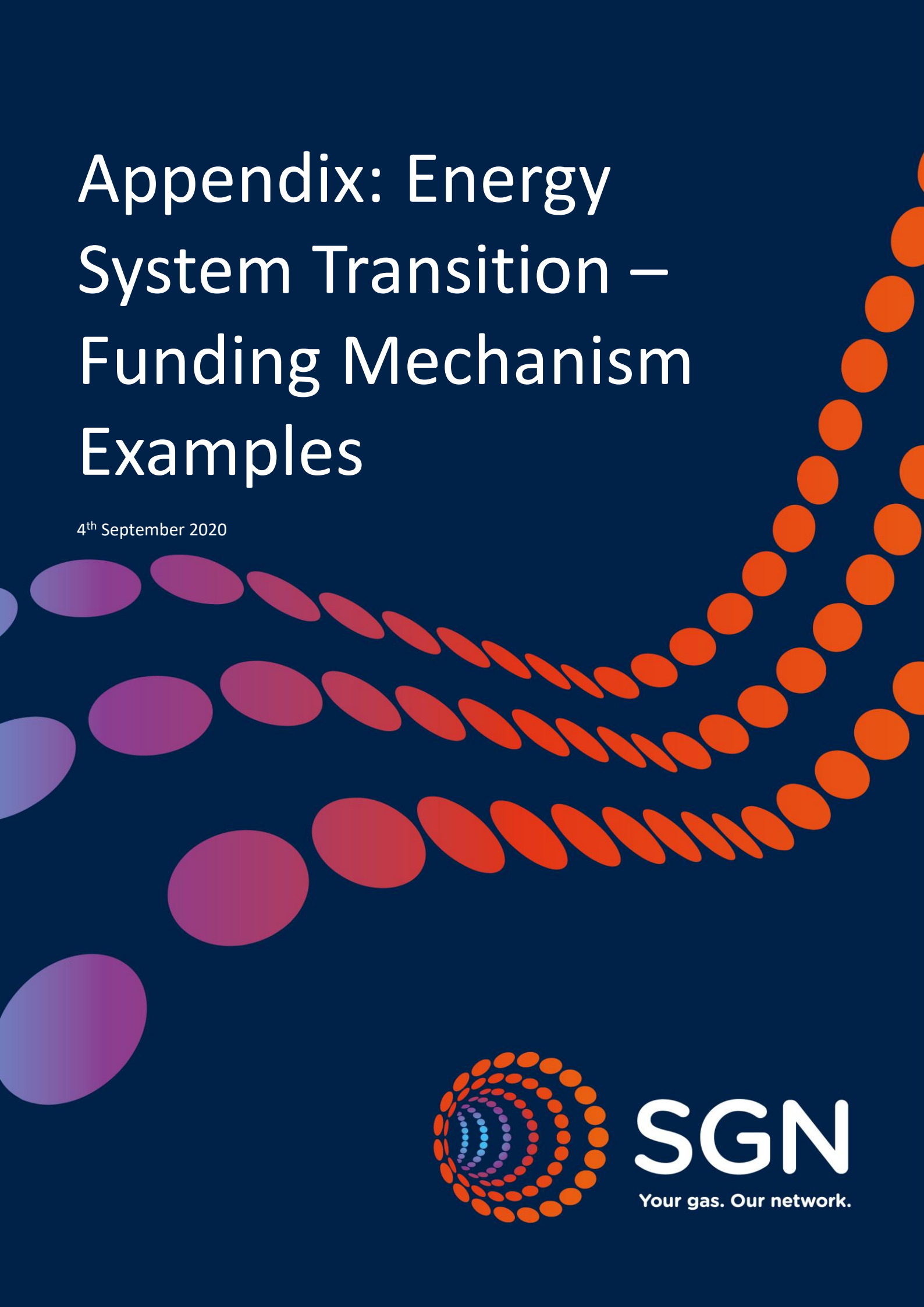
Appendix: Energy System Transition – Funding Mechanism Examples

4th September 2020



SGN

Your gas. Our network.

Introduction

We are pleased that Ofgem have recognised that the development of a cohesive and viable pathway for decarbonisation will require support through the Strategic Innovation Fund (SIF), Net Zero Re-Opener and Heat Policy Re-Opener.

However, it is important to work through real examples of how these mechanisms will support projects to ensure we are able to deliver to stakeholder wants and needs, and the pathway to decarbonisation of the gas network.

This document supports our draft determination consultation response by providing examples of how these mechanisms can support some of the key projects from our GD2 business plan.

8.2 Innovation (core document)

8.2.1 Strategic innovation fund (core document)

Strategic Innovation Fund

Q24 Do you agree with our proposals for the RIIO-2 Strategic Innovation Fund?

We broadly agree with the proposals set out in the draft Determination Core Document and welcome the opportunity to help shape the Strategic Innovation Fund.

It is important to recognise that the development of a cohesive and viable pathway for decarbonisation will require the support, through SIF, of projects that are of significant scale and would not be undertaken business as usual. The value of these can be attributed to the whole energy system transition through the delivery and demonstration of outcomes, leading to roll out on later price control periods. We have set out within our business plan a programme of known SIF projects, and their anticipated cost to support the design of the new SIF mechanism[1]. An example of this is our "Future of LTS (Local Transmission System)" programme of works proposed to be undertaken during GD2[2].

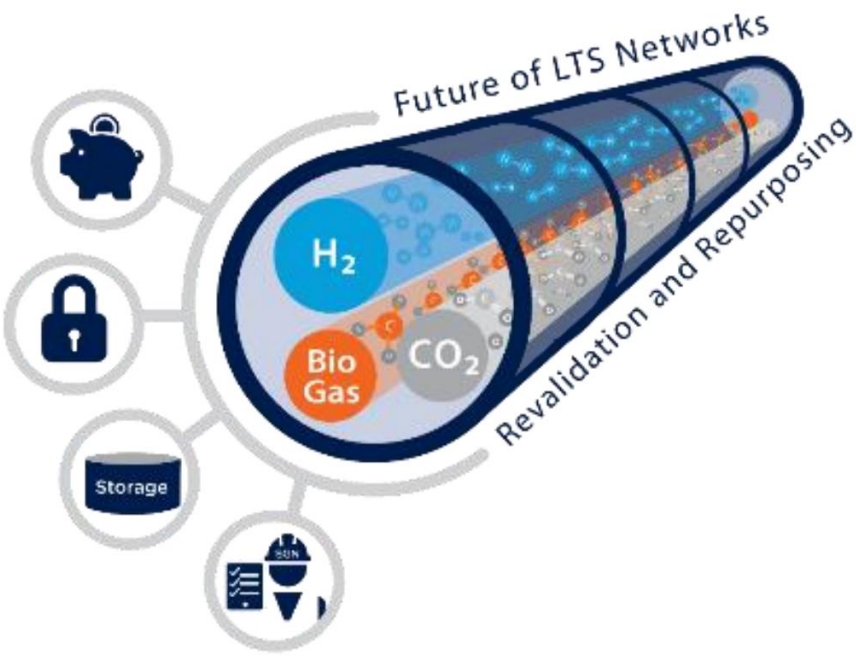
Example Project: The Future of the LTS

"The Future of LTS" is designed to develop the safety, technical and practical evidence to support the use of hydrogen in the LTS. The research work proposed underpins many aspects of the decarbonised pathway; the work will inform network safety and impact, provide the technical input to ensure decarbonisation of industrial clusters can be delivered, the role of LTS in system transformation and the impact on hydrogen roll out and green recovery.

[1] Appendix-006-SGN Energy System Transition, Annex 8, (page 43)
[2] Appendix-006-SGN Energy System Transition, Annex 8, GD2 Pathways Projects, Future LTS (page 52)

For our proposal there will be a requirement for different elements of the project to be funded through both the NIA and SIF mechanisms. The NIA will provide the foundation and building block elements of the R&D, to establish the necessary evidence to progress to the required full-scale field trial of our Granton to Grangemouth pipeline, funded under SIF.

A high-level breakdown, taken from our Business Plan Appendix 006, of the various elements within the project is shown in the table below, with the anticipated timing, funding mechanism and estimated cost for each.



Phase	Timing	Funding Mechanism	Amount (£ Million)
Laboratory and Offline Testing	2021 – 2022	NIA Energy System Transition	0.2
LOHC Feasibility Study	2021 – 2022	NIA Energy System Transition	0.3
Insertion/Lining Feasibility Study	2023 – 2024	NIA Energy System Transition	0.3
Pipeline Hydraulic Testing and Integrity Inspection and Assessment	2021 – 2022	NIA Energy System Transition	1.5
Experimental Design and Risk Assessment	2021 – 2022	NIA Energy System Transition	1.5
Engineering Design and HAZID	2022 – 2023	NIA Energy System Transition	1.5
QRA to Assess all Known and New Risks and Assign Frequency	2022 – 2023	NIA Energy System Transition	0.3
Full Scale Field Trial	2021 – 2024	SIF Energy System Transition	18

Benefits

The Future LTS project enhances the evidence for the safety case which proves the safe transportation of H_2 and CO_2 through the gas network. This project contributes to the development of key hydrogen storage and carbon capture innovations on the pathway to decarbonisation. Furthermore, the ability to use existing infrastructure to transport H_2 and CO_2 can result in reduced cost and disruption to consumers.

8.1 Net zero re-opener (core document)

Net Zero Re-Opener

Q23 Do you have any views on our proposed approach to a Net Zero re-opener?

All Net Zero options should be carried out with supporting CBA, considering at appropriate scale alternative options (i.e. electrification v hydrogen vs biomethane), and demonstration of value for money for customers through partnership selection and commercial process. Ofgem must ensure they are agile and responsive to emerging technologies in their triggering of the re-opener mechanisms.

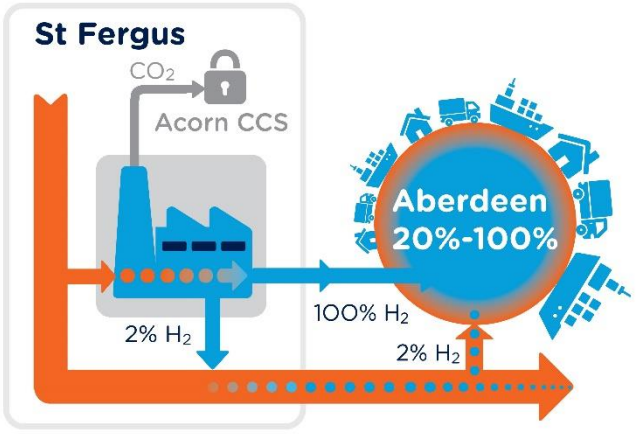
The Net Zero re-opener should consider co-dependent projects out with the traditional networks e.g. the Acorn CCS project is co-dependent on the Aberdeen Vision, project Cavendish and industrial clusters project.

Our "Aberdeen Vision" project is proposed to be funded through the Net Zero Re-opener during GD2[3].

Aberdeen Vision

Our Aberdeen Vision project in partnership with National Grid is one of the projects which, in GD2 and beyond, is intended to demonstrate the commercial viability of:

- Injecting 2% hydrogen into the NTS.
- A 100% hydrogen pipeline to Aberdeen.
- A 20% blend into the Aberdeen distribution network



St Fergus gas terminal, located 40 miles north of Aberdeen, is well suited as a hydrogen development location. Central to Aberdeen Vision would be an SMR plant producing hydrogen from natural gas landed at St Fergus. CO_2 released from the gas during this process would be captured and exported to the proposed Acorn CCS project.

Product hydrogen would be exported to Aberdeen and captured CO2 exported offshore for sequestration. Hydrogen would be exported down to Aberdeen both as a 2% blend into the NTS and in a dedicated 100% hydrogen pipeline. Hydrogen is already in use for transport in Aberdeen, where a fleet of hydrogen fuel cell buses and two refuelling stations are currently in operation and proposals are in progress to double the capacity. Hydrogen supplied to a hub at Aberdeen could supply these refuelling systems, be blended into the local natural gas network at 20% and would offer further opportunities for 100% hydrogen use in shipping and other markets.

Benefits

Preparedness for deep decarbonisation of Aberdeen region, bringing about carbon reduction benefits and air quality improvements. Stimulation of hydrogen economy will bring widespread macroeconomic benefits in the region.

For our proposal there will be a requirement for different elements of the project to be funded through both the NIA and Net-Zero Re-opener mechanisms. The NIA will fund second stage feasibility, to establish the necessary evidence to progress to full-scale decarbonisation of the Aberdeen region, funded under the re-opener.

Phase	Timing	Funding Mechanism	Amount (£ Million)
Second Stage Feasibility	2021 – 2022	NIA Energy System Transition	0.5
Detailed Design and Permitting	2022 – 2023	Net Zero Reopener	7

[3] Appendix-006-SGN Energy System Transition, Annex 8, GD2 Pathways Projects, Aberdeen Vision (page 51)

65 km Hydrogen Pipeline to Aberdeen	2023 – 2024	Net Zero Reopener	70
Aberdeen Hydrogen Network (10 km LP H2 Distribution Pipeline and 4/5 PRU's	2023 – 2024	Net Zero Reopener	15
End User Conversion at Aberdeen (300 Domestic Users)	2025 – 2026	Net Zero Reopener	2

7.3 GD specific uncertainty mechanisms (gas distribution annex)

7.3.7 Heat policy (including energy efficiency) (gas distribution annex)

Heat Policy Re-Opener

GDQ46 What are your views on our consultation position to address bespoke decarbonisation of heat re-openers through our proposed innovation stimulus, Net Zero and Heat Policy re-opener mechanisms?

We believe that a solution for H100 Fife can be implemented that requires no derogation, licence consent, licence exemption or changes to regulatory arrangements. The only likely requirement would be a letter of comfort from Ofgem addressing the fit of the project into The Gas (Calculation of Thermal Energy) Regulations 1996 (as amended)[4].

As we progress to conversion trials, such as H100 ph2 and H21 ph3, exemption to the GS(M)R for 100% Hydrogen from the HSE and affected customer consent will be required, unless new legislative powers are introduced. Hydrogen does not have a framework of legislation in the same way as natural gas; therefore, it is expected, subject to the success of key projects such as H100 Fife, that new legislation will be introduced.

We have been working closely with the wider industry on changes to GSMR. Initially it is proposed to introduce a new IGEM standard for the 2H family of gases, effectively replacing schedule 3 from GSMR. This will not, in the first change, include allowance of hydrogen up to 20%, however, will facilitate this amendment later, once fully evidenced by national projects, such as Hydeploy. We have not included a top down approach to hydrogen injection, i.e. via NTS for the reasons described in the main body of our response.

7.2.5 Addressing changes to legislation, policy and technical standards (core document)

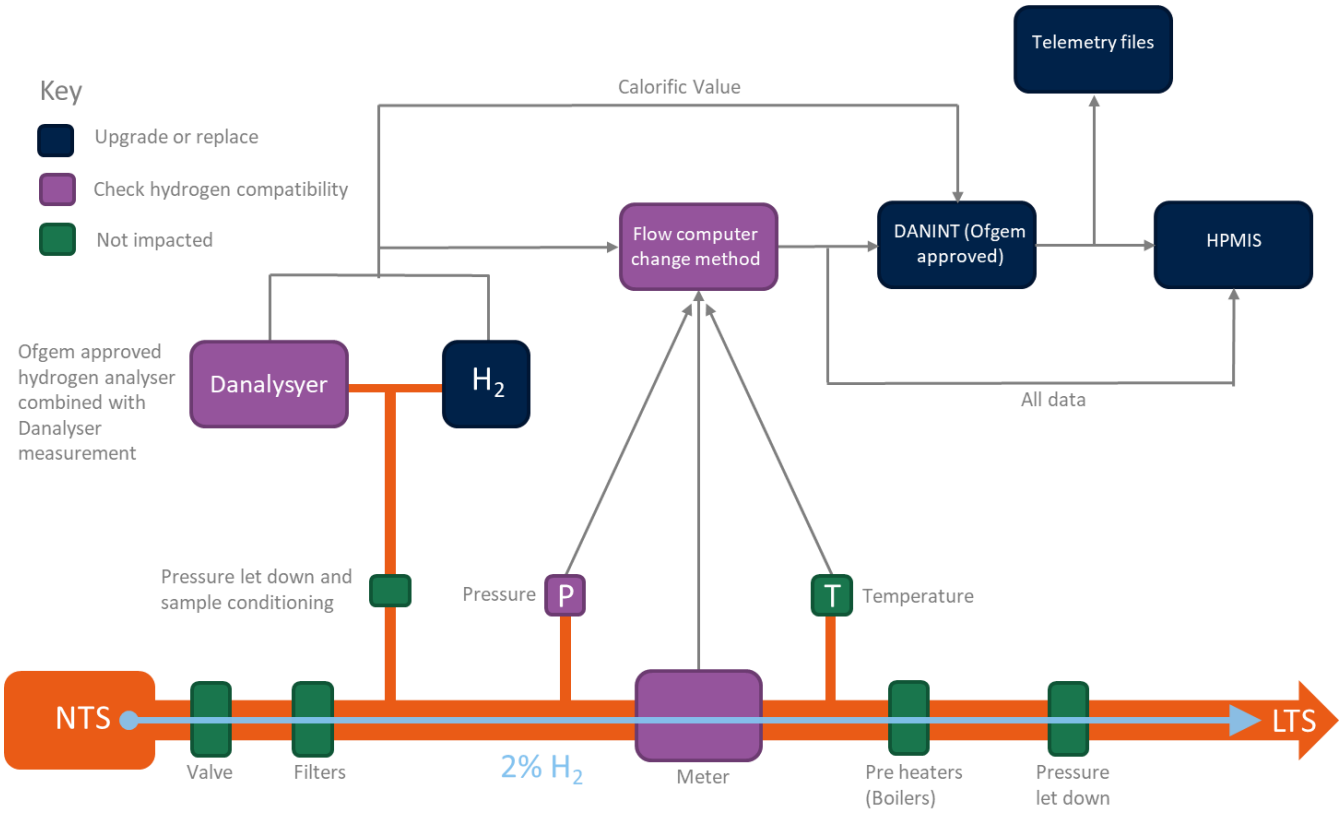
Q20 Do you agree with our approach regarding legislation, policy and standards?

Illustration of the level of intervention required to facilitate a 2% hydrogen blend from the NTS at an NTS/GDN offtake.

[4] SGN H100 Fife NIC ISP Final – April 2020 - https://www.ofgem.gov.uk/system/files/docs/2020/05/sgn_h100_fife_nic_isp_final_06.04.20.pdf, Full NIC H100 Fife bid submitted by SGN 31st July 2020

[5] Appendix-006-SGN Energy System Transition, Section 4.1 (page 24)

[6] Appendix-006-SGN Energy System Transition, Section 4.1 (page 25)



Changes will also be required to GSMR to make it agnostic to the gas delivered, similar to the Gas Act 1996 (as amended). These changes will allow the future introduction of a 4th family of gas industry standard, for pure hydrogen.

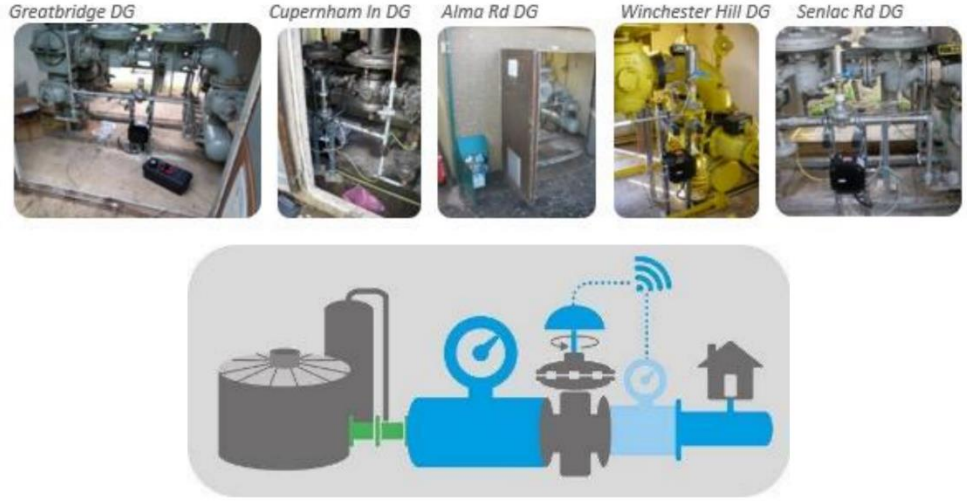
4.6.1 Biomethane improved access rollout (SGN annex)

SGNQ3 Do you agree with our proposal for SGN's bespoke biomethane technology rollout PCD?

Biomethane improved access rollout PCD

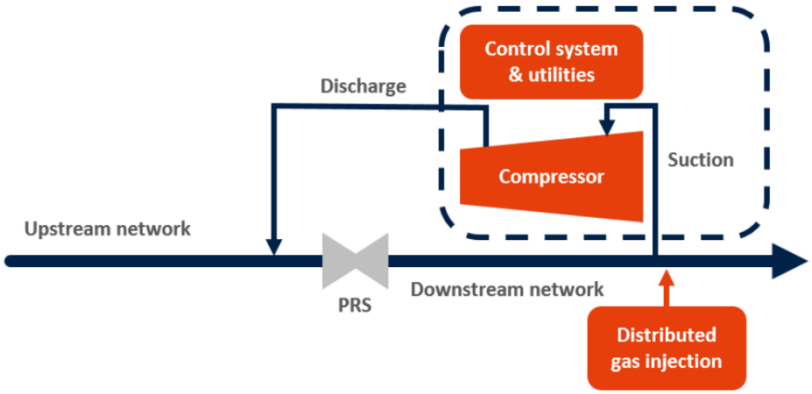
Ebbsfleet example for smart control of biomethane in the network[5]

At Ebbsfleet biomethane facility in Kent we are in discussion with the producer to trial the new pressure management and control technology we have developed in RIIO-GD128. This smart Utonomy/SGN solution allows automated set-point control of the injection facility, which works in conjunction with the district governors (the pressure control systems supplying the local network). This would prioritise the injected flow rate from the biomethane entry points by line packing our network with biomethane.



Gore Basin - Isle of Wight example of Reverse Compression Optimised Capacity[6]

The constraint issues identified for distributed gas producers where there is insufficient demand on the network to accommodate the constant volume of gas they can inject could be solved using other methods.



There are various theoretical solutions to this issue, as 'line-packing' of the immediately accessible system will only accommodate a slight increase in injection capacity for a limited period before injection can no longer be achieved.

One possible solution to the issue of insufficient demand would be to install compressor equipment at an existing PRS(s) and compress gas to the higher pressure tier upstream. This is essentially expanding the accessible mains network in which the distributed gas can be temporarily stored (i.e. 'linepack' on the network upstream of the injection facility).

Gore Basin biomethane facility is an existing embedded entry point injecting into the Isle of Wight Medium Pressure grid, the injection rate for this facility is currently 600 scm/h. This site can experience issues with the entry of gas during low demand periods, especially overnight during the summer months.

The project will look at the various elements in compressor design, installation and control, including dynamic simulation of the compressor operation in a stable manner with optimal compressor capacity, electrical demand and connection and site location.