program are monitored and challenged at a monthly validation meeting. If the project was deviating from scope, cost or schedule this would be indicated early and the steering group can take the appropriate actions. As stated in the submission NGN believes the only section of the bid that could be suspended (although unlikely) would be sections 2A,B,C which would be based on an external factor that could occur at any point in time, for example a parliamentary decision.
	Conclusion 1: This answer is good and reflects good project management practice.

3. INITIAL RESPONSE SUMMARY

This section summarises the response to the initial review of the submission and the formation of the challenges.

The T-Shale project proposed by NGN is presented in a brief submission. The scope of the project would improve NGNs understanding of many aspects of their network. It would allow a series of tools to allow NGN to better plan for a transition to an increased supply of shale gas.

However, the project has several serious failings that should be remedied if the submission was to be accepted. These are:

- Quality of Submission. The submission is brief (40 pages) and is not consistent with a request for in excess of £5 million of funding. The submission presents little detail or qualified argument to support the proposal and as such it is difficult to assess the merits of the proposal.
- Project Structure. The project is comprised of several largely independent sub-projects that should be considered independently on their own merits. The submission does not make a coherent case for each sub-project, nor does it weave the disparate parts into the whole.
- Innovation. The project is not 'innovative' and actually makes no claims to be. While a project could be formed out of some ideas in the submission that would be considered suitable for innovation funding, other parts (socio-economic impacts and policy commentary) could not. Validation of an existing network model is not innovative, but a novel use of a validated model may be.
- Low Carbon and Environmental. The project will not benefit the low carbon economy (and the submission makes no claim to). The submission includes modelling of environmental impact of shale gas transport, but the environmental impact of shale gas is high compared to other forms of gas. The arguments made in the submission are not robust.
- Value for Money. The case for providing the customer with value for money is not made. The project is costly, but no attempt has been made to estimate a benefit from the project. No evidence is provided that the project costs have been minimised.
- Methodology. The scope of work of the project is not well defined and clear objectives and deliverables have not been set. A robust test plan is needed and evidence of proper risk management is required.

4. FINAL RESPONSE SUMMARY

Following receipt of the answers to the challenges raised, comments have been prepared for each response. In general, the responses provide some additional argument and relevant additional information. These responses, together with the presentation by the partners, have clarified some of the issues.

- Quality of Submission. The bilateral presentation provided a great deal of data that was not presented in the original submission. On one hand, the presentation was very useful and informative; on the other hand this further illustrates issues with the quality of the original submission. In particular, the focus of the flow metering on developing low flow demand curves was not communicated in the submission.
- Innovation. The challenge to the innovative nature of the project was answered robustly; however no additional information has been presented to demonstrate that the project is innovative. The case is not made that that this work should be funded under an innovation framework and why an understanding of the supply and demand to and from the network not “business as usual” for a network operator. A project of this kind could be innovative if a (speculative) investment now could provide a (potential) large benefit in the future. However, the case is not made for this project because no attempt has been made to characterise whether there actually is a constraint on the network, nor what the benefit of better low flow modelling would be.
- Project Structure / Low Carbon and Environmental / Value for Money. The original conclusions regarding these issues stand. Although some additional information or argument has been presented, the fundamental issues have not been addressed.
- Methodology. A number of failings with the submission could be addressed with a different methodology. In particular, the submission fails to make a convincing case that the methodology presented is the right one because there are so many unknowns.