

RIIO GD2 Business Plan Appendix

Statutory Independent Undertakings

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1 Overview

Scope of this Appendix

We own and operate five independent gas networks in the more remote parts of Scotland, known as the Scottish Independent Undertakings (SIUs). They are also known by Ofgem as Statutory Independent Undertakings.

Prior to Natural Gas, many towns around the UK were supplied by town gas that was manufactured at a central facility. In general, these facilities were not networked. At the time of conversion from town gas to natural gas, the SIU locations were too remote from the National Transmission System to be supplied directly with North Sea gas, so alternative provisions were made for these networks to be supplied with liquid gas via storage facilities. The liquid gas is vaporised on site and fed into discrete local networks. The five sites are Stornoway, Campbeltown, Oban, Thurso and Wick.

Figure 1: Location of SIU Networks



Stornoway, on the Isle of Lewis, receives LPG via road tanker from LPG storage tanks in the central belt of Scotland, before being ferried to Stornoway. The four other sites use LNG which is transported via road and rail from the Isle of Grain in Kent to local storage facilities. It is stored at the facility as a cryogenic liquid at around 163°C before being vapourised on site and fed into the local networks at Campbeltown, Oban, Thurso & Wick.

This Appendix covers both the capital and operational expenditure (capex & opex) requirements for the five SIUs for GD2. It discusses our actual and forecast expenditure for GD1 and re-examines the enduring solution options for the SIUs.

There is an important distinction between the opex funding arrangements for the five SIUs compared to the rest of our network in Scotland: the operational costs are subsidised via an arrangement set out in both our and National Grid Transmission's Special Licence Conditions. This arrangement effectively funds the SIU opex costs from all GB gas customers by including them in National Grid Gas's allowed revenues. The capital investment costs associated with new and replacement SIU assets are treated in the same way as other SGN assets.

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Impact

The gas we transport in our network and the LPG & LNG transported by road, rail and sea, is a potentially hazardous substance. Continued investment is required to ensure that our assets remain fit for purpose and in a safe operational condition. Our customers and stakeholders have told us that maintaining a safe and reliable network should be our priority for GD2. This stakeholder expectation is supported by a strong legislative and regulatory framework that provides how we should deliver this.

Approach to GD2

Over GD1 we have delivered efficiency benefits by training and multiskilling our onsite work teams in the SIUs so they can complete a wider range of works, which we will continue to leverage in GD2.

The ongoing operational costs associated with the SIUs are categorised as follows:

- LNG fuel – shipper services costs from Isle of Grain (IOG) or Zeebrugge
- LNG transportation and tanker maintenance – including tanker loading costs
- Staff costs – managers, senior & industrial staff
- Operating & maintenance costs for the five sites
- Gas quality – appliance testing and maintaining the requirements of the Gas Safety (Management) Regulations exemption

The operating costs associated with LPG commodity acquisition and its transportation by road are funded via a separate direct contract with the supplier operating in Stornoway. These costs are recovered directly by the supplier via National Grid's Gas Transportation licence and do not form part of our GD2 business plan.

We are not expecting any growth during GD2 in our SIUs. New customers do connect, but the LNG volume impact is balanced by existing customers installing more efficient boilers thus maintaining the supply/demand balance.

Our proposed capital investment plan for the SIUs covers the minimum work necessary to maintain a safe and reliable network, the primary driver being the risk associated with ageing and degrading assets. These stand-alone assets are managed in the same way as the rest of our network, applying the same risk management process and procedures to ensure ongoing safety and reliability.

Forecast investment

We propose to carry out a low regrets investment strategy for the SIUs in GD2, whilst ensuring that the five remote networks continue to be safe and reliable.

Our proposed SIU investment plan for GD2 is £48.08m at a 2018/19 price base, split over capex and opex as follows:

Table 1: Table of GD1 & GD2 investment actual & forecasts (capex & opex)

£m's (18/19 Prices)	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Opex													
Fuel	7.53	8.15	6.19	1.26	0.62	0.43	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Transportation	2.20	2.01	1.76	2.30	2.64	2.83	2.82	2.82	2.82	2.82	2.82	2.82	2.82
Administration	1.34	1.19	1.52	1.59	1.48	1.57	1.57	1.57	1.49	1.48	1.47	1.46	1.46
Other Opex:													
Holder Storage Maintenance	0.76	0.70	0.57	0.68	0.60	0.65	0.58	0.58	0.58	0.58	0.57	0.57	0.57
Leakage Control	0.06	0.09	0.03	0.03	0.06	0.10	0.11	0.11	0.11	0.11	0.10	0.10	0.10
Other Opex	0.18	0.57	1.37	1.60	0.24	0.32	0.29	0.29	0.40	0.40	0.40	0.39	0.39
Stranraer LDZ	0.36	0.34	0.19	0.69	0.64	0.59	0.66	0.62	-	-	-	-	-
Appliance Testing	-	-	2.64	0.68	0.26	0.35	0.26	0.31	0.31	0.31	0.31	0.30	0.30
Total Opex	12.43	13.04	14.28	8.83	6.54	6.84	7.22	7.22	6.63	6.62	6.60	6.59	6.57
Capex													
Interim Solutions	1.80	0.66	0.49	0.03	0.00	-	-	-	-	-	-	-	-
Enduring Solutions	-	1.23	2.72	2.10	0.92	0.66	-	-	-	-	-	-	-
Other Capex	-	-	-	-	-	-	-	-	-	-	-	-	-
Preheating replacement	-	0.65	2.00	0.06	-	-	-	-	-	-	-	-	-
SIU Other Capex	0.45	0.35	0.27	0.77	0.28	0.84	-	-	-	-	-	-	-
Continuing SIU Capex	-	-	-	-	-	-	3.07	3.29	3.02	2.87	2.82	3.08	3.28
Total Capex	2.25	2.88	5.48	2.95	1.20	1.51	3.07	3.29	3.02	2.87	2.82	3.08	3.28

The increase in operational costs across the GD2 period compared to the last 3 years of GD1 (with Stranraer costs excluded) relates to:

- predicted colder winters when compared against the unseasonably warm winters experienced in the middle of the GD1 period which saw only circa 9,000 tonnes of LNG being required for all 4 LNG SIUs per annum rather than the normal 10,000 tonnes;
- predicted increases in the Shipper Services contract which is due to be re-tendered in late 2019 / early 2020. Market analysis indicates this is likely to result in increased costs for this service. The previous LNG Shipper Services tender was open to gas shippers operating at all three European LNG terminals (IOG, Gate and Zeebrugge) with truck loading facilities. It is not clear how the UK's approach to exiting the European Union will impact on LNG importation costs into the UK, however exiting from the European Union without an interim arrangement in 2019 may result in either higher costs associated with importing LNG or a reduced number of gas shippers participating in the tender process. The latter risk may impact on the price to make LNG capacity available in the UK with SGN competing with several other LNG operators for smaller overall volume of available LNG; and
- predicted increases in the LNG road haulage contract which is also due to be re-tendered in 2022 and again is likely to result in increased costs for this service. The likelihood of a Scotland LNG terminal being constructed within the GD2 period is at this stage unknown, however no firm proposals are evident to SGN the time of submission.

Price uncertainty

Unlike the rest of the GB gas market, the effects of indigenous and imported pipeline supplies do not have an effect on the price of LNG. Normal pipeline markets are largely constrained by the supplies entering them and the demand markets they serve. The time and cost of laying pipelines means these developments are undertaken on a very strategic and long term basis. The availability of LNG in the UK and Europe is therefore dependent on global market conditions, and whether it is profitable enough for producers to import LNG to

certain locations. The effect of this for small scale applications is that supply will be constrained for as long the UK and European domestic markets are trading significantly below the world LNG market.

While a minimum amount of LNG will continue to be delivered, the availability of LNG for small scale applications is unlikely to be guaranteed and may attract a premium in line with world prices. Any attempt to implement contractual clauses for guaranteed supply is unlikely to be agreeable to the capacity holder or result in an even more significant premium being paid. In addition, the scale of profits which could be made by reselling a commodity in another market may be so great as to make the guarantee worthless.

2 SIUs within the Business Plan

In this Appendix we have set out our investment against allowance for the SIUs in GD1, along with our proposals for GD2. Figure 2 below shows how the SIUs fit into the overall Business Plan structure.

Figure 2: Appendix structure

	Distribution Mains & Services	Distribution (Governors & Crossings etc)	Transmission	Other Assets	Cost Efficiency, Financeability, Procurement, Stakeholder Engagement
Management	Work Management & Business Support				
	Environmental Action Plan				
Systems	IT & Cyber Resilience		Electrical & Instrumentation		
	Energy Futures: Whole Systems & Scenarios, Energy System Transition, Innovation				
People	Workforce Management				
Other Assets	Property, Fleet, Plant & Equipment				
Customers	Customer Service & Vulnerability				
Emergency Service	Emergency Service			SIUs	
	Repair Service				
Inspection/ Maintenance		Asset Maintenance			
Repair & Revalidation	Repex	Integrity	Integrity & Compliance		
Refurbishment / Replace / Rebuild					
Growth/Resilience	Connections				
	Capacity Management				
Removal		Maintenance	Integrity & Compliance		

Until the Government publishes its Heat Policy (currently planned for 2023), the long-term future of gas is uncertain. Therefore, to avoid the risk of stranded assets our GD2 Business Plan is based on a low or no regret investment policy. Our '4Rs' asset strategy minimises investment: we repair, refurbish or replace before we carry out more expensive rebuild. In addition, we are required to revalidate assets in accordance with our Written Scheme of Examination, drafted to comply with the Pressure Systems Safety Regulations 2000; and to Revalidate our road tankers in accordance with Department of Transport codes.

As can be seen from Figure 2 above, our SIUs require the provision of emergency services, inspection & maintenance regimes. We carry out repair and revalidation of assets as well as refurbishment, replacement and/or rebuild across the five independent networks.

3 GD1 Performance & Learnings

3.1 Overview of Service Delivered

Our business plan for SIU capex projects in GD1 originally requested £11.02m at 2018/19 prices. This was encompassed within the overall capex integrity allowance for transmission projects in the Scotland Network.

4 GD1 capex allowance

Table 2: Storage (Non-LTS) projects

£m	Total GD1	2014	2015	2016	2017	2018	2019	2020	2021
Storage (Non-LTS) projects < £0.5m	11.08	3.11	1.61	1.61	1.71	1.51	1.51	0.0	0.0

At the time of submitting the GD1 Business Plan, there was great uncertainty as to the future of the SIUs distributing LNG. Glenmavis had closed and the closure of the one remaining site that still supplied LNG from the NTS, Avonmouth, had been announced.

Other sources of LNG were available in France, Norway and Spain, but these generally redistributed imported LNG. LNG liquefied from the NTS in the UK met the gas composition standards defined within the Gas Safety (Management) regulations (GS(M)R). However, LNG imported from elsewhere, does not necessarily meet the UK GS(M)R standards. Generally, the energy quotient of imported LNG is higher and the Wobbe Index, currently limited to 51.41MJ/m³ under the GS(M)R, could not be met.

Due to this uncertainty, the required investment for the four LNG SIU was only requested up to 2016, while the investment for Stornoway was requested for the entire GD1 period.

The planned asset integrity projects on the LNG SIUs were the absolute minimum to ensure the sites remained safe and reliable up until 2016.

Once the future of the four LNG SIUs had been resolved, it was intended to trigger a re-opener to generate additional allowances as necessary. A re-opener option was provided, with a specific time cut off April 2016. Following the completion of the enduring solution project (see Enduring Options EJP & accompanying CBA) it was agreed with Ofgem that a re-opener would not be necessary as efficiency savings implemented because of the planned move to the Isle of Grain facility would be sufficient to operate and invest in assets for the SIUs throughout GD1. Since 2016 we have been sourcing all of our LNG from the Isle of Grain with a contingency arrangement at Zeebrugge in Belgium.

Figure 3: Rail tankers



In August 2018, we began to transport our LNG tankers by rail. Thirty of the fleet of 37 LNG tankers are ISO tankers – a cryogenic vessel housed within an ISO standard sized frame. These can be mounted on a standard flatbed trailer or offloaded onto a railway goods trailer. We now have arrangements for a road haulier to transport LNG ISO tankers from the Isle of Grain to the Daventry International Rail Freight Terminal. The tankers are then transported by rail to Coatbridge and Inverness, where they are transferred back onto a road trailer for onward transfer to the SIUs. By this route, we save around £14k per annum for each ISO tanker in service.

4.1 Legislative Background

In relation to the legislative framework applicable to the SIU networks, the existing legal requirements pertaining to the Gas Act 1986 and the Utilities Act 2000 apply to the LNG and LPG gas networks. The Control of Major Accident Hazards (COMAH) regulations apply specifically to the SIU networks both in terms of the LNG storage sites which are lower tier COMAH sites and the LPG storage site which is an upper tier COMAH site. The Provan LNG storage site is also controlled under the COMAH regulations. Pressure Systems Safety Regulations 2000 are also applicable to the operations at the SIUs. In relation to the gas quality levels at the LNG SIUs, we obtained an exemption from specific provisions detailed in the Gas Safety (Management) Regulations 1996 around the Wobbe index of the gas obtained from the Isle of Grain. This exemption is controlled by the HSE and is now incorporated into SGN's Safety Case and is reviewed by SGN and the HSE on a regular basis.

The LNG and LPG road fleet are governed by the ADR regulations¹ and are also compliant with site regulations when being loaded and offloaded. ADR regulates (but not limited to): the conditions of carriage, loading, unloading, handling of dangerous goods, vehicle crews, equipment, operation, documentation construction and approval of vehicles.

The SIUs also come under our licence framework, and our licence requirements apply equally to the SIUs as they would to any other part of our gas network. In addition to the Standard and Standard Special Licence conditions in our licence, we have a Special Licence Condition pertaining specifically to the SIU networks. These provisions are detailed in Special Condition 4I (Gas Conveyed to Independent Systems) which puts in place the framework to facilitate the continuation of the subsidy arrangements as detailed by the Secretary of State. Following initial discussions with BEIS and Ofgem in July 2019 relating to the continuation of the subsidy, BEIS indicated to both Ofgem and ourselves that there was no clear reason why the subsidy should not continue in its current form, i.e. as part of a GB wide subsidy arrangement. We intend to formally write to BEIS to confirm the position regarding the continuation of this subsidy.

4.2 GD1 Output Delivery

During GD1 we were required to provide an output deliverable in the form of an enduring solutions report to analyse the suitability of continuing to use LNG at the four SIU locations in Oban, Campbeltown, Wick and Thurso. This study required the analysis of alternate energy options for the SIUs including the connection to the wider pipe network, electrification, LPG and district heat networks. The enduring solutions report was associated with a price control re-opener option linked to the closure of the Avonmouth LNG facility, which at the time was the only LNG facility in the UK with truck loading facilities. The report concluded that the continuation of LNG as an energy source at the SIUs was the most efficient and effective energy solution for the customers located in these four towns. Following Ofgem's agreement in relation to our decision not to re-open the price control to facilitate additional costs associated with maintaining gas supplies at the SIUs, we carried out a number of outputs to ensure that LNG obtained from the alternate source at the Isle of Grain was feasible and safe. These outputs included:

- putting in place a tender and new contractual framework to facilitate the provision of LNG capacity at the Isle of Grain;
- detailed discussions and gas quality assurance framework to meet HSE GS(M)R exemption requirements;
- UNC changes to facilitate new commercial arrangements at the Isle of Grain;
- gas appliance and quality checks at all of the LNG SIU networks; and
- gas quality forecasting and monitoring arrangements for all four LNG SIU networks.

¹ Accord européen relatif au transport international des marchandises Dangereuses par Route – Transport of Dangerous Good

In addition to the enduring solutions report we delivered integrity projects to maintain the SIUs. This work was not included in the enduring solutions workload, it was a programme of work that was submitted before GD1 commenced. The outputs of the integrity work included:

- statutory work to comply with COMAH regulations including COMAH Safety reports for Stornoway and Provan;
- PSSR and PSR (Stornoway only) work which is required by law and proves to the competent authority SGN are operating safe sites; and
- Integrity Work including capacity projects to maintain security of supply and resilience of the SIUs.

4.3 GD1 Customer Experience

The SIU networks are included within our performance standards, which reflect an overall positive experience across the period 2013 to 2018. Throughout this period, we maintained reliability of the gas network and the logistics chain to transport both LNG and LPG from the Isle of Grain and Grangemouth respectively. A reliable energy supply in the form of gas in these remote communities is important especially in winter when other forms of energy provision may be susceptible to adverse weather conditions. The importance of having local multi-skilled teams at each location stands out in relation to ensuring guaranteed standards of performance for our customers are maintained and where possible improved. Scotland's overall standard for the one and two hour response time for gas emergencies (98.6% and 99.4% respectively) reflects the essential nature of maintaining SGN local presence at these SIU locations. Multi-skilled teams in the SIUs are trained to attend gas emergencies and also carry out services such as connecting 208 fuel poor customers in GD1, as well as the highly technical and skilled tasks associated with managing LNG and LPG storage.

Throughout GD1 we replaced 1.7 kms of metallic mains in the SIU networks ensuring risks associated with gas leaks was reduced and also methane leakage. The SIU mains replacement programme helped contribute towards our overall reduction of 20% in leakage across the period 2013 to 2018 reducing our greenhouse gas emissions. We have also taken other steps at the SIUs to reduce shrinkage gas volumes in relation to our use of hot water vaporisers (these assets are required to vaporise LNG in liquid form to gas when external temperatures fall below a certain level). We are now controlling when hot water vaporisers are used much more closely to ensure that their utilisation is only when absolutely necessary. This leads to a reduction in gas which is an element of the overall shrinkage volume. CO₂ emissions are also reduced through this initiative.

The largest customer interaction with our customers in GD1 took the form of the 'Oban - Opening the Gas Market' project which undertook trials on different gases at customer premises to ascertain the impacts on different types of appliances and gauge safety impacts. Throughout this project, we visited over 7000 customers to test the safety of appliances and to distribute carbon monoxide alarms. The project led to the distribution of a wider specification of gas to the other SIUs.

We also perform a unique service in the SIU communities by offering a chargeable boiler service contract and appliance checking service for customers wishing to sign up. This service is performed by us under a *de minimis* (non-formula) arrangement where regulated assets and First Call Operatives (FCOs) can be used to perform external contracts for third parties. This service is important to our customers especially in these remote communities where traditional gas appliance contracts may not be as readily available as found in the main network communities in the large towns and cities in Scotland. We currently have ^{Commercial Co} service care contracts in our SIU networks which represents approximately 15% of the customer base in these networks.

A further customer experience highlighted throughout GD1 is the commercial gas supply framework operating at our Stornoway SIU. As the gas distributed is LPG and is not included within the Uniform Network Code (UNC) arrangements between transporters and gas shippers, customers do not have the benefit of being able to switch supplier. We are aware of the disadvantages this situation places on our customers and therefore we are undertaking a piece of analysis in conjunction with our Central Data Services Provider, Xoserve, to establish whether a gas supplier switching service could be introduced efficiently. This would require appropriate system and process support from Xoserve and also the introduction of contractual terms between SGN and gas

suppliers covering both the transportation charge and the LPG gas supply elements. Following the conclusion of Xoserve's analysis we will establish the viability of providing this service to our customers in Stornoway which, if successful, will enable access to cheaper energy supply arrangements for our customers by being able to access a wider range of tariffs including access to dual fuel contracts.

4.4 GD1 Allowances and Expenditure

Table 3: Opex: expenditure vs allowance

Our opex expenditure in comparison to our allowance is as follows:

SIU Opex (£M 18/19 prices)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Allowances	14.44	14.53	14.62	14.71	14.80	14.89	14.98	14.97	117.95
Expenditure (forecast post 18/19)	12.43	13.04	14.28	8.83	6.54	6.84	7.22	7.22	76.41
Variance	2.01	1.49	0.34	5.88	8.26	8.05	7.76	7.75	41.54

The positive variance of £52.40m is due to obtaining permission from the HSE to supply outside of the GS(M)R specified gas quality limits. Following from our 'Oban - Opening Up the Gas Market' NIC project a qualified HSE exemption from the GS(M)R regulations enabled us to obtain LNG from different sources other than the historical delivery point at Avonmouth.

The costs associated with obtaining LNG from Avonmouth were inherently more expensive than other LNG delivery points as natural gas was liquefied in relatively small quantities and stored at this location. At other LNG delivery points, such as the Isle of Grain or Zeebrugge, LNG is imported in large volumes and stored with the actual liquefaction taking place at source (e.g. Qatar, Algeria etc).

This has enabled us to take advantage of economies of scale when sourcing LNG commodities. However, we are prohibited by licence from buying gas commodities and therefore we contract with a gas shipper organisation to ensure the required volumes of LNG are available at the Isle of Grain LNG facility and, as a contingency measure, at Zeebrugge should the Isle of Grain be unavailable.

Our capex expenditure in comparison to our allowance is as follows:

Table 4: Capex: allowance v actual

SIU Capex (£M 18/19 prices)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Allowances	3.11	1.61	1.61	1.71	1.51	1.51	0.0	0.0	11.08
Expenditure (forecast post 18/19)	2.25	2.88	5.48	2.95	1.20	1.51	3.07	3.29	22.63
Variance	0.86	-1.27	-3.87	-1.24	0.31	0.00	-3.07	-3.29	-11.55

The increase in expenditure of £11.55m from an allowance of £11.08m is due to:

- trial LNG ballasting project at Wick SIU; and
- additional investment at the four LNG SIUs beyond 2016.

This additional investment was agreed with Ofgem following the conclusion of the enduring study and agreement that a price control re-opener would not be necessary. The requirement to maintain the National Grid Gas Special Licence Condition allowances detailed in Section 11F Part "C", was set out in our

correspondence with Ofgem² at the time, which received general support.

4.5 GD1 Lessons Learnt

A number of key lessons learnt throughout the GD1 period include:

1. the entrance in to the wider LNG market rather than sourcing LNG from traditional sources such as that of Avonmouth has provided us with valuable experience of operating in the commercial LNG market and has provided the opportunity to source LNG from a wider number of sources and benefit from overall cheaper prices for our customers;
2. the transitioning to rail haulage for LNG rather than road has been built on the flexibility provided by the acquisition of ISO LNG tankers. This form of intermodal transport has unlocked potential cost savings by removing significant volumes of LNG from the GB road system and reducing the overall volume of CO₂ emitted. The transfer to rail has also reduced the risk associated with road transport, especially in the winter where bad weather can significantly increase the risks associated with maintaining security of supply obligations; and
3. following our network innovation project in Oban (opening the gas market) the knowledge of our SIU customer base increased dramatically. This stemmed from the household visits to safety check appliances in readiness for the wider sources of LNG which would be required following the planned closure of the Avonmouth facility. Connected to this has been the on-going safety checks required to maintain the HSE GS(M)R exemption which maintains our awareness of the customer base in the SIUs and their requirements.

What worked well in the SIUs in GD1?

The continuance of providing a reliable gas energy source for our customers without loss of supply throughout the GD1 period is testament to the robust nature of both the asset integrity and the contractual logistics chain required to provide both LNG and LPG. The transition to the commercial LNG arrangements was progressed in a professional and timely manner to ensure there were no interruptions to gas supplies for our customers following the closure of the Avonmouth LNG facility.

The network innovation project based in Oban was carried out successfully and included a wide section of our stakeholder community and provided the opportunity for the maximum number of customers to participate and secure safety checks for their gas appliances. The project ultimately led to the Health and Safety Executive (HSE) agreeing to provide an exemption in relation to Wobbe limits detailed in the Gas Safety (Management) Regulations 1996 following the conclusion that no additional safety risk would be introduced by using gas from the IOG. Our continuing gas quality monitoring checks and customer appliance checking also worked well and will continue into GD2.

The transitioning process over to rail transport has worked well and has increased our resilience in relation to risks associated with road transport. We will be looking for further increases in volumes of LNG moving over to rail in GD2 to further provide costs and security supply benefits to our customers. In addition to limited availability of suitable ocean going vessels to transport bulk LPG, the supply chain for Stornoway has now been transferred to road tanker / ferry. This facilitated decommissioning of the short LPG transfer pipeline between the wharf at Stornoway harbour and the LPG storage site. This also negated the requirement for ongoing costs associated with the Stornoway port demurrage. The road tanker option provides a flexible transport solution to maintain security of supply obligations.

In relation to areas which could be improved in GD2; we recognise the importance of decarbonising the gas network to meet the 2045 net carbon neutral targets is of paramount importance. We have started the SIUs on this journey by partnering with the Scottish Government to fund a feasibility study for the location of a

² SGN sent a letter to Ofgem dated 22nd August 2014 and received a response from Ofgem on 28th October 2014

biomethane plant at the LNG network in Campbeltown. We recognise that more needs to be achieved throughout the remainder of GD1 and going forward into GD2 in relation to how the SIUs can play a part in decarbonising gas.

This will take the form of ensuring that the SIUs are ready to accept biomethane by undertaking feasibility studies at each of the three remaining LNG SIUs to establish their suitability for injecting biomethane into the network. Although the commercial drivers associated with biomethane plant development are outside of our remit and control, we will be lobbying hard for further government subsidies for biomethane to ensure biomethane is allowed to continue to support the wider gas network in its decarbonisation journey. We believe having these studies ready and available for each SIU location assist developers in choosing to locate their plants at these four locations. The previous study at Campbeltown incorporated potential savings in the form of reduced LNG transport costs from the IOG into a CBA model for the plant. We will explore these potential benefits with biomethane operators to ensure that innovative commercial arrangements could be developed to ensure biomethane development is commercially viable in the SIUs. This may take the form of us contracting directly with biomethane operators for biomethane capacity to offset road costs associated with LNG or jointly developing innovative storage solutions to provide biomethane operators a flat demand profile at times when demand on the SIU networks is lower than required.

Throughout GD1 we have maintained all five SIU networks without the forecast requirement to re-open the price control which was thought a real possibility at the beginning of GD1 due to the planned closure of Avonmouth. Following innovative commercial arrangements being introduced to allow wider market involvement in the provision of LNG to the SIU customers this substantially reduced our opex costs from May 2016 through the rest of GD1 and into GD2. The asset integrity costs linked to maintaining the SIU assets to ensure they remain safe and reliable has been funded through the existing subsidy opex arrangements with no overall increase in cost to both SIU customers or the wider UK gas customer.

As we have explained previously, we also ensure our SIUs colleagues are trained to perform a multi-function role to ensure our customers' requirements can be met by using our local workforce. This has reduced the volume of external contractors required to be brought into the SIU locations and has the effect of controlling costs in this area.

5 Stakeholder Insight

We have undertaken a comprehensive programme of customer and stakeholder engagement and research during the development of our GD2 business plan. Further information is provided in chapter 4 of our business plan and the Enhanced Engagement appendix (022). The following sections describe how the SIUs impact upon the three commitments at the heart of our business plan that reflect our customers' priorities: positive impact; shared future; and safe & efficient.

5.1 Positive Impact



Investment in the SIUs has a direct effect on making a positive impact for our customers connected at these sites. We have supported fuel poor customers in these networks by undertaking 208 fuel poor connections across GD1, helping vulnerable customers in our SIUs benefit from lower energy bills. We will seek to build on this progress in GD2.

As previously discussed, we are analysing the potential to facilitate supplier switching for customers on the Stornoway network in conjunction with Xoserve. These Stornoway customers are currently only supplied by British Gas outside of the Uniform Network Code. The ability to change suppliers should give SIU customers greater choice and opportunities to switch to lower energy bills by increasing competition in the market.

5.2 Shared future



Our customers and stakeholders have told us that exploring future energy solutions is an area they'd like to see prioritised for investment. They also rate minimising environmental impact as an important area upon which we should focus.^{3 4} A step towards decarbonisation is to 'green' the SIUs, the options for which are discussed in section 5 below.

Looking ahead to GD2 we understand the importance of implementing CO₂ savings for the remote communities the SIU networks serve, as well continuing the security of supply responsibilities. We will continue to engage directly with the communities and stakeholders specifically to discuss the progress we have made in relation to reducing CO₂ emissions directly associated with the SIU networks and how they are contributing towards the net zero targets for Scotland.

We have undertaken engagements with local stakeholders in our SIUs, including local authorities, Highlands and Islands Enterprise, Scottish Government, Industrial and Commercial (I&C) customers, Housing Associations and local consumer groups. These engagements have covered topics including decarbonisation, expected future gas demand, collaborative working and satisfaction with the services we provide. Local councils covering the regions in which our SIUs are located generally expect gas usage to stay the same or increase in the next 5-10 years. Many of these councils are adopting ambitious energy decarbonisation programmes and would like to work with us to assist in achieving their goals.⁵ Stakeholders were generally satisfied with our services, wanting an emphasis on reducing environmental impact of the energy provision at the SIU. Stakeholders considered more could be done to deliver environmentally friendly, low carbon energy supplies for the SIUs in the form of either biomethane solutions or hydrogen gas solutions. Some stakeholders indicated that local energy solutions which incorporated the gas network assets as part of an integrated energy solution for the SIUs was key to the overall success of meeting Scottish Government CO₂ net zero targets. Large I&C stakeholders indicated their wish to be connected to the SIU gas network. These customers

³ Stage 1: Explorative Qualitative Workshops and interviews (ref 002)

⁴ Stage 3: Conjoint & WtP Summary report (ref 005)

⁵ SIU interviews (Ref 087)

have traditionally utilised non-gas energy options such as heavy fuel oil or LPG as the gas network was either unable to support their energy loads or the costs associated with LNG storage would have been prohibitively expensive. Stakeholder feedback suggests that innovative contractual solutions which deliver energy to these customers during periods of low temperature sensitive demand could be a solution, with alternative energy supplies being utilised during peak periods.

Stakeholders and customers want us to continue to put more green gas, such as biomethane and blended hydrogen, into our network.^{6 7 8} In our programme of research this was a higher priority area for most customers groups.⁹ We are proposing a biomethane feasibility study at three SIU locations (Thurso, Wick and Oban) to complement the previously completed feasibility study at Campbeltown to provide information for prospective biomethane producers who may wish to invest in a plant at a SIU location. We are analysing the potential to supply large industrial/commercial customers at these SIU locations during the summer using biomethane gas which would normally be flared due to extremely low demand volumes on these SIU networks. There may also be the potential to offset LNG transportation costs by instead contracting with biomethane producers. This would provide an additional income stream for biomethane plant operators. We shared these ideas with biomethane stakeholders at our Scotland distributed entry connections workshop. These stakeholders endorsed actions to facilitate entry capacity for green gas. They also support an ambitious target to increase the number of households supplied with green gas during GD2.¹⁰

In our quantitative acceptability testing customers were asked a question in relation to the additional element of encouraging more low carbon 'green gas' into the network. This additional element of our plan attracted high total levels of acceptability from both customers in Scotland and southern, at 81% in Scotland and 77% in southern. Domestic customers in Scotland gave this element the highest acceptability (81%), indicating an appetite for lower-carbon gas from Scottish customers.¹¹

5.3 Safe & efficient

Safe and reliable gas supplies are very important to all our customers, including those served by our SIU networks. Our programme of customer research has shown that customers view keeping costs down as a priority. The results also demonstrate that whilst acting safely and keeping the gas flowing are of high importance, customers view our current level of performance as already very good and would therefore not want us to invest significantly in going beyond current levels of performance. These priorities have informed our strategy towards our SIU network investment plans in GD2. Replacing end-of life assets at SIUs, and a comprehensive maintenance regime, helps to ensure reliability. Following our '4Rs' approach to asset management ensures we also deliver this safety and reliability at a lower cost to customers. The upcoming tender for the LNG and LPG services will ensure the most efficient market providers will be considered for future energy delivery.



Since the Oban project, we have been closely involved with the gas quality systems and worked closely with the HSE to ensure the SIU exemption was implemented and is maintained. The widening of the Wobbe Index range is being used to deliver change across the UK gas distribution system and has wider implications for the UK gas industry in general, potentially helping to reduce customer bills.

⁶ Max diff Prioritisation Phase (Ref: 003, 004)

⁷ Future of Heat specialist panel Dec 2018 (Ref 024)

⁸ Expert round tables on sustainability (Ref: 065,066)

⁹ SGN Business Plan Acceptability Testing Phase 1 (Ref 078)

¹⁰ Biomethane and Gas Entry connections round table event (ref 095)

¹¹ Business Plan Acceptability Testing Phase 2 (Ref 079)

6 GD2 Cross Sector Issues

6.1 Decarbonisation & Whole system

Background

During GD1 the landscape around the SIU LNG supply began to transform with the planned closure by National Grid (NG) of the Scottish LNG storage facility at Glenmavis which required us to plan an extended logistics chain to the NG LNG facility at Avonmouth near Bristol and also required the construction of a Scottish LNG tanker storage facility at Provan near Glasgow.

In parallel to the move to Avonmouth it emerged that NG also planned the future closure of the Avonmouth LNG facility which was initially indicated to be tabled for 2018, however was then brought forward to May 2016. To plan for the closure of the last remaining tanker loading facility (at this point in time the Isle of Grain tanker loading facility was not fully constructed or operational), Ofgem requested that we carry out an in-depth study of alternative energy options for the SIUs prior to agreeing to any price control re-opener which would be necessary to facilitate the continued supply of energy to the SIUs. This study focused on all available energy sources at that point in time and considered a whole solution cost including impacts on end consumer energy bills and security of supply considerations.

The conclusion of the Enduring Solution report ¹² pointed towards the continuation of LNG as the energy source for the existing LNG SIUs as this was the most economic and efficient solution including ensuring affordable energy was available for SIU end consumers.

The report stipulated that LNG would be sourced from the Isle of Grain facility in Kent following the commissioning of the facility by National Grid. This in turn would require closer monitoring of gas quality due to the extended range in the Wobbe index of the gas available at the Isle of Grain. The report also concluded that a price control re-opener submission was not required as the potential savings afforded by the switch to the Isle of Grain would deliver considerable opex savings over the cost of utilising the Avonmouth facility. Ofgem agreed that savings flowing from the move to the Isle of Grain could be utilised to fund asset integrity investment requirements for the SIUs.

As part of Ofgem's Enduring Solutions response letter¹³, which confirmed their agreement with our conclusion to continue the LNG solution for the SIUs, they requested that we re-fresh the conclusions contained within the enduring solution report for the GD2 business plan submission. The following section focuses on the enduring solution alternate energy options to provide an updated set of costs and to consider any industry and regulatory changes which may have impacted on the assumptions made in the original paper. In addition to the LNG SIU networks considered in the original enduring solutions paper, Ofgem have requested that we include the LPG network which serves Stornoway. This LPG network was excluded from the first study as LPG supplies were not under threat as they are sourced directly from supplies in Scotland. This remains the case as of today.

Report summary

Following analysis carried out in conjunction with DNV-GL focusing on the currently available alternate solutions for supplying energy to the SIUs, the conclusions reached in the previous study completed in 2015 as part of the price control re-opener remain valid. We recognise the changing landscape associated with renewable energy sources and technologies which have advanced since the conclusion of the previous report and are considered as part of each alternate option. The premise for the 2015 study was that secure GS(M)R

¹² Report submitted by Paul Mitchell to Rhianne Ogilvie at Ofgem 31st May 2015

¹³ Letter from Dora Guzeleva to John Lobban 28th October 2014

compliant supplies of LNG at that point in time may not have been available for the remainder of GD1 and an alternate energy source would have been required. As the 2015 study progressed and the results of the Oban Innovation project provided the technical evidence which under wrote the basis for the GS(M)R HSE exemption, it became clear that LNG tankered from the Isle of Grain (or other alternate European source) was the most secure and cost-effective solution for energy supply to the SIUs.

Moving forward to 2019, the re-refresh of the costs associated with alternate energy solutions, which remain valid today, point towards tankered LNG remaining the most secure and cost-effective energy solution for the LNG SIUs. This is further evidenced by the substantial opex cost reductions realised through the contractual framework put in place for LNG procured from the Isle of Grain compared to LNG obtained previously from the National Grid liquefaction plant at Avonmouth. Also, with the potential for a LNG storage facility to be located in Scotland at a point in GD2 there remains the real potential to further reduce LNG opex costs moving forward. The EJP and associated CBA are attached at Annex 17.

All the alternate energy solutions for the LNG SIUs require substantial capital investment to effectively provide the same level of service to our customers and in the case of electrification and district heat, would result in increased tariffs for energy supply bills. (refer to Annex B of this document for Enduring Options analysis).

In relation to decarbonisation of the SIU energy supply, the continuation of LNG & LPG and the SIU gas networks provides the basis for the future introduction of hydrogen and / or biomethane into the grid. Being physically separated from the rest of our network the SIUs provide an opportunity for decarbonised gases to be trialled over a limited number of customers to ensure the energy supply meets our customer's needs and expectations whilst allowing us to review the engineering and operational processes for these new types of decarbonised fuels. Like the Oban opening the gas market project which focused on trialling a wider range of natural gas qualities on the Oban SIU network, the four LNG SIUs may provide an opportunity to test the blending of alternate gases into natural gas to reduce the reliance on fossil fuels. We talk about biomethane as a full alternative to LNG in the Engineering Justification Paper for enduring solutions and the feasibility study we carried out in conjunction with the Scottish Government to assess the viability of biomethane as an energy source in Campbeltown.

Although the production volumes and associated economics of biomethane dictate a steady injection rate across the year, relying on a much wider demand base in the summertime compared to the winter which the SIUs can't accommodate due to their restricted size, it would be possible to introduce biomethane into the SIUs utilising different regulatory solutions. For example, the use of summer capacity products already available under the UNC to encourage large I&C customers to utilise biomethane gas in the summer which would provide a demand base for the biomethane producer when traditionally demand is very low on the SIU networks.

To ready the LNG SIU networks for a decarbonised future we are requesting funding for 3 further biomethane feasibility studies for Oban, Thurso and Wick to ensure an off the shelf information pack is available for biomethane producers or community action groups wishing to construct and operate biomethane facilities in the SIU towns. We are also committed to modifying the regulatory / network code framework to allow more flexible exit and entry capacity solutions which meet the needs of the biomethane industry. To facilitate biomethane readiness on the SIUs, we would need to invest Commercial Confidential to compile the 3 further detailed feasibility studies offering an investment grade study to potential biomethane developers at the SIU locations. We suggest a use it or lose it mechanism would be appropriate for these costs. This is covered further in Section 6.8 'Managing Uncertainty' below.

In the case of Stornoway there is also the potential to use bio-propane to completely decarbonise the network on Lewis. We are committed to including bio-propane as an option in the next LPG tender to test the market for availability and cost of supply. Should the tender provide for an economic, safe and secure supply of bio-propane for the Stornoway network we are committed to ensuring this option goes ahead which would result in the operation of GB's first decarbonised fuel gas network. As discussed further in Section 5.2 we are also in discussion with the Scottish Government and Western Islands Council regarding a feasibility study for a

hydrogen network in Stornoway utilising constrained electricity generation for hydrogen production.

6.2 Innovation

Innovation has been heavily present throughout the GD1 period to sustain the operation of the SIU networks. Innovation in the form of technical changes to facilitate new sources of LNG stemming from the Oban Innovation project and also the distribution of LNG by rail rather than just by road has decreased SGN's impact on the environment.

Throughout GD2 we are proposing a number of innovations which will ready the SIU networks for future requirements to meet carbon net zero targets by 2045 in Scotland. We are proposing to include an option for bio-propane to be used in our SIU network in Stornoway. We will include bio-propane as part of the re-tendering for LPG in 2020 to test the market to ensure price and availability are efficient. Should we be successful in obtaining the required volumes at an economical price for our customers we believe this would be the first regulated network in GB with a wholly renewable energy source and with 80% less associated equivalent carbon emissions. We're also looking to maximise the potential for biomethane injection at the SIUs by undertaking additional feasibility studies for the LNG SIUs to ready these networks for commercial biomethane injection in GD2. We have also been in discussion with the Scottish Government and Western Islands Council in relation to the potential for hydrogen to be implemented as an energy source in Stornoway. We are planning to partner with the Scottish government to undertake a feasibility study for a hydrogen network in Stornoway following the completion of our H100 innovation project which is currently at feasibility stage. Once the findings are established from this project which will concentrate on the end to end requirements for hydrogen, the learning points will be used to establish the feasibility for hydrogen as a fuel source throughout the SIU networks.

6.3 Resilience

Due to the remote geographical location of the SIU networks, resilience to ensure continued supplies of gas to our customers has been at the centre of SIU operation throughout GD1. The move to sourcing LNG from the Isle of Grain and the commercial framework with our gas shipper continued our requirement to maintain full storage supplies at each SIU location to ensure any interruption in the logistics chain between Scotland and the Isle of Grain would be mitigated. We maintain at least a seven-day storage supply at each SIU location to increase resilience against any unplanned interruption of LNG deliveries. We also incorporated a contingency LNG supply requirement into the LNG shipper services contract which enables us to access LNG capacity at the Zeebrugge terminal should the Isle of Grain facility be unavailable. We also book truck loading slots at Zeebrugge and test logistics chains regularly to maintain this contingency options' viability and readiness. The transfer of a percentage of LNG from road transport over to the rail network has also enhanced our resilience level to external factors such as inclement weather conditions which historically can impact on road transport.

To maintain reliance at the SIU networks we continue to maintain and upgrade the sites. This has been done through scheduled maintenance and scheduled inspection. During GD1 we developed a condition monitoring inspection routine which is currently being undertaken at Oban and another will have been undertaken before the end of GD1. Throughout a continued programme of work, we have continued to maintain the SIU sites. Larger projects such as the installation of new hot water vaporisers and boilers at Stornoway and Campbeltown has continued to maintain resilience at the SIU networks.

In relation to our workforces' resilience, our colleagues at the SIUs are trained in all matters associated with the operation of the SIU facilities and networks. This enables a high level of cross-over flexibility to maintain services to our customers and to ensure the plants are operated and maintained to the required levels and standards. High levels of work force resilience are important in the remote SIU locations as travel times from other parts of the main network inhibit timely attendance to ensure GSOS standards are met or other service level requirements.

Our impact on the environment is discussed throughout this business plan appendix and includes our use of

rail transport over road which reduces our carbon footprint by 80% in relation to each km travelled to transport LNG. We are also proposing to include in the next LPG gas tender for Stornoway an option to price for bio-propane which is a bi-product of the manufacture of bio-diesel. Bio-propane is a renewable and sustainable energy resource and can reduce associated carbon emissions as an energy source by up to 80%. We're also requesting an allowance to undertake further biomethane feasibility studies at three of our four LNG SIU locations at Oban, Wick and Thurso to analyse the suitability of constructing and injecting biomethane at these locations. Our aim is to have ready the knowledge to implement biomethane at these locations in conjunction with the wider biomethane industry. This would be wholly dependent on the continuation of government subsidies following the end of the Renewable Heat Incentive (RHI) scheme in 2021. However, we are confident that a replacement scheme will exist, albeit in potentially a different framework.

7 GD2 Activity breakdown

7.1 Approach to GD2

We are proposing a ‘low regrets’ approach to investment in the SIUs over RIIO GD2 with a safe network approach to asset integrity. A low regrets investment basis allows us to maintain a safe and secure network over the RIIO GD2 period without investing heavily in new assets which may be in future conflict with newly emerging alternative energy solutions for the SIU locations. The capital and operating expenditure proposed is the minimum required to ensure the continued safe and efficient operation of this critical assets. The capital investment proposals are justified through Investment Decision Packs (Engineering Justification papers and associated CBAs) discussed in sections 6.4 and 6.5 below. Operating cost efficiency is discussed in section 6.7. The overall approach to GD2 is a continuation of the LNG energy supply for the existing 4 SIU networks and also the continuation of the LPG supply for Stornoway. We are cognisant of the requirement where appropriate to maximise environmental opportunities at the SIU locations by minimising the CO₂ emissions associated both with the LNG/LPG and the general operation of the networks. We have requested a bespoke output for the SIUs in the form of three biomethane feasibility studies to promote external investment in these types of plants, combined with exploring new approaches to offsetting LNG consumption with these localised energy solutions through innovative contract solutions. Rail transport for LNG tankers has allowed us to already transfer significant LNG volumes from the road and reduce associated CO₂ emissions. We are also committed to exploring the market for bio-LPG fuels for our Stornoway network to reduce the carbon footprint in Stornoway of gas consumption for our customers. Continuation of the SIU assets by investing on a low regrets basis provides a strong foundation for us to explore environmental benefits using these existing assets for our customers.

Background to the SIUs

Each of the SIU sites is a deemed Local Distribution Zone (LDZ) and Calorific Values are declared on a regular basis for the purposes of calculating customer bills.

Campbeltown, Oban, Thurso and Wick

For the four mainland sites, for many years the LNG was supplied by one of four LNG storage sites on the National Transmission System: primarily Glenmavis in Scotland; but also, Avonmouth, Dynevor Arms and Partington. All these sites have since been decommissioned by National Grid.

In each case, the LNG sites provide a gas supply to customers in the local town with the market for gas supply open to full supplier competition. Table 5 below shows the approximate customer numbers in each location:

Table 5: Customer numbers

Town	Customer numbers	Peak Hour demand (scm/h)
Campbeltown	1,945	2,020
Oban	1,083	2,000
Thurso	2,390	2,650
Wick	2,007	3,200

The potential for the customer base to grow is relatively small as these towns are isolated geographically and the take-up of gas as a domestic fuel is already reasonably significant.

LNG is stored at a temperature of -163°C. Therefore, both the road / rail tankers and the on-site storage vessels are vacuum insulated for cryogenic storage. Prior to distribution to the local community, the LNG is vapourised by both ambient and hot water vapourisers. The gas pressure is regulated and the gas is odourised.

A volume of vapourised gas is stored on site as a contingency in case the LNG vapourisation and treatment plant develops a fault.

The amount of gas stored on each site is less than 200 tonnes. Therefore, the sites are designated as lower tier under the Control of Major Accident Hazard (COMAH) regulations.

In 2010 National Grid announced the phased closure of all four of the LNG storage and liquefaction sites. Initially Dynevor Arms and Partington were closed. These were followed by the closure of the Glenmavis facility, requiring us to obtain LNG from the alternative facility at Avonmouth in South West England near Bristol. The additional time to transport LNG to the SIUs, and concerns highlighted by National Grid about the reliability of the plant at Avonmouth, forced us to construct an additional storage facility for LNG tankers at Provan near Glasgow. The facility caters for up to 18 ISO tankers and the site is designated as Upper Tier under the COMAH regulations.

In 2017, we engaged consultants DNV GL to carry out a logistics study to determine:

- The number of road tankers required on the road;
- The number of full tankers required to be held at Provan as a contingency;
- The number of tankers that may be decommissioned during summer periods when demand is lower; and
- the fleet and storage requirements to ensure licence obligations associated with security of supply could be maintained.

The study, completed in January 2018, concluded that, to meet a peak demand scenario, the existing fleet of 7 road tankers and 16 of the available ISO tankers would be required to be on the road in the supply chain. A further 12 full ISO tankers would be required to be retained at Provan. The study also provided recommendations for tanker availability at lower demands – 80%, 60% and 45% - and we operate our fleet of tankers accordingly.

Stornoway

The remaining SIU is located in Stornoway on the Isle of Lewis. LPG is transported to site by road tanker via ferry from sources in Scotland. Up to 542 tonnes of LPG is stored on site at ambient temperature before being vapourised by hot water vapourisers, pressure regulated and distributed to around 1,400 customers.

Due to the volume of LPG stored, the site is designated as upper tier under the COMAH regulations.

Prior to 2018, LPG was delivered to Stornoway by a small LPG ship. However, delivery has often been affected both by LPG and LPG ship availability. Also, the publically owned wharf at which the LPG ship docked was deteriorating with consequence of high failure due to its location in the centre of the town. We reviewed the costs and sustainability of delivery by road tanker and this is now the chosen method of delivery of LPG. Due to the capacity of the site, the volume of LPG stored is sufficient to maintain customer demand for around three to four months. As a result, a logistics study to analyse the scale of the road fleet was not justified.

The LPG network in Stornoway, although operated under our Licence, remains outside of the UNC arrangements which set out the contractual obligations between ourselves and gas shippers. Our Licence requires us to maintain transportation charges for customers in Stornoway to be no more than the equivalent charges for main land customers. As such the charges detailed in our transportation charging statement are applied to customers on the Stornoway network.

In place of the UNC we have established a separate contractual arrangement with the single gas shipper / supplier for Stornoway which sets out the basis for transportation charging. As many of the arrangements detailed in the UNC are not applicable to customers on Stornoway, such as supply point switching, energy balancing, transmission capacity, the document is restricted to the contractual arrangement for transportation charging, although the same Guaranteed Standards of Performance (GSOP) arrangements apply to customers on Stornoway and are referenced in this agreement. We are considering the viability of a supplier switching service for customers on Stornoway, and during the recent Xoserve system upgrade (Project Nexus), arranged

for these MPRNs to be migrated into the central supply point register. These supply points are currently flagged within the central Xoserve system to ensure they are not included within the normal supply point switching arrangements. We are currently examining the requirements of facilitating this arrangement from both a systems and regulatory / contractual perspective and hope to progress this arrangement within the GD2 period.

Investment Decision Packs

The following Annexes contain the EJP and associated CBAs for capital projects over £0.5m:

Table 6: EJP & CBA locations

SIU	Project/Programme	Engineering Justification Paper - Reference
Campbeltown	Replace Atmospheric Vaporisers	SGN SIU 001
Campbeltown	LNG Vessel Replacement	SGN SIU 002
Campbeltown	Electrical Upgrade	SGN SIU 003
Oban	Replacement of Hot Water Vaporisers	SGN SIU 004
Fleet	LNG – Road barrel & ISO tank replacement & re-validation	SGN SIU 005

Enduring Solution Investment Decision Pack

The enduring solution for the four LNG SIU networks and further explanation relating to the Stornoway LPG SIU are contained within Annex B and associated CBA – SIU Enduring Options. The CBA on the enduring options was carried out on the basis of the baseline model being the continuing LNG process with further options of electrification, LPG, connection to the main pipeline network, district heat and liquefaction. Cost factors incorporated into the analysis included CO₂ reductions afforded to each option as well as impacts on customers' energy costs.

6.1(b) Impact of Government Policy

The capital investment associated with the SIU networks throughout RIIO GD2 is directed at maintaining safe and secure assets to deliver RIIO GD2 outputs in a safe and efficient manner. It is unlikely that government policy in the areas of health and safety which directly impact on these assets will change significantly throughout the price control period. Areas of both UK and Scottish government policy which are likely to change throughout the RIIO GD2 period are connected to reducing the UK's CO₂ and greenhouse gas emissions with an aim to making the UK's net zero CO₂ targets by 2045 (Scotland) and the rest of the UK by 2050. It is possible that these targets may be brought forward which increase the focus on re-newable energy supplies for the SIU networks. We consider the completion of the three additional biomethane feasibility studies for Wick, Thurso and Oban important to drive forward re-newable energy supplies at the SIU locations to meet these net zero targets. The governmental view on the replacement of the RHI and the level of subsidy provided to biomethane projects will heavily influence the biomethane markets' view on locating re-newable gas plants at the SIU locations. While methane emissions are not a significant driver in terms of project justifications, a reduction in methane content has been factored into the CBA (see section 6.1(c) Scenarios and Sensitivities below).

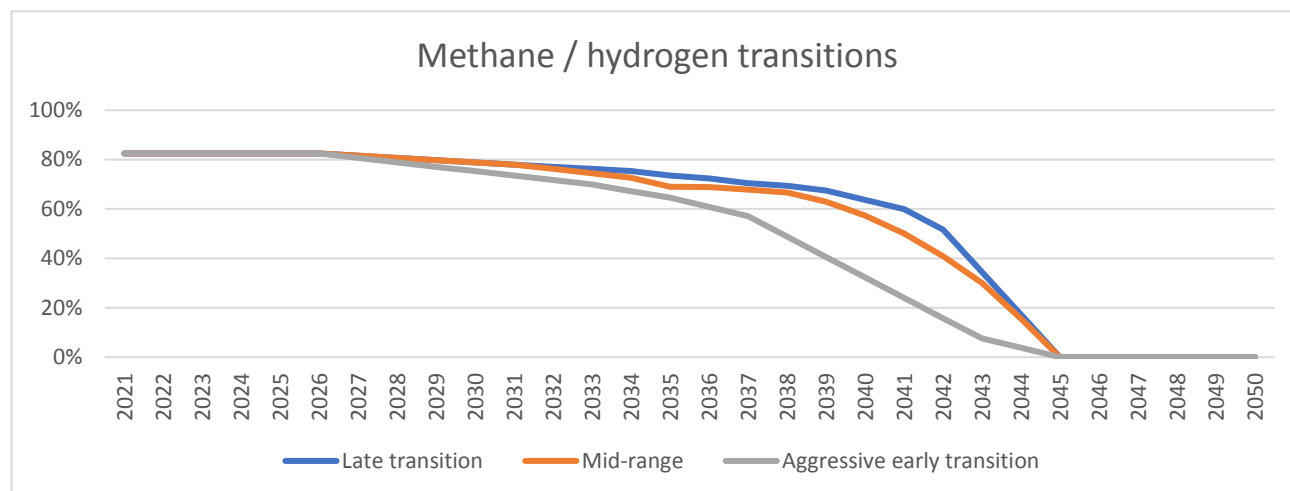
6.1(c) Scenarios and Sensitivities

Sensitivities have been applied to the SIU capex investment CBAs as follows:

Variations in capex project cost have been applied for the range -10% to +20%. These are considered realistic ranges based on our experience in GD1 and the likely pressures on cost in relation to the procurement of materials and main contracts.

Variations in methane levels (and therefore environmental impact) have been considered to take account of the anticipated introduction of hydrogen. SGN have committed to a 'net zero' carbon network by 2045. In practice that means no methane by that date. Also, while the use of hydrogen in distribution is being actively investigated and hydrogen is currently being introduced into a network for the first time since the conversion to natural gas, it is considered very unlikely that hydrogen will be injected on a wider scale until GD3. For these reasons, methane levels have been considered in three ranges.

8 Methane / hydrogen transition – sensitivities



The current version of the CBA template, version 4, already acknowledges that methane is estimated to be 28 times more damaging than CO₂. This figure is taken from the IPCC Fifth Assessment Report published in 2014. Since this figure is derived from the latest science, it is not considered prudent to test for sensitivity in this area.

Sensitivity in the value / cost of carbon is already included within the CBA template with base-case and high-case scenarios mapped out. These sensitivities are considered sufficient in our CBA.

The data for CBA used to test the Transmission Integrity Plan has been taken from our C55 Monetised Risk model. The methodology in the model is entirely consistent with NARMS. Since the methodology and factors used have been forensically assessed, tested and validated, it is not considered appropriate to test for sensitivities. Such factors include number of lives lost, numbers of supplies lost.

8.1 GD2 Outputs & Price Control Deliverables

Opex outputs

SIU operational costs have six main elements:

- human resource (managers/staff and industrial staff)
- operating/maintenance costs for the five SIU sites
- LNG haulage costs, including fleet maintenance costs
- LNG shipper services' costs (LNG from the Isle of Grain and/or Zeebrugge)
- LNG Tanker loading costs
- gas Quality – costs associated with monitoring consumers' appliances and maintaining the requirements of the HSE GS(M)R exemption.

Incremental growth on the SIU networks is flat due to a managed connections policy. New domestic customers do connect but this impact is balanced out by existing customers installing more efficient boilers which has seen a steady annual quantity maintained. Our connections' policy is detailed in our 4B statement which requires all costs associated with making a non-domestic connection to be tested against the economic test. Any new potential demands which would require an increase in the available storage at a SIU location would result in substantial costs being placed against the viability of that connection in the economic test. As a result, the majority of industrial / commercial connection requests are deemed to be fully chargeable and are uneconomic for the customer. This limited growth rate on the SIU networks results in a relatively stable haulage and shipper service costs.

In addition to regular maintenance, under legislation, the haulage fleet requires periodic inspection and these costs are factored in to the opex costs.

We are responsible for all elements of the SIU management: securing the provision of LNG at the relevant terminal, transportation of the gas to each SIU location, distribution the gas within the network, storage, gas processing, as well as new connections and any disconnections. This model creates efficiency savings and enhances security of supply arrangements, as any separation of these activities would require external contractors and would likely dilute the historical robust security of supply record and in turn would be both more expensive and would increase the risk profile associated with security of supply.

Table 7: Operating expenditure in GD2

£m's (18/19 Prices)	2021/22	2022/23	2023/24	2024/25	2025/26
Opex					
Fuel	0.93	0.93	0.93	0.93	0.93
Transportation	2.82	2.82	2.82	2.82	2.82
Administration	1.49	1.48	1.47	1.46	1.46
Other Opex:					
Holder Storage Maintenance	0.58	0.58	0.57	0.57	0.57
Leakage Control	0.11	0.11	0.10	0.10	0.10
Other Opex	0.40	0.40	0.40	0.39	0.39
Stranraer LDZ	-	-	-	-	-
Appliance Testing	0.31	0.31	0.31	0.30	0.30
Total Opex	6.63	6.62	6.60	6.59	6.57

* Stranraer removed from SIU cost base for GD2 and added to Scotland Gas Networks opex cost base.

Capex outputs

Our forecast GD1 and proposed capital expenditure on the SIUs in GD2 is summarised as follows.

Table 8: Capital expenditure in GD2

Capex	2021/22	2022/23	2023/24	2024/25	2025/26
Interim Solutions	-	-	-	-	-
Enduring Solutions	-	-	-	-	-
Other Capex	-	-	-	-	-
Preheating replacement	-	-	-	-	-
SIU Other Capex	-	-	-	-	-
Continuing SIU Capex	3.02	2.87	2.82	3.08	3.28
Total Capex	3.02	2.87	2.82	3.08	3.28

8.2 Bespoke outputs

We are proposing a single bespoke output for the SIU networks relating to the provision of investment grade feasibility studies for three SIU network locations at Thurso, Wick and Oban. We estimate that each study will cost in the region of ^{Commercial Conf} based on costs already incurred in GD1 for a similar study at the Campbeltown SIU location. We consider these studies are vital for operators and investors looking to invest in biomethane plants at these remote, rural locations and will provide the necessary information to provide the basis for an investment grade proposal. Once complete we will make the relevant information to prospective biomethane investors and operators to promote the viability and likelihood of biomethane sites being located on these networks.

8.3 Investment in Existing Assets – CBA/NARMs

Our approach to cost benefit analysis is based upon Ofgem’s CBA template and guidance notes within its Investment Decision Pack guidance of 20 September 2019. The Investment Decision Packs (Engineering Justification Paper and associated CBA) are discussed in the next section. Although NARMs are not relevant to this asset group the standard CBA methodology approach has been used to assess options for projects with a value <£500K.

8.4 Engineering Justification Papers

An overview of each individual project associated with the SIUs, including the road tanker ISO and road barrel fleet, is provided below. Where appropriate (i.e. for projects over £0.5m) EJPs and CBAs are included.

SIU	Project/Programme	Value £m	CBA Payback	Engineering Justification Paper - Reference	
Campbeltown	Replace Atmospheric Vaporisers	0.96	-0.3	50	SGN SIU 001 EJPDec2019
	E&I Upgrade	1.37	3.6	0	SGN SIU 003 EJPDec2019
	Vessel Replacement	1.25	1.1	12	SGN SIU 002 EJPDec2019
	Gas Quality	0.07			N/A
	Sigma CV Replacement	0.07			N/A
Oban	Replace Hot Water Vaporiser	1.57	2.4	9	SGN SIU 004 EJPDec2019
	Gas Quality	0.07			N/A
	LNG HP Vessel Revalidation	0.5			N/A
Stornoway	Removal/Decommissioning of pipeline & pig traps	0.19			N/A
	Gas Holder Volumetric Governors & Filling System	0.19			N/A
	Gas Quality	0.07			N/A
	E&I Upgrade	0.44			N/A
Fleet	Revalidate/Replace Road Fleet	4.7	0.5	21	SGN SIU 005 EJPDec2019
	Fleet Road Tankers & ISO Upgrades	1.56			N/A
Thurso	LNG HP Vessel Revalidation	0.5			N/A
Wick	LNG HP Vessel Revalidation	0.5			N/A
All SIU's	Site Proximity Switches/SSOV's upgrade	0.39			N/A
	Vessel Level Gauging	0.59			N/A
	COMMAH Plans	0.3			N/A
Total					

8.5 Investment in New Assets

We are not proposing any investment in new assets as part of our core business plan submission. Options for utilising the SIUs as decarbonisation test beds are discussed in Section 5 above.

8.6 Cost Efficiency

All SIU integrity projects are subject to our procurement contracting strategy detailed in our Procurement and Native Competition appendix (010). The tender specifically relating to the acquisition of LNG capacity at the Isle of Grain terminal is subject to full market tendering for all three LNG terminals across Europe ensuring the widest spectrum of gas shipper participation in the exercise. All main operational cost tenders including LNG, LPG and road transport align to our procurement strategy.

8.7 Managing Uncertainty

We are proposing two uncertainty mechanisms for the SIU networks in GD2 covering LNG gas quality and biomethane feasibility studies. In relation to LNG gas quality, we currently have a Gas Safety (Management) Regulations 1996 exemption with the HSE covering the Wobbe limit for the gas sourced from the Isle of Grain. This exemption is dependent on a number of factors being carried out by us, including customer appliance checks and close gas quality monitoring and forecasting. Despite our close monitoring of safety risks for our customers at the LNG SIU locations we are unable to control the overall gas quality limits sourced from the Isle of Grain facility. The Isle of Grain facility itself accepts LNG deliveries from all over the world which can vary greatly in quality depending on the original liquifying location. For example, LNG located from Algeria as opposed to Qatar may have substantially higher upper Wobbe index which would impact on the gas available for delivery to the SIUs. National Grid LNG currently ballast their LNG gas prior to it being injected in the national transmission system. However, the LNG made available to us for truck loading is not ballasted by

National Grid LNG and hence is susceptible to fluctuations in the Wobbe limit.

To mitigate this risk, we are proposing a price control re-opener mechanism if small scale nitrogen ballasting at each SIU location becomes necessary. The re-opener will trigger if the GS(M)R exemption is removed.

Our previous project costs associated with construction of a nitrogen ballasting plant at our Wick SIU location cost £3m with forecast operational costs of ^{Commercial Conf} per annum. We would expect efficiency savings over this initial project cost for the construction of three further ballasting plants at Thurso, Campbeltown and Oban. Upon triggering the re-opener, we will provide Ofgem with an up-to-date forecast of the capital and operating costs for assessment and approval.

Although we expect the risk of the withdrawal of the HSE exemption to be low as we are actively managing the risk in relation to LNG gas quality at the SIU networks through appliance testing and gas quality forecasting, there is a low risk that at any point throughout GD2 there would be a requirement to ballast LNG at the SIU networks.

In relation to the promotion of biomethane injection at the SIU locations, we are proposing that a use it or lose it mechanism is made available to enable the delivery of three biomethane plant feasibility studies covering the locations at Oban, Wick and Thurso. We have already completed a biomethane feasibility study at Campbeltown in conjunction with the Scottish Government which looked at the full range of requirements to locate and operate a biomethane plant on the gas network. We estimate that the cost of each study would be in the region of ^{Commercial Confidential} and therefore are proposing that a use it or lose mechanism is provided to cover these costs. The importance of decarbonising the SIUs was raised directly with Stakeholders in the SIUs and also by our Scottish Customer Engagement Group in their July 2019 report.

8.8 Competition

In relation to our opex strategy to maximise competition in the provision of services we intend to re-issue the tender for LNG gas shipper services in 2020 to the wider gas shipper market. In the previous tender issued in 2015 for commencement in 2016 we received several tender responses to provide LNG capacity at the Isle of Grain and other European ports. Now that the operation of this complex tendering arrangement is established we have a greater understanding of the LNG market and will be able to structure the tender to maximise involvement from the gas shipper community.

We also intend to re-issue the provision of LPG for Stornoway prior to the commencement of GD2. As previously, we will issue this tender to the wider LPG market which is well established in Scotland. We also intend to request whether LPG suppliers will be able to include an element of bio-LPG within their submissions to reduce the overall environmental impact of our network in Stornoway.

The issuing of the LNG and LPG haulage contracts will take place in GD2 (planned for 2022) and will again specify modes of transport which enable cheaper and more environmentally friendly modes of transport including increased use of rail as opposed to road transport. All tenders will be issued in line with the overall SGN procurement contracting strategy detailed in the Procurement and contracting Appendix 010.

8.9 Real Price Effects

Real price effects impacting on the SIU operation relate mainly to the acquisition of LNG capacity at the Isle of Grain, transport costs linked to rising fuel costs and market costs of obtaining LPG for the Stornoway SIU. Brexit and implications of a 'no deal' arrangement following the UK's planned exit from the European Union on 31st October 2019 may impact on our contingency arrangements at Zeebrugge where we have booked tanker loading slots in the event that the Isle of Grain facility is not available due to maintenance or unplanned shut down. In relation to the acquisition of LNG capacity at the Isle of Grain, the current commercial arrangement requires us to pay a premium for each therm of energy booked for SIU use. This premium has remained static throughout GD1 and is added to the cost of commodity obtained by the contracted gas shipper at the Isle of Grain. The commodity costs are linked to month ahead average LNG hub prices as published on the

Intercontinental Exchange (ICE) index for the Isle of Grain and are compared to National Balancing Point (NBP) system average sell prices to calculate a cost of commodity to us. The ICE and NBP indices have remained largely in line across GD1. However, unknown impacts associated with Brexit may cause price increases in this area. Costs associated with LPG acquisition are market linked and follow international oil price indices. Despite tendering for LPG provision on a regular basis there is a risk that these costs may increase due to international market factors.

8.10 Financial Summary

Major trends in our GD2 forecast are:

- significant opex cost reductions from 2016 onwards linked to the move from Avonmouth to the Isle of Grain LNG facilities;
- Stranraer LDZ costs associated with booking capacity on the Premier Transmission pipeline have been removed from the SIU costs base and added into the Scotland Gas Networks cost base. This removes an historical legacy where Stranraer was previously a SIU network until it was connected indirectly by pipes to our network; and
- capex investment in the SIU networks across GD2 has been structured on a delivering a safe network with minimal investment in new assets

Table 9: **Commercial Confidentiality**

9 BPD 3.01 LTS, storage & entry

The table below demonstrates the Capital expenditure for SIU works through GD1 thus far as well as the investment for the remainder of GD1 and throughout GD2. The investment proposals below are contained within the LTS, Storage and Entry tab, 3.01 of the Scotland BPD.

Table 10: Capital expenditure for SIU

SIU Capex (£M 18/19 prices)	13/1 4	14/1 5	15/1 6	16/1 7	17/1 8	18/1 9	19/2 0	20/2 1	21/2 2	22/2 3	23/2 4	24/2 5	25/2 6
Interim Solutions	1.80	0.66	0.49	0.03	0.00	-	-	-	-	-	-	-	-
Enduring Solutions	-	1.23	2.72	2.10	0.92	0.66	-	-	-	-	-	-	-
Other Capex:													
Pre-Heating Replacement	-	0.65	2.00	0.06	-	-	-	-	-	-	-	-	-
SIU Other Capex	0.45	0.35	0.27	0.77	0.28	0.84	-	-	-	-	-	-	-
Continuing SIU Capex	-	-	-	-	-	-	3.07	3.29	3.02	2.87	2.82	3.08	3.28
Total Capex	2.25	2.88	5.48	2.95	1.20	1.51	3.07	3.29	3.02	2.87	2.82	3.08	3.28

* Stranraer removed from SIU cost base for GD2 and added to Scotland Gas Networks opex cost base.

9.1 Assurance

Our Business Plan, including Appendices, has been subject to a rigorous assurance process which is detailed in Chapter 3 of the Plan and the Board Assurance Statement.

Our Network Director was appointed as the Sponsor for the Statutory Independent Undertaking (SIU) Appendix and the associated Cost Benefit Analyses (CBAs), Engineering Justification Papers (EJPs) and Business Plan Data Templates (BPDs); which have been through the following levels of review and assurance:

First Line

This was undertaken at project level by the team producing the document, as a regular self-check or peer review.

Second Line

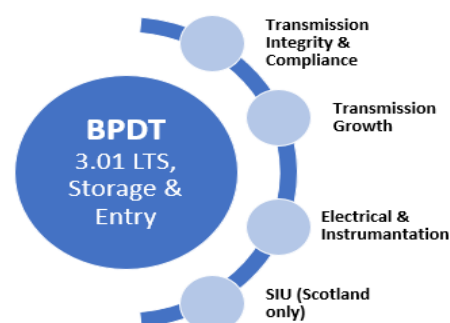
This was undertaken independently within the organisation to review and feedback on product development, including GD2 workshops on SIUs, Capital Expenditure (CAPEX), CBAs and EJPs. Internal Audit reviewed the third line assurance work conducted by Ove Arup and Partners against scope.

Both Senior Manager and Director sign-off was obtained and our RIIO-GD2 Executive Committee: (1) considered the appropriateness of assurance activity for the Appendix and (2) provided assurance to SGN's Board that the Business Plan meets Ofgem's assurance requirements.

Third Line

This was undertaken by external advisors and groups providing critical challenge during the development of products within the Business Plan. In addition to the feedback and challenge provided by the Customer Engagement Group (CEG) and Customer Challenge Group (CCG) this Appendix was developed after

Figure 4: BPD 3.01



consultation with and advice from:

Advisor / Group	Contribution
Ove Arup and Partners	Consultancy support to enable development of an evidence based high quality business plan draft by acting as an expert challenge group through independent peer reviews against Ofgem Business Plan Guidance.

Fourth Line

This was undertaken by independent and impartial external providers, who provided a detailed and comprehensive report to both the Executive Committee and Board of Directors:

Advisor / Group	Contribution
Ove Arup and Partners ('Clean' Team)	Review of Appendix against Ofgem's assurance requirements.
PwC	Business Plan Data Template review: Opex Cost Matrix: Controllable Activity Costs

10 Glossary

All acronyms and associated descriptions can be found within the Glossary appendix.

11 Annex

Engineering Justification Papers Contents

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e.	Level Gauging Upgrades - Campbeltown, Oban, Thurso, Wick, Stornoway
f.	Gas holder volumetric governor and filling system - Stornoway
g.	Gas Quality - Stornoway
h.	COMAH Drawings and Emergency Plans – Campbeltown, Oban, Thurso, Wick, Stornoway
i.	Removal and decommission LPG pipeline and pig traps - Stornoway
j.	HP vessel re-validation - Oban, Thurso, Wick.....
k.	LNG Road Barrel and ISO tank Replacement and Re-Validation.....
l.	Fleet – Road tanker and ISO Component Upgrades.....
m.	Campbeltown – LNG Vessel replacement and repair.....
n.	Oban Gas Chromatograph Replacement.....
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Annex redacted

9. Annex B

SIU Enduring Options. Engineering Justification Framework

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