

Question No.	From	Proforma section	Question	Date question asked	Date response required	Date received	Follow up to Question #	Confidential (y/n)
1	OCE	4.1/ Appendix A	Please provide carbon benefits for the method calculated against the actual energy use of consumers in Tain?	22 August 2017	24 August 2017	24 August 2017		N
2	OCE	4.1/ Appendix A	Please provide financial benefits for the method calculated against the actual energy use of consumers in Tain? For example, if many households use electricity for heating how much will it cost to install gas central heating?	22 August 2017	24 August 2017	24 August 2017		N
3	OCE	4.1/ Appendix A	What is the future cost of maintenance of the network? Has this been factored into the cost and benefit calculations?	22 August 2017	24 August 2017	24 August 2017		Partially
4	OCE	4.1	Please explain why supplying gas to a new community, and the potential roll out to create other networks, constitutes decarbonisation? The Scottish Governments target is 50g CO2/KWh by 2030 but gas heating typically has 200gCO2/KWh so this project would appear to lock in the local network to higher emissions.	24 August 2017	29 August 2017	25 August 2017		N
5	OCE	3.2	The submission states the project alleviates fuel poverty. What is the evidence of existing levels of fuel poverty and how will the project impact will be measured?	24 August 2017	29 August 2017	25 August 2017		N
6	OCE	4.1/ Appendix A	Can the workbooks with detailed calculations of carbon and financial benefits be provided?	24 August 2017	29 August 2017	31 August 2017	1,2,3	Partially
7	CO	N/A	Please provide the project plan and risk mitigation strategy for Fordoun Mother Station and Daughter Station projects? i) What are the risks to these projects? ii) How likely are delays to these projects and how do they effect this project?	29 August 2017	31 August 2017	01 September 2017		Partially
8	CO	Appendix C.4	What is the state of development of the community campus? i) How have you engaged with the council to understand the likelihood of the campus seeking a gas supply? ii) If the campus does not take up the supply what is the impact on the project?	29 August 2017	31 August 2017	31 August 2017		N
9	CO	N/A	Please can you provide the Memorandum of Understanding (MoU) between Fulcrum and CNG Services?	29 August 2017	31 August 2017	31 August 2017		Y
10	CO	Multiple	Does the technology for a 250 barg pressure reduction system exist? Does further design work need to be done in order to use this technology for a domestic gas system?	29 August 2017	31 August 2017	31 August 2017		N
11	NC	7	In your submission (page 36) you say that there is no prospect of competition in supply on the proposed gas network in Tain. As either a licenced Gas Transporter or a licence exempt network operator, how would you discharge your duties under either Section 9 of the Gas Act or Article 32 of the Gas Directive respectively?	31 August 2017	05 September 2017	05 September 2017		N
12	ST	1 + 4	You describe various approaches to dealing with security of supply and management of peak demand that do not include the construction of local storage. However, you state later in your submission (on page 25) that the additional cost of storage would be £0.5m over and above your existing measures. This seems relatively cost-effective. Please provide analysis to show how the other options have been determined to be more cost effective than this storage solution. Please also provide any other information on why traditional storage was ruled out.	05 September 2017	07 September 2017	07 September 2017		Partially
13	ST	4	Against a backdrop of declining gas use nationally can you please outline why you believe the creation of additional gas network capacity (page 20) is a benefit of this project.	05 September 2017	07 September 2017	07 September 2017		Partially
14	ST	N/A	Have any alternatives to a gas grid connection been considered or modelled for the community, in terms of both social and environmental benefits, such as heat pumps or district heating? Please provide analysis that shows a gas grid to be the best option.	05 September 2017	07 September 2017	07 September 2017		Partially
15	EP	4	Please demonstrate how this project is technically innovative.	05 September 2017	07 September 2017	07 September 2017		N
16	EP	N/A	i) How much will it cost consumers to connect to the new network and convert their house to gas? ii) Is there evidence of consumer willingness and ability to pay for the new gas connection and gas conversion, particularly for the fuel poor and/or owner-occupiers?	05 September 2017	07 September 2017	07 September 2017		Partially
17	EP	N/A	i) Please provide a comparison of the costs of accessing and using a gas connection to that of installing oil-fired heating. ii) How many oil-fired households are there in Tain? Would there be any additional benefits for these households if they switched from oil to gas?	05 September 2017	07 September 2017	07 September 2017		N
18	EP	N/A	What is the minimum number of connections required to make this project viable?	05 September 2017	07 September 2017	07 September 2017		Partially
19	EP	N/A	What would happen to the network if the supporting business, the Glenmorangie Distillery, decided to move the location of their business? Would this require extra funding for the network to continue to run?	05 September 2017	07 September 2017	07 September 2017		Partially
20	EP	N/A	Are there any international commercial or technical examples of networks being built or operated in this way?	05 September 2017	07 September 2017	07 September 2017		N

## Internal Only

21	NC	N/A	Please provide a comparison of the costs of maintaining and using an electric heating system compared to that of installing and using a gas heating system.	05 September 2017	07 September 2017	07 September 2017		N
22	ST	7	Has there been any engagement with the Joint Office or wider industry on some of the arrangements proposed? In particular around the validity of the UNC. How about the IGT UNC?	12 September 2017	14 September 2017	14 September 2017		N
23	EP	N/A	Please provide evidence that the social landlords' energy efficiency targets in Tain have not been met yet?	12 September 2017	14 September 2017	14 September 2017		N
24	EP	3.4	Please provide analysis of the delivered price that you estimate will be achievable for future projects and explain why you	12 September 2017	14 September 2017	14 September 2017		N
25	SB	2.2	Why do you need an LPCO if all appliances in Tain will have a flame failure device?	12 September 2017	14 September 2017	14 September 2017		N
26	EP	8	How do you plan to engage with the community to support them with finding central heating installers, insulation	12 September 2017	14 September 2017	14 September 2017		N
27	NC	9	Given that Project Deliverable one is associated with key areas of learning from the project the proposed level of NIC funding associated with this criteria appears low. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate.	14 September 2017	19 September 2017	19 September 2017		N
28	NC	9	Given that Project Deliverable three is associated with key areas of learning from the project the proposed level of NIC funding associated with this criteria appears low. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate.	14 September 2017	19 September 2017	19 September 2017		Partially
29	NC	9	Given that the building of the network is a BAU activity the level of funding associated with this deliverable appears to be high relative to other deliverables. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate.	14 September 2017	19 September 2017	19 September 2017		Partially
30	NC	9	The learning from the operation of the network itself appears relatively low. Therefore the level of NIC funding associated with deliverable six appears high. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate.	14 September 2017	19 September 2017	19 September 2017		Partially
31	RP	4/ Appendix A	The base case you used to calculate the financial and carbon benefits is based on using a 'SIU approach' to supply LNG. However, this method is not currently used in Tain so does not appear to be a reflective base case for this location as you would be building a new network. i) Please justify the counterfactual used to calculate the financial and carbon benefits. ii) Please set out the costs and benefits, including the cost of conversion, using the base case that there is no network currently in Tain. The methodology used should be consistent with government appraisals and should show the full economic costs of the project irrespective of who will pay for the different elements.	03 October 2017	10 October 2017	10 October 2017	6	N
32	EP	4	a) Please provide evidence of how you have engaged various parties, including the precise commitments they have made and any specific roles they have committed to, including but not exclusively: - Glenmorangie - Local council - Social housing landlords - The public - Scottish Government b) What guarantees do you have on minimum customer take-up in Tain? We would like to see the decision makers from the council and/or housing associations to understand their commitment to the project. c) What evidence do you have of consumer willingness to pay for the new gas connection and gas conversion?	26 September 2017	10 October 2017	10/10/2017 , resubmitted on 18/10/2017 and answered at Second Bilateral on 05/10/17		Partially
33	EP	7	Please provide more detail on how you intend to make the necessary changes to the commercial and regulatory arrangements. This should be clear on Ofgem's expected role, and the expected role of any other regulatory bodies (e.g. HSE).	26 September 2017	10 October 2017	10/10/2017 and answered at Second Bilateral on 05/10/18		N
34	EP	7	Please provide information on how you intend to calculate the relative price cap that you suggest would protect consumers, including the minimum charge necessary to support the network related operating costs.	26 September 2017	10 October 2017	10/10/2017 and answered at Second Bilateral on		N
35	EP	3/ Appendix B	You have estimated a delivered price of 5 3p/kWh in a rollout to other towns with distilleries, and 5 8p/kWh for towns without distilleries. Currently, this is higher than the cost/kWh of heating oil. Please justify how this project will alleviate fuel poverty if there are cheaper heating options and evidence of customer willingness to pay more for gas.	26 September 2017	10 October 2017	10/10/2017 and answered at Second Bilateral on 05/10/20		N
36	EP	2	Please explain what your back-up supply arrangements mean in practice. If tanker supply is cut off (eg a multi-day road closure), under the arrangements you have proposed, how long would back-up supplies last on a 1-in-20 peak demand scenario?	26 September 2017	10 October 2017	10/10/2017 and answered at Second Bilateral on 05/10/21		Partially
37	EP	7	Please provide a work plan for addressing the regulatory issues and the pricing structure. Your answer should clearly outline the work involved to reach the go/no-go decision planned for 2018.	10 October 2017	12 October 2017	12 October 2017		N

*Gas Network Innovation Competition Full Submission*  
**Supplementary Answer Form**

## **Project: Tain Innovative Gas Grid**

Tick if this answer has been provided verbally:

Project code	FPLGDN01/1	Question Number	1
Question date	22.08.17	Answer date	24.08.17
Submission section question relates to	4.1/Appendix A		
Topic	Environmental benefits		
Question	Please provide carbon benefits for the method calculated against the actual energy use of consumers in Tain?		
Notes on question			
Answer	Carbon benefits for Tain shown in the Full Submission have been calculated using our estimates of the energy use of consumers in Tain. The methodology is explained in Appendix D (sections D.1 to D.4).		
Attachments			

Tick if this answer has been provided verbally:

Project code	FPLGDN01/1	Question Number	2
Question date	22.08.17	Answer date	24.08.17
Submission section question relates to	4.1/Appendix A		
Topic	Financial benefits		
Question	Please provide financial benefits for the method calculated against the actual energy use of consumers in Tain? For example, if many households use electricity for heating how much will it cost to install gas central heating?		
Notes on question			
Answer	<p>Financial benefits for the method shown in the Full Submission have been calculated using our estimates of the energy use of consumers in Tain. The methodology is explained in Appendix B (B.1 to B.3).</p> <p>As required by the NIC Governance Document, and confirmed by Ofgem, financial benefits are derived as the difference between Base and Method costs at the scale of the project. The cost of installing central heating would be common to both Base and Method costs and is therefore not relevant to the calculation.</p> <p>For your information, the cost of a gas central heating installation (including radiators) would vary according to the size of the house and other factors, but would typically be of the order of £4000. With estimated savings of over £800 per annum per consumer switching from electricity to gas, this would pay back in approximately 5 years.</p>		
Attachments			

Tick if this answer has been provided verbally:

Project code	FPLGDN01/1	Question Number	3
Question date	22.08.17	Answer date	24.08.17
Submission section question relates to	4.1/Appendix A		
Topic	Network maintenance costs		
Question	What is the future cost of maintenance of the network? Has this been factored into the cost and benefit calculations?		
Notes on question			
Answer	<p>The network will be constructed from MDPE which is a strong, flexible material not subject to corrosion. It will be a fully PE welded system enhancing the integrity of the network. Therefore there are no anticipated maintenance costs for the network.</p> <p>There are two areas of opex envisaged (in addition to those incurred by the shipper and supplier):</p> <ul style="list-style-type: none"> <li>• Opex incurred at the daughter station for the supply logistics process and ongoing maintenance, which we have estimated at around ██████ p.a. in total;</li> <li>• Opex arising from end user calls to the gas emergency service number, e.g for CO alarms and issues with appliances. These costs are not shown explicitly in the submission. They would be absorbed by Fulcrum Pipelines and are factored into the RPC tariff, which we are proposing is used for the transportation component of the delivered gas price.</li> </ul> <p>Both of the above are factored into the benefits calculation as they contribute to the estimated delivered gas price to Tain consumers, which is a key component of the calculation. An illustration of the delivered gas price calculation is shown in Appendix B (B.6) of the Full Submission.</p>		
Attachments			

Tick if this answer has been provided verbally:

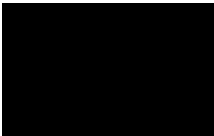

Project code	FPLGDN01/1	Question Number	4
Question date	24.08.17	Answer date	25/08/17
Submission section question relates to	4.1		
Topic	Environmental benefits		
Question	Please explain why supplying gas to a new community, and the potential roll out to create other networks, constitutes decarbonisation? The Scottish Governments target is 50g CO <sub>2</sub> /KWh by 2030 but gas heating typically has 200gCO <sub>2</sub> /KWh so this project would appear to lock in the local network to higher emissions.		
Notes on question			
Answer	<p>In the short-medium term, the supply of gas to consumers in Tain will result in lower carbon emissions than at present. We note in the Full Submission that weighted average emissions consistent with our assumed gas supply profile will be approximately 171 gCO<sub>2</sub>e/kWh in 2020 and reduce thereafter. Many energy consumers in Tain presently use oil and coal, and hence the conversion to gas offers significant carbon savings. Indeed, even with a reducing grid carbon intensity, our analysis identifies the potential for carbon savings every year to 2050.</p> <p>While full conversion to electrical resistance heating (assuming this could be accommodated on the LV network) would offer the potential for significant carbon reductions, it would also increase fuel poverty. Our project supports the achievement of both objectives.</p> <p>In the longer term, the route to decarbonisation of the heat sector is still unclear with options under active investigation including:</p> <ul style="list-style-type: none"> <li>• Biogases</li> <li>• Hydrogen</li> <li>• Electrification</li> </ul> <p>A new standalone gas network can facilitate all of these long-term options. Initially, we plan to include biomethane from local beef farms and from the Glenmorangie distillery as part of the gas mix. The potential for the use of other biogases (e.g. bio-SNG driven by waste or biomass gasification as in the pilot plant in Swindon) will be kept under review as technologies develop. As a new network, the gas grid at Tain will be hydrogen-ready, allowing either the injection of hydrogen into the gas mix or 100%</p>		

	<p>conversion to hydrogen at some point in the future. In relation to electrification, the presence of a gas grid facilitates a multi-vector approach, whereby gas boilers can support the use of heat pumps during peak periods. We therefore believe that the development of standalone networks is fully consistent with a decarbonisation agenda.</p> <p>Finally, we note that in Ofgem’s June 2017 response to the Scottish Government’s “Consultation on a Scottish Energy Strategy: The future of energy in Scotland”, you agreed “that there are potential benefits in encouraging a balanced combination of energy sources that is adaptable to changing market conditions”. Later in the response you note “that there is a need to understand clearly the costs of different technologies before committing to a particular policy or pathway to decarbonisation. These costs will include not only financial costs but also the challenge of public acceptability. For this reason, we support trialling of different options to uncover additional information on costs, benefits and risks.” Standalone gas networks supplied by a variety of sources will be adaptable to changing market conditions as we have described above. And trialling this at Tain will provide learning on the costs, benefits and risks of such an approach.</p>
Attachments	

Tick if this answer has been provided verbally:

Project code	FPLGDN01/1	Question Number	5
Question date	24/08/17	Answer date	25/08/17
Submission section question relates to	3.2		
Topic	Fuel poverty		
Question	The submission states the project alleviates fuel poverty. What is the evidence of existing levels of fuel poverty and how will the project impact will be measured?		
Notes on question			
Answer	<p>Highland Council provided us with a spreadsheet containing information on every house in Tain. This included an assessment for each household of the probability that the household was in fuel poverty. By summing these probabilities we have derived the expected level of fuel poverty in the town, which is 59%.</p> <p>We will work closely with Highland Council and the two housing associations in Tain to establish a mechanism for monitoring the impact of the project on fuel poverty. Our present expectation is that a switch to gas, together with an improvement in insulation, will have an immediate impact on the probabilities mentioned above and therefore allow an assessment of the impact on fuel poverty for the town as a whole. More detailed analysis may be possible but we would expect this to be led by the Council and/or the housing associations and be subject to the co-operation of the householders.</p>		
Attachments			



Project code	FPLGDN01/1	Question Number	6
Question date	29.08.17	Answer date	31.08.17
Submission section question relates to	Section 3.2		
Topic	a) Enviromental and consumer benefits		
Question	"Can the workbooks with detailed calculations of carbon and financial benefits be provided?"		
Notes on question			
Answer	<p>The workbooks containing the detailed calculations of carbon and financial benefits are attached as requested.</p> <p>The carbon benefits can be found in the document 'Environmental benefits - central assumptions.xlsx,' whilst the financial benefits can be found in the document 'Tain cost model - central assumptions.xlsx.'</p>		
Attachments	  <p>Environmental benefits - central as:</p>		



[REDACTED]

Appendix J 'Project Risk Register' identifies a number of whole project risks, many of which are relevant to Tain's reliance on Fordoun and Glenmorangie alongside our mitigation measures.

The overall mitigation strategy for the construction risks is that the TAIN plan is for design work in 2018 with build in 2019. [REDACTED]

[REDACTED]

As described in section 2.1, in the operational phase there are risks of insufficient security of supply (including Fordoun capability/availability); the mitigation is described in the bullet points in that section.

ii) How likely are delays to these projects and how do they effect this project?

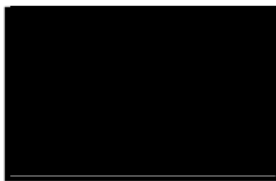
Most of the construction risks facing this project are similar in respect of likelihood with any other construction project of similar scale. Mitigation has been built into the programme through allowing margins on tasks.

[REDACTED]

Attachments

[REDACTED]

Project code	FPLGDN01/1	Question Number	8
Question date	29.08.17	Answer date	31.08.17
Submission section question relates to	Appendix C.4		
Topic	g) Robust methodology/ready to implement		
Question	<p>"What is the state of development of the community campus?</p> <p>i) How have you engaged with the council to understand the likelihood of the campus seeking a gas supply?</p> <p>ii) If the campus does not take up the supply what is the impact on the project? "</p>		
Notes on question			
Answer	<p>In respect of the state of development, we are pleased to report that 'The Minutes of Meeting of the Places Committee held in the Council Chamber, Council Headquarters, Glenurquhart Road, Inverness on Wednesday, 16 August 2017' record the following: <i>"assurance was sought, and received, that £16.28m had been allocated this year to the Tain 3-18 School Campus;"</i>.</p> <p>However, as reported in the local press (<a href="http://www.ross-shirejournal.co.uk/News/Bold-vision-for-new-Tain-super-school-campus-site-24082017.htm">http://www.ross-shirejournal.co.uk/News/Bold-vision-for-new-Tain-super-school-campus-site-24082017.htm</a>), whilst there is near certainty that the campus will be built, its exact location has recently been announced as being subject to a further consultation which could delay the project by two years.</p> <p>i) We are in close dialogue with Eddie Boyd at the Highland Council. Through this engagement, we have shared our plans and have worked constructively in identifying the site's energy requirement. Our understanding is that it is almost certain that natural gas will be chosen as the heating fuel if it is available.</p> <p>ii) The network has been sized to accommodate the gas demand of the proposed campus, however, we would propose this load to be interruptible with gas oil as a standby fuel in order to minimise any impact to security of supply. From initial discussions we believe this is an acceptable option for the council.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	9
Question date	29.08.17	Answer date	31.08.17
Submission section question relates to	N/A		
Topic	g) Robust methodology/ready to implement		
Question	Please can you provide the Memorandum of Understanding (MoU) between Fulcrum and CNG Services?		
Notes on question			
Answer	Please find attached the signed MOU, which was signed through counterparts, as allowed by clause 18.6.		
Attachments			

Project code	FPLGDN01/1	Question Number	10
Question date	29.08.17	Answer date	31.08.17
Submission section question relates to	Multiple		
Topic	Multiple		
Question	<p>Does the technology for a 250 barg pressure reduction system exist?</p> <p>Does further design work need to be done in order to use this technology for a domestic gas system?</p>		
Notes on question			
Answer	<p>Part 1) Pressure reduction technology based on natural gas with an inlet pressure of 250 bar is established for CNG virtual pipelines around the world, with the US being the largest market due to abundance of low cost gas and large geographic area with significant off-grid potential. Development in the US is focused on large I&amp;C customers, companies like NGAdvantage.com and XNG.com (both of whom we have been in touch with) provide this service. Manufacturers of the 250 bar PRS in the EU include cSAFE gas of Italy (<a href="http://www.safegas.it/cabina-di-misurazione/">http://www.safegas.it/cabina-di-misurazione/</a>) and Atlas Copco of Germany (<a href="https://www.atlascopco.com/content/dam/atlas-copco/compressor-technique/gas-and-process/documents/cng-bro-lr.pdf">https://www.atlascopco.com/content/dam/atlas-copco/compressor-technique/gas-and-process/documents/cng-bro-lr.pdf</a>). Such plant complies with EU Directives</p> <p>Part 2) For supply of gas to domestic customers, CSL/Fulcrum believe that the basic SAFE and Atlas Copco designs require additional risk assessment and may need some modifications (eg additional instrumentation) to provide the necessary reliability for domestic customer service (the main market at present is off grid industrials which generally accept a lower level of reliability due to option of using oil as back-up fuel). As part of HSE assurance given domestic customer supply, CSL and Fulcrum believe that an IGEM standard is both necessary and appropriate.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	11
Question date	30.08.17	Answer date	05.09.17
Submission section question relates to	Page 36 of submission		
Topic	a) N/A		
Question	In your submission (page 36) you say that there is no prospect of competition in supply on the proposed gas network in Tain. As either a licenced Gas Transporter or a licence exempt network operator, how would you discharge your duties under either Section 9 of the Gas Act or Article 32 of the Gas Directive respectively?		
Notes on question			
Answer	<p>The Tain Gas Transporter can facilitate competition by allowing any Supplier to supply any premise. However, a Gas Transporter cannot overcome the reality that, as explained in Section 7 of our Submission, there can be no effective supply competition since there will be a single body that injects gas at Tain and can decide to whom to sell that gas. If Suppliers cannot access gas, they cannot compete. There will be a de-facto monopoly controlling the gas entering the network and we do not want to hide this and do not want to pretend that, despite being facilitated, supply competition can provide consumer protection.</p> <p>We understand that there is no supply competition on the LPG networks operated by SGN and WWU. We presume that the acceptance of these networks is a precedent for accepting that the proposed Tain arrangements satisfy the legislative requirements.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	12
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	Section 7.		
Topic	N/A		
Question	<p>You describe various approaches to dealing with security of supply and management of peak demand that do not include the construction of local storage. However, you state later in your submission (on page 25) that the additional cost of storage would be £0.5m over and above your existing measures. This seems relatively cost-effective. Please provide analysis to show how the other options have been determined to be more cost effective than this storage solution. Please also provide any other information on why traditional storage was ruled out.</p>		
Notes on question			
Answer	<p>We believe that the uninterrupted power supplies and back-up diesel generators (at Fordoun and Glenmorangie) would be required given the supply to domestic consumers even if we had more storage.</p> <p>The other measures for managing peak demand proposed in our submission are very cost effective:</p> <ul style="list-style-type: none"> <li>- Glenmorangie distillery is interruptible, which reduces the level of storage required considerably. We estimate the cost of storage to replace this facility would be c. [REDACTED], in addition to the £0.5m quoted in the submission (which made a comparison with the SIU level of storage but assumed Glenmorangie was interrupted).</li> <li>- Access to the Glenmorangie PRS will be available on an emergency basis since Glenmorangie distillery will be interruptible.</li> <li>- We will only incur a cost in relation to the Leyland CNG filling station if and when we use it. This is also the case for the emergency pressure reduction station.</li> <li>- We will be actively promoting energy efficiency measures alongside the gas connection, hence helping to manage gas demand down.</li> <li>- Sub-daily data will be available from all consumers allowing us to build up an accurate gas demand picture.</li> </ul> <p>In total, we estimate that these measures will incur a small amount of opex, of the order of [REDACTED] per annum.</p> <ul style="list-style-type: none"> <li>- The spare 7-tonne trailer (to be kept near the daughter station) will cost around [REDACTED], which is comparable with the cost of low pressure</li> </ul>		



	<p>storage. However, the trailer solution provides greater flexibility since it could be refilled from a choice of CNG filling stations.</p> <p>A further consideration in relation to traditional storage is that there are space constraints around the daughter station site, which would have to be overcome if we wanted to install low pressure storage.</p>
Attachments	

Project code	FPLGDN01/1	Question Number	13
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	Sections 1 & 4.		
Topic	g) Robust methodology/ready to implement		
Question	Against a backdrop of declining gas use nationally can you please outline why you believe the creation of additional gas network capacity (page 20) is a benefit of this project.		
Notes on question			
Answer	<p>We have quantified network capacity benefits as required by NIC rules. In cases where gas demand is reducing, we agree that the creation of additional capacity may not be a real benefit. However, in this case we will be creating capacity for Tain where there is a demand for gas but no present means of supply.</p> <p>While not quantified in Tain's network capacity benefits, it is also worth noting that the new NTS block valve at Fordoun, which will first supply Glenmorangie, will also provide capacity benefits for future standalone networks and [REDACTED].</p>		
Attachments			


Project code	FPLGDN01/1	Question Number	14
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	N/A		
Topic	Multiple		
Question	Have any alternatives to a gas grid connection been considered or modelled for the community, in terms of both social and environmental benefits, such as heat pumps or district heating? Please provide analysis that shows a gas grid to be the best option.		
Notes on question			
Answer	<p>We have contacted Highland Council, and have asked if they are aware of any projects that involve district heating or heat-pumps in off-grid towns; the response has been that they are unaware of any such projects taking place or any at the feasibility study stage being actively considered.</p> <p>The absence of any feasibility work in relation to an electricity-only solution makes a detailed financial comparison difficult, particularly without knowing the potential electricity network reinforcement cost (which we could not get from SSE without a funded study). In any case, heat pumps may not be able to fulfil the whole heating requirement, particularly in cold temperatures and given the nature of the housing stock in Tain. The availability of a gas grid offers a multi-vector solution at some point in the future, with gas topping up the heat from heat pumps when required.</p> <p>In relation to district heating, we estimate the infrastructure cost associated to be of the order of £500 per metre for heat pipe, which compares with █████ per metre for our proposed feeder main, and █████ per metre for other LP mains.</p> <p>We have also spoken to █████, who have completed feasibility work for Glenmorangie; they have looked at the supply of low-grade heat from the distillery to the town, but concluded that it was not economic. They believe that district heating around the planned Community Centre could be a viable option, but without gas fuelling this is very difficult (they had not identified a viable alternative fuel source for such CHP). They say that bringing CNG to Tain does offer a good opportunity to run a district heating project around the Community Campus and new housing and we would be pleased to support such a development if this emerges as a preferred option once the Community Campus reaches a more detailed planning stage.</p> <p>In summary, the gas grid provides a route for the town's energy supply to be</p>		

	decarbonised over time while meeting the peak capacity requirements, and to do this in a way that helps to alleviate fuel poverty.
Attachments	

Project code	FPLGDN01/1	Question Number	15
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	Section 4.		
Topic	d) Is innovative		
Question	Please demonstrate how this project is technically innovative.		
Notes on question			
Answer	<p>As set out on pages 24 to 26 of the submitted report, the project is innovative in a number of areas. The key innovation is the idea of delivering gas by road in the form of CNG and using a variety of measures, including distillery interruption, to support security of supply rather than installing physical storage assets.</p> <p>The main technical innovations relate to the use of a 250 barg PRS and LPCO equipment – neither of which has previously been used in Great Britain for supply to domestic consumers - facilitated by the development of new IGEM standards and safety case changes.</p> <p>There are limited examples of similar networks overseas, as per our answer to question 20.</p> <p>As we explain in section 6.6, this project will adapt and integrate products that are in use elsewhere but have not been deployed in the operational environment in GB that is envisaged at Tain. The project aims to provide a full-scale demonstration in a working environment to test and improve these technologies, and also to put in place the associated frameworks, so that they will be ready for commercial deployment on standalone networks elsewhere in GB. We therefore conclude that the project has Technology Readiness Level (TRL) 7 now and will be TRL 9 when completed.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	16
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	N/A		
Topic	Multiple		
Question	<p>i) How much will it cost consumers to connect to the new network and convert their house to gas?</p> <p>ii) Is there evidence of consumer willingness and ability to pay for the new gas connection and gas conversion, particularly for the fuel poor and/or owner-occupiers?</p>		
Notes on question			
Answer	<p>i) In the costings, we assumed a contribution to Fulcrum of █████ per privately-owned house. The cost of a gas central heating installation (including radiators) would vary according to the size of the house and other factors, but would typically be of the order of £4000. N.B. for social housing, where the landlord is either Highland Council or one of the housing societies, we assumed a capital contribution of █████ per house in our central case, which would fully cover the cost of the connection and make a contribution to the cost of the LP mains.</p> <p>ii) There is currently a significant focus on fuel poverty in Scotland, and as such there are significant funds available to support vulnerable consumers with these costs, along with energy efficiency measures such as house insulation. This detail is covered in Appendix L of the submission. The focus of our initial development is in the area of the town in which the social houses are concentrated, and we have had strong support from Highland Council and Albyn Housing Society for our proposals.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	17
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	N/A		
Topic	Multiple		
Question	<p>i) Please provide a comparison of the costs of accessing and using a gas connection to that of installing oil-fired heating.</p> <p>ii) How many oil-fired households are there in Tain? Would there be any additional benefits for these households if they switched from oil to gas?</p>		
Notes on question			
Answer	<p>i) For a property that's not currently on oil, we estimate similar conversion costs as if converting to gas central heating. From the 'Tain cost model - central assumptions' document, sent in response to Question 6, there is only a small financial saving at present from oil to gas switching due to the low oil price, however the Council and Housing Societies prefer gas due to lower GHG emissions and better amenity value.</p> <p>ii) From the information that has been received, we have used the following numbers of households in the document 'Environmental benefits – central assumptions,' provided as an answer to question 6: Registered Social Landlords Oil: 131, Private Oil: 253. This leads to a total of 384 households using oil heating. In terms of the benefits of conversion, there are limited financial savings at present, but there are carbon savings and amenity benefits. Fuel oil produces an estimated 317 gCO<sub>2</sub>e/kWh whilst we estimate that the gas delivered to Tain will produce 171 gCO<sub>2</sub>e/kWh in 2020, reducing over time to around 120 gCO<sub>2</sub>e/kWh. The risk of spillage is also removed, as is the need for oil delivery by tanker. Gas is likely to be lower maintenance due to the flues being less sooty than oil. There tends to be an issue as to where to fit an oil tank when converting to oil; such an issue doesn't occur with a conversion to gas.</p>		
Attachments			

Project code	FPLGDN01/1		Question Number	18
Question date	05.09.17		Answer date	07.09.17
Submission section question relates to	N/A			
Topic	g) Robust methodology/ready to implement			
Question	What is the minimum number of connections required to make this project viable?			
Notes on question				
Answer	 <p data-bbox="284 1317 1318 1424">Glenmorangie are supportive of the project and it is their support that helps to underpin the business case (e.g. providing the site for the daughter station).</p>			
Attachments				



Project code	FPLGDN01/1	Question Number	19
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	N/A		
Topic	g) Robust methodology/ready to implement		
Question	What would happen to the network if the supporting business, the Glenmorangie Distillery, decided to move the location of their business? Would this require extra funding for the network to continue to run?		
Notes on question			
Answer	<p>If Glenmorangie was no longer located near Tain, having moved elsewhere near the gas grid, this would impact the economics of the project. However, the extent of the impact would depend on the success of the rest of the Fordoun/Lybster project and progress with other CNG stations in the highlands [REDACTED]</p> <p>It should be noted that Glenmorangie is one of the world's premium whisky brands, for example sponsoring The British Open Golf Championship. Glenmorangie are very much linked to Tain - they have just spent [REDACTED] on a water treatment plant. We therefore consider it very unlikely that the distillery will relocate from the sources of water and local barley that makes the whisky and are an integral part of the brand.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	20
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	N/A		
Topic	Multiple		
Question	Are there any international commercial or technical examples of networks being built or operated in this way?		
Notes on question			
Answer	<p>There is a new project in Australia that supplies CNG by road to communities across rural Victoria. They aim to supply a total of 11 towns, with 7 towns currently in operation and the remainder to be commissioned within the next six months. Having been in contact, it is understood that Tain looks about the same size as some of their larger towns, one of which has a CNG Station and natural gas network.</p> <p>Details of the Victoria project are here:</p> <p><a href="http://www.esc.vic.gov.au/wp-content/uploads/2016/11/Brookfield-Regional-Networks-Victoria-Pty-Ltd-Gas-Distribution-Licence-Application.pdf">http://www.esc.vic.gov.au/wp-content/uploads/2016/11/Brookfield-Regional-Networks-Victoria-Pty-Ltd-Gas-Distribution-Licence-Application.pdf</a></p> <p>A company, Naturelgaz, operate CNG virtual pipelines in Turkey including one that takes gas out of a 70 barg grid to supply gas to around 30 Tea factories for drying, run by companies such as Liptons (Unilever). Naturelgaz say that the supply of CNG to off grid towns is now happening in Turkey and they have said they can supply more information, which has been requested but not yet received.</p> <p>There is a further project currently out to tender in South Africa. We are also aware that similar projects are being looked at in the US, although we have not identified a domestic customer supply project that has gone ahead.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	21
Question date	05.09.17	Answer date	07.09.17
Submission section question relates to	N/A		
Topic	Multiple		
Question	Please provide a comparison of the costs of maintaining and using an electric heating system compared to that of installing and using a gas heating system.		
Notes on question			
Answer	We have assumed that this means resistive heating. The capital cost of such an installation would be around £2,000 vs around £4,000 for gas central heating. Maintenance costs would be low and similar in each case. The running cost, however, would be much higher for electricity. For example, at 15,000 kWh per year, the gas bill (at 5p/kWh) would be around £750 per annum, while electricity, at 11.4p/kWh, would be around £1,700 per annum.		
Attachments			

Project code	FPLGDN01/1	Question Number	22
Question date	12.09.17	Answer date	14.09.17
Submission section question relates to	7		
Topic	g) Robust methodology/ready to implement		
Question	Has there been any engagement with the Joint Office or wider industry on some of the arrangements proposed? In particular around the validity of the UNC. How about the IGT UNC?		
Notes on question			
Answer	Rather than the Joint Office or wider industry, we have engaged with Ofgem over an extended period about the appropriate regulatory arrangements for a standalone network. Our proposal is to involve others when the high level structure has been established, which we anticipate being embodied in licence requirements.		
Attachments			

Project code	FPLGDN01/1	Question Number	23																																																							
Question date	12.09.17	Answer date	14.09.17																																																							
Submission section question relates to	N/A																																																									
Topic	a) Enviro+consumer bens																																																									
Question	Please provide evidence that the social landlords' energy efficiency targets in Tain have not been met yet																																																									
Notes on question	Asked by Trisha McAuley at the Expert Panel meeting on 8 <sup>th</sup> September																																																									
Answer	<p>Highland Council provided us with a spreadsheet containing data on every house in Tain. This included predictions relating to the insulation of each house. The tables below, drawn from the Council's data-set, demonstrate that there is still work to be done to improve the energy efficiency of the social housing stock. We expect that our project will support the achievement of the social landlords' environmental targets as it will provide a catalyst for improving insulation in houses that convert to gas.</p> <p><b>Predicted number of houses with/without wall insulation by construction type</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Construction</th> <th colspan="2">Local Authority</th> <th colspan="2">Housing Association</th> </tr> <tr> <th>Insulated</th> <th>Uninsulated</th> <th>Insulated</th> <th>Uninsulated</th> </tr> </thead> <tbody> <tr> <td>Cavity</td> <td>28</td> <td>10</td> <td>20</td> <td>51</td> </tr> <tr> <td>Solid wall/stone</td> <td>21</td> <td>83</td> <td>7</td> <td>24</td> </tr> <tr> <td>System built</td> <td>5</td> <td>169</td> <td>2</td> <td>47</td> </tr> <tr> <td>Timber frame</td> <td>0</td> <td>14</td> <td>3</td> <td>3</td> </tr> <tr> <td>Total</td> <td>54</td> <td>276</td> <td>32</td> <td>125</td> </tr> </tbody> </table> <p><b>Predicted number of houses with various levels of loft insulation</b></p> <table border="1"> <thead> <tr> <th>Extent of insulation</th> <th>Local Authority</th> <th>Housing Association</th> </tr> </thead> <tbody> <tr> <td>0-50mm</td> <td>5</td> <td>8</td> </tr> <tr> <td>51-100mm</td> <td>32</td> <td>27</td> </tr> <tr> <td>101-150mm</td> <td>34</td> <td>8</td> </tr> <tr> <td>151-200mm</td> <td>137</td> <td>39</td> </tr> <tr> <td>201mm+</td> <td>78</td> <td>52</td> </tr> <tr> <td>Room in roof/no loft</td> <td>44</td> <td>23</td> </tr> </tbody> </table>			Construction	Local Authority		Housing Association		Insulated	Uninsulated	Insulated	Uninsulated	Cavity	28	10	20	51	Solid wall/stone	21	83	7	24	System built	5	169	2	47	Timber frame	0	14	3	3	Total	54	276	32	125	Extent of insulation	Local Authority	Housing Association	0-50mm	5	8	51-100mm	32	27	101-150mm	34	8	151-200mm	137	39	201mm+	78	52	Room in roof/no loft	44	23
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Project code	FPLGDN01/1	Question Number	24																									
Question date	12.09.17	Answer date	14.09.17																									
Submission section question relates to	3.4																											
Topic	Delivered prices																											
Question	Please provide analysis of the delivered price that you estimate will be achievable for future projects and explain why you won't require the equivalent of a £2m subsidy in future.																											
Notes on question	Asked by Sean Sutcliffe at the Expert Panel meeting on 8 <sup>th</sup> September																											
Answer	<p>The table below outlines the delivered prices that we believe would be achievable at Tain and in subsequent projects. The analysis underpinning this table is summarised in Appendix B of the Full Submission.</p> <p>The estimated impact of the £2.14m requested from the NIC would be to achieve a 4.9p/kWh domestic consumer delivered price (including VAT at 5%). Without this it would be around 6.6p/kWh.</p> <p>Without one-off costs and with efficiency savings we have estimated a delivered price of 5.3p/kWh in a roll-out to other towns with distilleries, and 5.8p/kWh for towns without distilleries. Even this higher price would still be very competitive against electricity, and amenity benefits may make gas attractive against oil at this price for some customers, particularly as the delivered oil price will be more sensitive to wholesale price movements. The amenity value of gas compared with oil comes from a combination of lower maintenances costs, no need for storage, no risk of spillage, no need for re-ordering, and the potential to cook with gas.</p> <p>It is possible that other sources of funding will be available during roll-out projects to bring the price down further, but this is not something that we are relying on.</p> <p><b>Estimated delivered prices – all prices in p/kWh, including VAT</b></p> <table border="1"> <thead> <tr> <th></th> <th>Tain Project</th> <th>Method</th> <th>Distillery roll-out</th> <th>Non-distillery roll-out</th> </tr> </thead> <tbody> <tr> <td>Target price</td> <td>4.9</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Without NIC subsidy</td> <td>6.6</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Less one-offs &amp; efficiencies</td> <td></td> <td>5.9</td> <td></td> <td></td> </tr> <tr> <td>Further roll-out efficiencies</td> <td></td> <td></td> <td>5.3</td> <td></td> </tr> </tbody> </table>				Tain Project	Method	Distillery roll-out	Non-distillery roll-out	Target price	4.9				Without NIC subsidy	6.6				Less one-offs & efficiencies		5.9			Further roll-out efficiencies			5.3	
	Tain Project	Method	Distillery roll-out	Non-distillery roll-out																								
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Without distillery benefit				5.8		
Attachments						

Project code	FPLGDN01/1	Question Number	25
Question date	12.09.17	Answer date	14.09.17
Submission section question relates to	2.2		
Topic	g) Robust methodology/ready to implement		
Question	Why do you need an LPCO if all appliances in Tain will have a flame failure device?		
Notes on question	Asked by Steve Brown at the Expert Panel meeting on 8 <sup>th</sup> September		
Answer	<p>Flame failure devices (FFDs) are designed for the specific purpose of ensuring that if a flame goes out on an individual burner, it will close the gas valve to the burner in question. We do not believe that they should be relied upon for restoration purposes and doubt that the HSE would accept any Safety Case proposal containing such a suggestion.</p> <p>As we noted in the Full Submission, Manx Gas (the Isle of Man gas transporter) use LPCO devices, and because their network is closer to ours in scale and operational principles, we approached them for information on their experiences. This led to the proposed approach to downstream supply restoration within our submission.</p> <p>We understand that when DNV GL completed a risk assessment for Manx Gas, they did not use reliance on the FFD in their risk calculations. Instead, they utilised the fact that all customers would have an LPCO as the protection under restored supplies.</p> <p>The cost of the LPCO is small (less than £0.2 per customer) but it provides additional safety assurance for standalone networks such as Isle of Man and Tain. Our proposal to introduce an IGEM standard increases safety further.</p>		
Attachments			



Project code	FPLGDN01/1	Question Number	26
Question date	12.09.17	Answer date	14.09.17
Submission section question relates to	8		
Topic	g) Robust methodology/ready to implement		
Question	How do you plan to engage with the community to support them with finding central heating installers, insulation installers and access to finance?		
Notes on question	Asked by Trisha McAuley at the Expert Panel meeting on 8 <sup>th</sup> September		
Answer	<p>The fact that we will be providing a new gas supply to Tain gives us the opportunity to undertake a prolonged and multi-faceted engagement process with the community. We will therefore use a variety of engagement methods, including a project website, newsletters delivered to all residents and Town Hall meetings. The material provided through these communication mechanisms will (amongst other things) contain information about the topics highlighted in the question.</p> <p>In addition, we intend to invite installers and representatives of the main funding agencies to the Town Hall meetings so that potential customers will have easy and direct access to the support that they are likely to need. Residents will also be able to contact us if they need further information.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	27
Question date	14.09.17	Answer date	18.09.17
Submission section question relates to	9		
Topic	g) Robust methodology/ready to implement		
Question	Given that Project Deliverable one is associated with key areas of learning from the project the proposed level of NIC funding associated with this criteria appears low. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate.		
Notes on question			
Answer	<p>We did not interpret the guidance to mean that we should propose percentages of NIC funding in section 9 proportionate to the level of learning associated with each deliverable. Indeed, we wouldn't know how to assess that in any objective way.</p> <p>Instead, the proposed percentages of NIC funding were based on the estimated costs of the activities associated with the respective deliverables.</p> <p>In summary, our estimate of costs associated with deliverable one were as follows:</p> <ul style="list-style-type: none"> <li>- Establish regulatory and commercial framework (£78k)</li> <li>- Establish safety case changes (£82K)</li> </ul> <p>The sum of the above (£160K) equates to 7.4% of the total level of NIC funding requested. The proposal that 8% of NIC funding is attributed to this deliverable allows for a share of general project costs to be included.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	28
Question date	14.09.17	Answer date	18.09.17
Submission section question relates to	9		
Topic	g) Robust methodology/ready to implement		
Question	Given that Project Deliverable three is associated with key areas of learning from the project the proposed level of NIC funding associated with this criteria appears low. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate.		
Notes on question			
Answer	<p>We did not interpret the guidance to mean that we should propose percentages of NIC funding in section 9 proportionate to the level of learning associated with each deliverable. Indeed, we wouldn't know how to assess that in any objective way.</p> <p>Instead, the proposed percentages of NIC funding were based on the estimated costs of the activities associated with the respective deliverables.</p> <p>In summary, our estimate of costs associated with deliverable three were as follows:</p> <ul style="list-style-type: none"> <li>- IGEN's costs for development of two technical standards [REDACTED]</li> <li>- CNG Services costs associated with the development of the technical standards [REDACTED]</li> </ul> <p>The sum of the above (£88K) is 4% of the funding sought from the NIC.</p>		
Attachments			



Project code	FPLGDN01/1	Question Number	30
Question date	14.09.17	Answer date	18.09.17
Submission section question relates to	9		
Topic	g) Robust methodology/ready to implement		
Question	<p>The learning from the operation of the network itself appears relatively low. Therefore the level of NIC funding associated with deliverable six appears high. Please provide a justification that the proposed percentage of funding associated with this deliverable is appropriate.</p>		
Notes on question			
Answer	<p>We did not interpret the guidance to mean that we should propose percentages of NIC funding in section 9 proportionate to the level of learning associated with each deliverable. Indeed, we wouldn't know how to assess that in any objective way.</p> <p>Instead, the proposed percentages of NIC funding were based on the estimated costs of the activities associated with the respective deliverables.</p> <p> <span style="background-color: black; color: black;">██</span>  <span style="background-color: black; color: black;">██</span>  <span style="background-color: black; color: black;">██</span>  <span style="background-color: black; color: black;">██</span>  <span style="background-color: black; color: black;">██</span> </p> <p>The proposal that 22% of NIC funding is attributed to this deliverable allows for a share of general project costs to be included.</p>		
Attachments			

Project code	FPLGDN01/1	Question Number	31
Question date	03.10.17	Answer date	10.10.17
Submission section question relates to	4/Appendix A		
Topic	a) Enviro+consumer benefits		
Question	<p>The base case you used to calculate the financial and carbon benefits is based on using a 'SIU approach' to supply LNG. However, this method is not currently used in Tain so does not appear to be a reflective base case for this location as you would be building a new network.</p> <p>i) Please justify the counterfactual used to calculate the financial and carbon benefits.</p> <p>ii) Please set out the costs and benefits, including the cost of conversion, using the base case that there is no network currently in Tain. The methodology used should be consistent with government appraisals and should show the full economic costs of the project irrespective of who will pay for the different elements.</p>		
Notes on question			
Answer	<p>i) We did not use the same Base Case for the financial and carbon benefit calculations. For the carbon benefits, the counter-factual was that consumers continued to use their present fuels. We took account of forecast changes in grid carbon intensity over the period to 2050 in analysing the carbon emissions associated with this counter-factual. We understand that the NIC Guidance document allows us to calculate carbon savings in the way that we think is most appropriate, and we believe that a counter-factual based on customers' present fuels is the most appropriate approach.</p> <p>For the calculation of financial benefits we followed the approach set out in the NIC Governance and Guidance documents. We checked the appropriateness of this approach with Ofgem by email because it seemed to us that an approach based on financial benefits to Tain consumers would be more reflective of the true value of the project than an approach in which our Method is compared with a Base Case, as defined in the NIC documentation. You responded on 6<sup>th</sup> July to explain that the approach prescribed in the NIC Governance document must be followed, noting that "all network customers fund Gas NIC projects, not just the potential customers in Tain".</p> <p>To follow the prescribed approach we had to establish a Base Case, which we interpreted as the most economic method in use <i>on the GB transportation system</i> [our italics] to supply an off-grid settlement with</p>		

natural gas. The implication of the question is that the Base Case should be the most economic method presently in use *in Tain* of (presumably) delivering energy to consumers. We do not agree that this interpretation is consistent with NIC rules, notwithstanding the fact that it seems a sensible approach to the calculation of financial benefits.

Our assessment was that the Base Case was either a physical connection to the integrated network or an SIU-style approach of LNG delivery. At the time of writing the full submission, the best information that we had available suggested that an SIU approach was the most economic of the two alternatives. This therefore formed our Base Case. That assessment is set out in Appendix B (pp. 46-47) of the full submission document.

Since the full submission, we have received updated estimates from SGN of the cost of reinforcing their network and laying a connecting pipeline to Tain. The reinforcement costs quoted by SGN are unfortunately just the chargeable element and we suspect that the full cost is appreciably higher. We are therefore unable to revise the analysis that led to our choice of base case in a reliable way. Furthermore, the information provided by SGN quotes an indicative timescale for the reinforcement of 5½ years, which casts doubt over the suitability of a physical connection as a base case in any event.

We should also consider that the chosen Base Case is used in the financial analysis of the roll-out, both at the scale of Network Licensee and at GB scale. In relation to the former, while Tain is 20 km from the integrated gas network, the average distance of the target towns from the integrated gas network is 45 km, with some of those targets having the added complication of being on islands.

For all of these reasons, we are satisfied that an SIU-style approach remains the appropriate choice of Base Case.

ii) In the time available we have had to make a number of simplifying assumptions in order to compare the costs and benefits associated with the proposed method and the counter-factual that consumers continue to use their present fuel:

- That a conversion from oil to gas would be financially neutral. The present oil price is very similar to our target gas prices on an efficiency-adjusted basis. Additional factors are the cost of converting heating systems, on one hand, and the fact that many existing oil systems are near the point when they will need to be replaced, on the other. In addition, gas has an amenity value over oil.
- That the present fuel split at the roll-out towns, the make-up of the houses that convert and the average household energy consumption are the same as at Tain.
- That existing heating systems are halfway through a 20 year life-time, and would therefore need to be replaced in 10 years' time (4 storage heaters at a cost of £700 each = £2800), and again in 30 years' time.
- That conversion to gas would cost £4000 per house, and that replacement of the new system would be required 20 years later at a cost of £2870.
- That prices remain at current levels in real terms to 2050. Projections from the Committee on Climate Change suggest that electricity prices

	<p>are likely to rise by more than gas prices. This assumption is therefore likely to understate project benefits.</p> <ul style="list-style-type: none"> <li>- Finally, our analysis is of domestic consumers only. We anticipate that the majority of I&amp;C consumers who convert to gas will use oil at present, but it is possible that some will use electricity. This assumption is therefore also likely to understate project benefits.</li> </ul> <p>Using these assumptions applied to our central initial customer take-up case, we estimate that the NPC of the counterfactual at Tain to 2050 (comprising the cost of electricity and the cost of replacing heating systems) would be approximately £10.7m. The equivalent NPC of the project (comprising the cost of gas – at the Method price – and the cost of conversions and subsequent system replacements) would be approximately £7.4m, leading to a benefit of approximately £3.3m. This equates to approximately £9500 per electricity consumer that converts to gas.</p> <p>Extending this to Network Licensee scale and GB scale, using the same scaling factors as in the full submission, gives the following estimates:</p> <p>Network Licensee scale: counter-factual cost = £85.4m; method cost = £56.0m, hence benefit = £29.4m</p> <p>GB scale: counter-factual cost = £168.8m; method cost = £112,2m, hence benefit = £56.6m</p>
Attachments	



Project code	FPLGDN01/1	Question Number	32 (Big 1)
Question date	27.09.17	Answer date	Revised on 18.10.17
Submission section question relates to	4 e)		
Topic	External stakeholders		
Question	<p>a) Please provide evidence of how you have engaged various parties, including the precise commitments they have made and any specific roles they have committed to, including but not exclusively:</p> <ul style="list-style-type: none"> <li>- Glenmorangie</li> <li>- Local council</li> <li>- Social housing landlords</li> <li>- The public</li> <li>- Scottish Government</li> </ul> <p>b) What guarantees do you have on minimum customer take-up in Tain? We would like to see the decision makers from the council and/or housing associations to understand their commitment to the project.</p> <p>c) What evidence do you have of consumer willingness to pay for the new gas connection and gas conversion?</p>		
Notes on question			
Answer	<p>a)</p> <p><u>Glenmorangie</u></p> <p>Glenmorangie are very supportive of this project, having originally suggested the idea of taking CNG to Tain to CNG Services. [REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>“ we are in advanced discussion with Air Liquide and CNG Services Ltd in relation to converting the boiler to dual fuel and using CNG brought to the distillery from Fordoun, Lybster and local beef farms.</p> <p>As part of discussions on that project, we asked CNG Services to investigate the feasibility of providing the benefit of gas supply, facilitated by our own requirement, to the town of Tain. We are delighted that this has led directly to the Fulcrum Tain Innovative Gas Network Project NIC bid.</p> <p>We are supportive of the project’s aim to reduce fuel poverty in Tain and also reduce the carbon footprint of energy supply to the town. “</p> <p><u>Highland Council</u></p>		

[REDACTED]

Highland Council is interested in and excited by our project and keen to work closely with us "to ensure that it can determine and deliver a project that will bring all the expected value and environmental improvements needed to meet the emerging policy requirements". In this context, they have encouraged us to consider how the introduction of biogases and hydrogen could be accelerated in our plans. We have agreed to work together over the coming months to analyse the project [REDACTED]

[REDACTED] The Council have confirmed that this should be achievable in a timescale consistent with our project plan which has a go/no-go decision on the basis of customer take-up in Q3 2018.

The Council's letter of support is attached for reference.

### Albyn Housing Society

" Albyn Housing Society is very excited to support this innovative project to provide a gas supply to Tain. We have circa 135 properties in Tain which will require their heating upgraded over the next 3-4 years. The opportunity to connect into an affordable gas supply will support both our energy efficiency strategy and most importantly support our fuel poverty agenda. "

We wouldn't expect Albyn to commit to a particular level of take-up or funding until we have NIC funding and the gas price has been tied down, but the above quote demonstrates why we are very confident that they will want to convert the bulk of their houses to gas if the project goes ahead.

### Scottish Government

The Scottish Government (through their Home Energy Efficiency Programmes (HEEPS) Area Based Schemes) are aware of our project and stand ready to engage with Highland Council if the Council advises them that this is their preferred option. The availability of funding for costs downstream of the meter (e.g. via HEEPS) is greater in Scotland than elsewhere in Great Britain.

### Highlands & Islands Enterprise (HIE)

" I write with regards to your plans to introduce compressed natural gas (CNG) to Tain. We are aware of a number of businesses in Tain and Easter Ross that would benefit from a greater choice of fuel supply and to that end we would welcome the safe and viable provision of CNG to Tain for its contribution to providing options to local business might reduce their costs and improve their carbon footprint.

If, as a result of this provision, local households can also access to CNG to their benefit, in terms of contributing to mitigating fuel poverty and/or improving their carbon footprint, we would also welcome this position to the local community."

HIE are highly supportive of the project. They plan to meet the political leader of Highland Council on 11<sup>th</sup> October 2017 to explain the benefits of the project to her and garner her support.

b) Commitment to specific levels of take-up and funding contributions from the Council and the housing societies would follow their formal decision-making processes next year. Highland Council have contributed substantial sums towards networks elsewhere in their area to ensure the delivery of gas heating, replacing other fuels, e.g. the Muir of Ord infill (700+households) and Culloden in Inverness.

[REDACTED]

As noted above, significant sources of 'downstream of the gas meter' funding would be available, as would interest free loans to support customers with conversion costs and grants for vulnerable customers.

We didn't interpret your interest in seeing "the decision makers from the council and/or housing associations to understand their commitment to the project" as a request for us to bring them to the bilateral meeting on 5<sup>th</sup> October. We would be very pleased to arrange introductions for you, e.g. to the Leader of the Highland Council and/or their Director of Development & Infrastructure if you would like us to.

c) Our primary focus on the social housing stock means that we are not too reliant on the willingness to pay of individual consumers. However, a number of factors give us confidence that willingness to pay would be high:

[REDACTED]

- Very significant potential price savings for electricity consumers (58% of the town) with electricity prices forecast to rise
- The availability of grants for vulnerable customers
- Experience of gas connection projects elsewhere in GB, e.g. domestic connections associated with Fulcrum's TICK pipeline project in Speyside
- Amenity benefits of gas over oil – see our response to Big Question 4

Attachments



Letter from Highland Council, 18.10.17.pdf

Project code	FPLGDN01/1	Question Number	33 (Big 2)
Question date	27.09.17	Answer date	10.10.17
Submission section question relates to	Section 7		
Topic			
Question	Please provide more detail on how you intend to make the necessary changes to the commercial and regulatory arrangements. This should be clear on Ofgem's expected role, and the expected role of any other regulatory bodies (e.g. HSE).		
Notes on question			
Answer	<p>For Tain, we do not believe effective competition is practical. We have therefore proposed that bespoke arrangements be put in place rather than trying to make changes to the existing arrangements in order to accommodate the specific features of an independent network, such as Tain. In particular, this would mean that none of the existing arrangements embodied in the Uniform Network Code would apply, with independent networks sitting outside the usual commercial arrangements. For this to be possible, Ofgem would need to agree that a range of standard licence conditions should not apply to an independent network, potentially creating a new class of GT Licence in effect.</p> <p>In addition to establishing appropriate licence conditions, Ofgem would have the role that exists for all networks with regard to various elements of the commercial and regulatory regime, including the network code and associated network charging methodologies.</p> <p>Our programme plan includes the establishment of regulatory and commercial principles in Q1 2018, with the detailed arrangements developed by July 2018. We cannot dictate the process that Ofgem would wish to undertake before proposing the licence conditions that should and should not apply. However, we anticipate engaging with Ofgem on the substance of the issues early in 2018, and contributing to the development work to the extent that Ofgem would like us to. For example, if Ofgem wish us to, we would be happy to make proposals in relation to regulatory principles and to produce drafts of the necessary documentation for discussion with them. Establishing these arrangements is a critical path activity for the project, and the subject of a go/no-go decision point, so we are fully committed to supporting this process.</p> <p>The HSE's involvement will be: a) to consider our proposals for GS(M)R Safety Case provisions for the mother station at Fordoun, the daughter</p>		

	<p>station at Tain, and the low pressure network (enabling working practices that make full use of the Low Pressure Cut-Off Devices), and; b) to act as a consultee in our application to the local authority for Hazardous Substances Consent at the daughter station. We will follow well-established processes with the HSE in order to obtain their acceptance of the Safety Cases and to obtain the HSC from the local authority. Initial discussions have taken place with the HSE so they are aware of the project and our plans.</p>
Attachments	

Project code	FPLGDN01/1	Question Number	34 (Big 3)
Question date	27.09.17	Answer date	10.10.17
Submission section question relates to	Section 7		
Topic			
Question	Please provide information on how you intend to calculate the relative price cap that you suggest would protect consumers, including the minimum charge necessary to support the network related operating costs.		
Notes on question			
Answer	<p>We have presumed that, in the absence of effective competition, Ofgem may wish to include in relevant licences additional measures designed to protect customers. It will be for Ofgem to determine what licence conditions they propose but our suggestion is that a relative price cap would be the most direct and transparent form of protection. It is in our interest to have happy customers as we will want to expand the network in Tain and replicate it elsewhere. We therefore see any price cap as a backstop designed to provide customer reassurance rather than being a key selling feature.</p> <p>A relative price cap could be established, for example, by reference to the tariff that would apply to a customer in a situation similar to that at Tain - e.g. a standard variable tariff for a domestic customer elsewhere in Scotland. The maximum price that could be charged to a domestic consumer at Tain would be this reference price plus x%, where 'x' would be established at a level that would cover the additional (otherwise unfunded) costs associated with the Tain gas supply compared with the reference customer. Given the relatively low number of customers at Tain, it would be sensible to keep this calculation simple.</p> <p>The question refers to "network related operating costs". The bulk of operating costs will be incurred by Air Liquide at the daughter station for the supply logistics process and ongoing maintenance. These would be taken into account in the calculation of 'x' described above. (We have included an estimate of these costs in our calculation of the achievable delivered gas price in Appendix B (page 52) of our Full Submission). As we explained in our response to Question 3 on 24.08.17, the only opex expected to be incurred by Fulcrum would arise from end user calls to the gas emergency service number. Such costs are effectively factored into the RPC tariff, which would also be taken into account in the calculation of 'x'.</p> <p>We envisage that the principles of the calculation of the relative price cap (or alternative customer protection) would be agreed with Ofgem in Q1</p>		

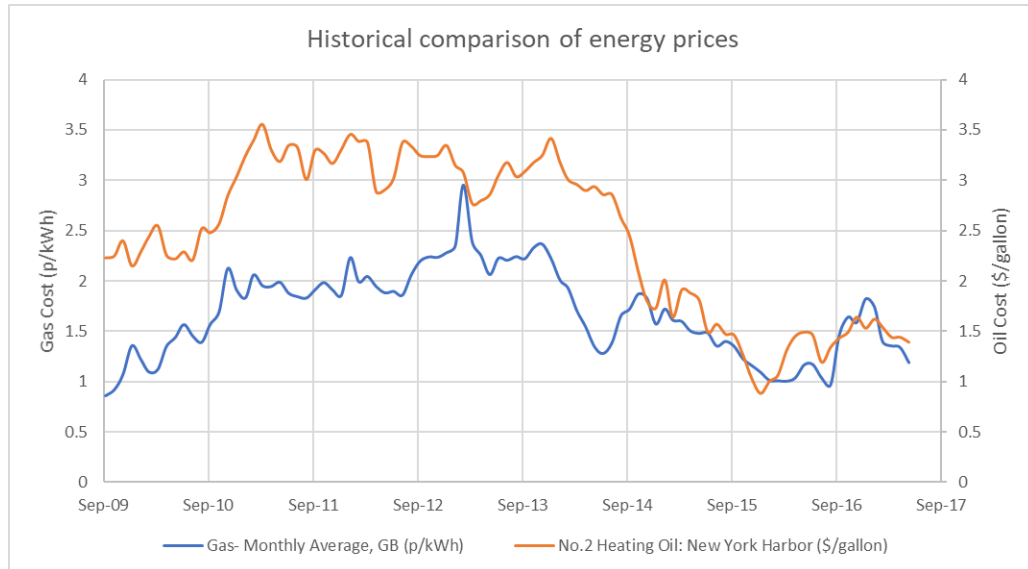
	<p>2018, with the calculation itself finalised during Q2 2018. This would allow the project to move forward with sufficient certainty through the first go-no-go decision point, whilst providing time for costs to be estimated more accurately ahead of the price cap calculation. Consistent with our response to Big Question 2, we would be happy to support Ofgem with this process by making proposals in relation to the relative price cap (principles followed by details) for their review and agreement.</p>
Attachments	

Project code	FPLGDN01/1	Question Number	35 (Big 4)
Question date	27.09.17	Answer date	10.10.17
Submission section question relates to	Section 3/Appendix B		
Topic			
Question	<p>You have estimated a delivered price of 5.3p/kWh in a rollout to other towns with distilleries, and 5.8p/kWh for towns without distilleries. Currently, this is higher than the cost/kWh of heating oil. Please justify how this project will alleviate fuel poverty if there are cheaper heating options and evidence of customer willingness to pay more for gas.</p>		
Notes on question			
Answer	<p>The delivery of CNG to standalone networks has twin objectives of achieving financial and environmental benefits. Financial benefits will mostly be achieved by the conversion of customers presently using electricity for heating, while environmental benefits will mostly be derived by the conversion of customers presently using other fossil fuels.</p> <p>In Tain, 58% of domestic consumers use electric heating, which is more than twice as expensive per unit of delivered heat than our target gas price. The scope for the alleviation of fuel poverty is therefore very real through the conversion of electricity consumers alone.</p> <p>Our analysis of financial and environmental benefits has been based on Tain housing stock data. We don't have equivalent data on the roll-out target towns, although we do know that fuel poverty is a widespread problem in the Highlands area of Scotland. It is also reasonable to assume that towns not on the gas grid will contain a mixture of houses heated by electricity and fossil fuels.</p> <p>Even the higher gas price of 5.8p (our target for towns without distilleries) would provide a substantial saving against the price of electricity, so we believe that there is significant scope to support the alleviation of fuel poverty through a roll-out of standalone networks.</p> <p>In relation to the willingness to pay for gas of those using oil at present, we would note that a pure price comparison is not the only criterion when deciding whether to switch from oil to gas.</p> <p>First, gas has a greater amenity value than oil:</p> <ul style="list-style-type: none"> <li>- There is no need for a storage tank</li> <li>- There is no need to arrange tanker deliveries</li> </ul>		



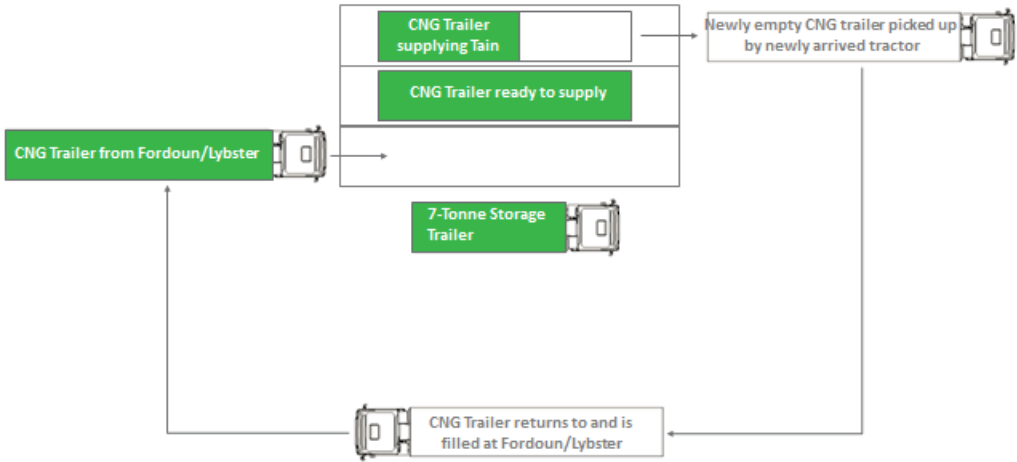
- Gas is cleaner with no risk of spillage
- Gas has lower maintenance requirements
- Gas has lower GHG emissions

Second, gas carries reduced price risk. Our target gas prices are relatively close to the present oil price even though the latter is at a historically low level, and the oil price has started to rise again recently. Furthermore, delivered oil prices are more sensitive to wholesale price movements: 30% of our target delivered gas price at Tain comes from the wholesale price, whereas the equivalent for heating oil is over 50%. This leads to greater price volatility for oil consumers.



Taking the lower price risk together with considerations of amenity value, we believe that conversion from oil to gas will be attractive.

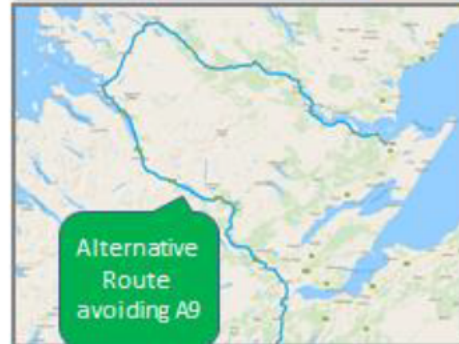
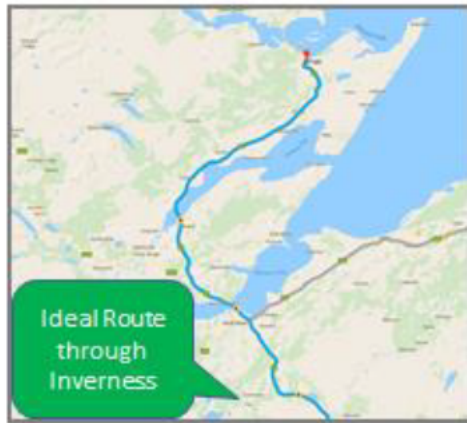
Attachments

Project code	FPLGDN01/1	Question Number	36 (Big 5)
Question date	27.09.17	Answer date	10.10.17
Submission section question relates to	Section 2		
Topic			
Question	Please explain what your back-up supply arrangements mean in practice. If tanker supply is cut off (eg a multi-day road closure), under the arrangements you have proposed, how long would back-up supplies last on a 1-in-20 peak demand scenario?		
Notes on question			
Answer	<p>We plan to use three 10-tonne CNG trailers working in rotation, with one trailer arriving in time to replace the trailer that is being emptied. We also plan to store a back-up 7-tonne trailer at Tain. The total level of CNG stored at Tain at any one time is therefore two 10-tonne trailers plus one 7-tonne trailer, which gives a total usable capacity of 33,577sm<sup>3</sup>.</p>  <p>In the scenario described in the question, we would interrupt the CNG supply to Glenmorangie distillery. Assuming our high customer take-up case (initial phase only, i.e. the scope of the NIC project) this level of storage is equivalent to 4 days of projected demand in 1 in 20 conditions.</p> <p>As we describe in the Full Submission document, we have designed a number of levels of protection into the scheme. In particular, we are planning:</p> <ul style="list-style-type: none"> <li>- Supply robustness through uninterruptible power supplies and back-up</li> </ul>		

electricity generation at Fordoun;

- Diversity in the CNG supply, with deliveries from Fordoun (south of Tain), Lybster (north of Tain) and beef farms in the Highlands;
- Access to deliveries from a CNG filling station at Leyland, [REDACTED];
- Access to other CNG trailers that supply other distilleries (also interruptible);
- Access to an emergency PRS that can be connected to the network.

The simultaneous closure of all roads from the range of available sources for a number of consecutive days would be a highly unlikely event.



Attachments

Project code	FPLGDN01/1	Question Number	37																																											
Question date	10.10.17	Answer date	12.10.17																																											
Submission section question relates to	7																																													
Topic	g) Robust methodology/ready to implement																																													
Question	Please provide a work plan for addressing the regulatory issues and the pricing structure. Your answer should clearly outline the work involved to reach the go/no-go decision planned for 2018.																																													
Notes on question																																														
Answer	<p>Below is a suggested workplan for the development of the regulatory and commercial frameworks required to support standalone networks. Key for us is the agreement of principles in time to support a go/no-go decision in June. Otherwise, we are happy to amend this in accordance with Ofgem's wishes.</p> <table border="1"> <thead> <tr> <th>Activity</th> <th>Who</th> <th>When</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="4">1. Principles and licence derogations</td> </tr> <tr> <td>1.1 Prepare paper on regulatory principles for discussion</td> <td>FPL</td> <td>Early Jan</td> <td rowspan="3">Focus will be: licence derogations to reflect lack of supply competition and that standalone networks sit outside the UNC; and the application of a relative price cap drawing on Ofgem's experience with LPG networks and safeguard tariffs</td> </tr> <tr> <td>1.2 Meeting to discuss regulatory principles</td> <td>Ofgem &amp; FPL</td> <td>Mid Jan</td> </tr> <tr> <td>1.3 Revise principles paper if necessary</td> <td>FPL</td> <td>Late Jan</td> </tr> <tr> <td>1.4 Meeting to discuss revised paper if necessary</td> <td>Ofgem &amp; FPL</td> <td>Mid Feb</td> <td rowspan="2">Only required if principles not agreed at first meeting</td> </tr> <tr> <td>1.5 Apply to Ofgem for licence derogations</td> <td>FPL</td> <td>Mid March</td> </tr> <tr> <td>1.6 Draft Ofgem consultation paper on licence derogations</td> <td>FPL</td> <td>Mid March</td> <td rowspan="3">Assuming Ofgem wish to consult on this and want FPL to draft it. FPL can also help with any redrafting if required</td> </tr> <tr> <td>1.7 Revise and publish consultation paper</td> <td>Ofgem</td> <td>End April</td> </tr> <tr> <td>1.8 Consultation period</td> <td></td> <td>May</td> </tr> <tr> <td>1.9 Ofgem decision on licence derogations</td> <td>Ofgem</td> <td>Mid June</td> <td></td> </tr> <tr> <td>1.10 FPL go/no-go decision</td> <td>FPL</td> <td>End June</td> <td></td> </tr> </tbody> </table>			Activity	Who	When	Notes	1. Principles and licence derogations				1.1 Prepare paper on regulatory principles for discussion	FPL	Early Jan	Focus will be: licence derogations to reflect lack of supply competition and that standalone networks sit outside the UNC; and the application of a relative price cap drawing on Ofgem's experience with LPG networks and safeguard tariffs	1.2 Meeting to discuss regulatory principles	Ofgem & FPL	Mid Jan	1.3 Revise principles paper if necessary	FPL	Late Jan	1.4 Meeting to discuss revised paper if necessary	Ofgem & FPL	Mid Feb	Only required if principles not agreed at first meeting	1.5 Apply to Ofgem for licence derogations	FPL	Mid March	1.6 Draft Ofgem consultation paper on licence derogations	FPL	Mid March	Assuming Ofgem wish to consult on this and want FPL to draft it. FPL can also help with any redrafting if required	1.7 Revise and publish consultation paper	Ofgem	End April	1.8 Consultation period		May	1.9 Ofgem decision on licence derogations	Ofgem	Mid June		1.10 FPL go/no-go decision	FPL	End June	
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<b>2. Relative price cap and licence changes</b>				
2.1	Prepare detailed proposal for relative price cap	FPL	End April	
2.2	Meeting to discuss relative price cap proposal	Ofgem & FP	Early May	
2.3	Revise detailed proposal for relative price cap if necessary	FPL	Mid May	Only required if material changes needed following first meeting
2.4	Meeting to discuss revised proposal if necessary	Ofgem & FPL	End May	
2.5	Draft consultation paper on relative price cap proposal	FPL	Early June	Assuming Ofgem wish to consult on this and want FPL to draft it. FPL can also help with any redrafting
2.6	Revise and publish consultation paper	Ofgem	End June	
2.7	Consultation period		July	
2.8	Decision on relative price cap	Ofgem	Mid August	
2.9	Draft Supplier and iGT licences	FPL	Mid August	Supplier licence conditions may be informed by separate Ofgem work on supply price cap
2.10	Meeting to discuss draft licences	Ofgem & FP	End August	
2.11	Revise draft licences	FPL	Early Sept	Only required if material changes needed following first meeting
2.12	Meeting to discuss revised draft licences	Ofgem & FPL	Mid Sept	
2.13	Draft statutory consultation on licence changes	FPL	End Sept	
2.14	Revise and publish consultation paper	Ofgem	End Oct	
2.15	Consultation period		Nov	
2.16	Decision on licences	Ofgem	Dec	
<b>3. Network Code and supporting documents</b>				
3.1	Draft Network Code and supporting documents for standalone network	FPL	End Sept	
3.2	Meeting to discuss draft documents	Ofgem & FPL	Mid Oct	
3.3	Revise Network Code and supporting documents if required	FPL	End Oct	
3.4	Publish consultations on draft Network Code and supporting documents	FPL	End Oct	
3.5	Consultation period		Nov	
3.6	Ofgem approval for Network Code and supporting documents	Ofgem	Dec	
Attachments				