



# **Detailed Design Phase of the Hydrogen Village Trial**

**Application Form**

December 2022

# Contents

<b>1. Application Introduction .....</b>	<b>3</b>
<b>2. Project Details .....</b>	<b>4</b>
<b>3. Eligibility .....</b>	<b>8</b>
<b>4. Table of References .....</b>	<b>10</b>
<b>5. Project Overview .....</b>	<b>14</b>
<b>6. Evidence Base .....</b>	<b>18</b>
<b>7. Planning and Project Delivery Risk Mitigation.....</b>	<b>43</b>
<b>8. Infrastructure and Delivery.....</b>	<b>63</b>
<b>9. Public and Local Engagement .....</b>	<b>91</b>
<b>10. Cost and Commercial .....</b>	<b>112</b>
<b>11. Grant Funding Agreement .....</b>	<b>135</b>

# 1. Application Introduction

## 1.1 Application Guidance

You should ensure that they read the Hydrogen Heating Village Trial Stages 3 to 5 Funding Application Guidance before answering the questions set out within this document. You should also refer to the Trials Evidence Framework in Annex B.

Your application will comprise two main elements:

### 1. Completed Application Form

You should provide written responses within each answer box provided in this form and ensure they keep to the overall word count set for each section. Questions are based on the assessment criteria set out in the Hydrogen Heating Village Trial Stages 3 to 5 Funding Application Guidance.

In some cases, 'Additional guidance' is provided in this form to give further clarity on what should be covered in responses. You must include everything specified in the additional guidance in your answer.

### 2. Additional Attachments

For certain questions, GDNs are required to provide attachments alongside their written submission. These attachments are mandatory. You should refer to relevant sections of attachments in your answers in the Application Form.

All attachments should be clearly labelled with the correct corresponding letter (i.e. Attachment **A**) at the top of the document. See Table 1 Table of References below for a list of all attachments required.

If you wish to provide additional supporting evidence, this should be clearly labelled and signposted in the relevant sections of your Application Form response.

Please note that references to supporting evidence do not count towards word limits, however referencing should not be used to expand the word limit. If excessive amounts of information is provided as supporting evidence, assessors may not review all documents.

## 2. Project Details

2.1 Project Details	
<b>Organisation Name:</b>	Northern Gas Networks
<b>Charity No. or Companies House Registration No.</b>	<p>Northern Gas Networks Limited (05167070).            Northern Gas Networks Operations Limited (03528783).            Northern Gas Networks Holdings Limited (05213525).            Northern Gas Networks Pensions Trustee Limited (05424249).            Northern Gas Networks Finance Plc (05575923).</p> <p>Registered address: 1100 Century Way, Thorpe Park Business Park, Colton, Leeds LS15 8TU.</p> <p>Northern Gas Networks Pension Funding Limited Partnership (SL032251). Registered address: 1st Floor Citypoint, 65 Haymarket Terrace, Edinburgh, Scotland, EH12 5HD.</p>
<b>Project Title:</b>	Redcar Hydrogen Community

2.2 Lead Contact Details	
<b>Name:</b>	████████████████████
<b>Email:</b>	████████████████████
<b>Phone Number:</b>	████████████████████
<b>Job Title / Position in Organisation:</b>	████████████████████
<b>Organisation Address:</b>	Northern Gas Networks
<b>Address Line 1:</b>	1100 Century Way
<b>Address Line 2:</b>	Thorpe Park
<b>Address Line 3:</b>	
<b>Address Line 4:</b>	
<b>Town / City:</b>	Leeds
<b>Postcode:</b>	LS15 8TU

**2.3 Summarise the aims and objectives of your organisation.**

Northern Gas Networks (NGN) is proud to be the North of England's gas distributor. By transporting gas to homes and businesses across the North East, Cumbria and much of Yorkshire, Northern Gas Networks (NGN) provides an essential service to 6.8 million customers.

Our priorities are to provide a safe and reliable service at the right price, deliver outstanding customer service, provide support for those customers in vulnerable situations, and continue to respond to the pressing issue of climate change by developing green forms of energy and reducing the carbon footprint of our day-to-day operations.

NGN's current Business Plan is the most ambitious to date. It builds upon a bold and imaginative programme of service delivery and reinvention which began in 2005.

Highlights of our 2021 to 2026 business plan include:

### **Reducing customer bills**

NGN recognises that affordable bills are a priority for our customers, and NGN will deliver a 6% real-terms reduction in bills from 2021.

### **Continued investment in our networks and delivering for the environment**

NGN will invest close to £800 million in our assets to maintain the high standards of safety and reliability our customers expect.

### **Delivering an outstanding customer experience**

NGN will continue to enhance the customer experience, to maintain our position as the industry's leader in customer satisfaction.

### **Help for those who need it most**

NGN will support customers who are struggling financially, or in vulnerable circumstances, through an enhanced support programme, and through partnerships with expert organisations.

### **Developing green forms of energy**

NGN will support the UK's carbon reduction ambitions, by continuing our industry-leading work to develop green forms of energy and supporting integrated energy solutions.

With the UK tasked with reaching net zero emissions by 2050, there is an urgent need to develop affordable, renewable energy solutions.

During RII0-1 NGN have been a UK leader in the research and development of green, renewable forms of gas, such as hydrogen. Our H21 programme, to assess the practical, environmental and safety considerations around converting existing gas networks to hydrogen, has galvanised the industry, and attracted international attention.

NGN have also championed the cause of integrated energy solutions and smart networks, involving gas, electricity, renewables, and transport. NGN launched InTEGReL in conjunction [REDACTED] – an incubator for integrated energy system technology – allowing utilities and businesses to test their whole-system ideas in real-world



[REDACTED]

A copy of the audited accounts is provided in Attachment A.

**2.7 Since 2017 has your organisation been in receipt of other grant funding from BEIS? If so, please give details of what that is/was for, the time period it covers and the team you liaised with.**

BEIS Funding source	Details	Period	BEIS Team you liaised with
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED] [REDACTED] [REDACTED]

**2.8 Has a member of the Board of Trustees / Directors signed off this proposal for funding for the Village Trial? Provide his/ her contact details.**

The proposal has been signed off by [REDACTED]

Contact Details:

NGN Thorpe Park, 1100 Century Way, Thorpe Park Business Park, Colton, Leeds LS15 8TU.

Email Address: [REDACTED]

Telephone Number: [REDACTED]

**2.9 Total lifetime project costs (please use 2018/19 prices)**

	Total project cost (£m)	Total BEIS allocated cost (£m)	Total Ofgem allocated cost (£m)	Private contribution/ match funding (£m)	Other (£m)
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

# 3. Eligibility

## 3.1 Have you applied for funding for a similar project or service you are currently undertaking?

There are three projects that would inform or support the bid:

### Hydrogen Town

Department for Energy Security and Net Zero (DESNZ) are currently reviewing NGN's bid for grant funding to continue planning activities for the deployment of 100% hydrogen for three town locations and beyond, within a 7-year period.

### H21 Programme

The H21 programme comprises multiple projects to tackle the many different challenges of a hydrogen gas conversion. They are funded by Ofgem through their Network Innovation Competition (NIC) and Network Innovation Allowance (NIA) funding streams and involve different partners to give access to the best areas of expertise.

### Hydrogen Home

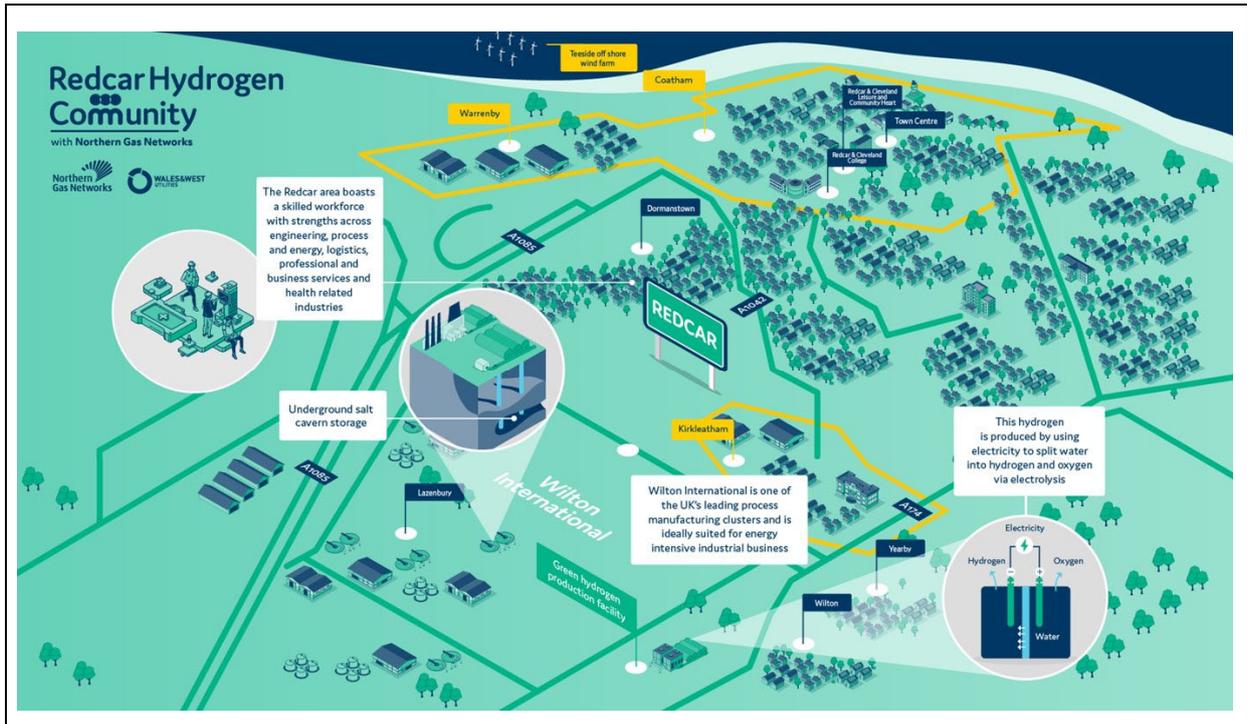
Hydrogen Home was officially opened to the public in July 2021 and was partially grant funded by the department for Business, Energy, and Industrial Strategy (BEIS now DESNZ). Hydrogen Homes will remain open for 3 years and will be used to showcase all the hydrogen appliances and educate everyone about hydrogen being used as a fuel. They were built by Northern Gas Networks in partnership with Cadent and (the former) BEIS.

## 3.2 Where will the activity be delivered (across United Kingdom, Wales, England, Scotland, Northern Ireland)? Please be specific.

Teesside is at the heart of the UK's green industrial revolution with significant hydrogen production facilities under development by major industrials, world-leading natural assets for storage, and a range of industries seeking to decarbonise with hydrogen. With the vision for the development of a hydrogen economy through East Coast Hydrogen, Redcar is ideally placed to deliver an effective Hydrogen Village Trial (HVT).

The Redcar Hydrogen Community (RHC) Project comprises residential and commercial sites in the Warrenby and Coatham areas of Redcar, and an industrial site at Kirkleatham in Redcar. The total population of the project area is 5,866, and includes a diverse building stock including homes, shops, leisure facilities and light industrial units.

The figure below outlines the trial area and also identifies the location of supporting activities, including hydrogen production and storage.



**3.3 Is your organisation a non-profit making organisation? (that is, carrying out not-for-profit activities but is not a public body or local authority)?**

**If your organisation is not a registered charity (CIC or CIO), we may need to check your governing documents to assure ourselves that you are a non-profit making organisation.**

NGN is not a non-profit making organisation.

**3.4 State the legal structure of your organisation**

- A Charity registered on the charity commission website
- A Corporate body – company limited by guarantee (registered at Companies House)
- A Community Interest Company (registered at Companies House or CIC regulator)
- A co-operative (we will need to see your governing documents)
- An Independent Provident Society (we will need to see your governing documents)
- New Charitable Incorporated Organisation (CIO)
- None of the above, but the organisation has a formal constitution (set of rules) or governing document which shows its objectives and management structure

Other please specify:

## 4. Table of References

The following table contains a list of all the mandatory attachments required as part of the application.

Please list within Table 1 any additional supporting documents submitted as part of your application, clearly referencing within individual questions the relevant sections or pages from each document.

Table 1: Table of References

<b>Section</b>	<b>Mandatory attachments</b>	<b>Additional supporting documents</b>
Project overview	<ul style="list-style-type: none"> <li>Attachment A – Most recent audited accounts</li> </ul>	None
Evidence base	<ul style="list-style-type: none"> <li>Attachment B – Evidence against the Trial Evidence Framework</li> <li>Attachment C – Detailed Survey Data</li> <li>Attachment D – Monitoring and Evaluation Framework</li> <li>Attachment E – Final Detailed Plan for Safety Evidence</li> <li>Attachment F – Status Update on the 10 Collaborative End User Safety Evidence Projects</li> </ul>	<ul style="list-style-type: none"> <li>Redcar Hydrogen Village – Residential Properties Electrification Report</li> <li>Redcar Hydrogen Community - Consumer Offer</li> <li>Attachment K - Consumer Protection Plan</li> <li>Third Party Research Reports.</li> <li>End User Conversion Procedures.</li> <li>Redcar Hydrogen Community - Expected Benefits</li> <li>Redcar Hydrogen Community – Monitoring &amp; Evaluation Plan</li> <li>HAZID &amp; HAZOP Studies</li> <li>NGN Personal Data Privacy Notice</li> <li>Redcar Hydrogen Community – Network Design Plan.</li> <li>Redcar Hydrogen Community – Sectorisation Plan.</li> <li>Stage 2 Consumer Research Report.</li> <li>Redcar Hydrogen Community - Training Plan</li> </ul>
Planning and risk mitigation	<ul style="list-style-type: none"> <li>Attachment G – Risk Register</li> <li>Attachment H – Exit Plan</li> <li>Attachment I – Detailed Workforce Plan</li> <li>Attachment J – Detailed Project Schedule</li> </ul>	<ul style="list-style-type: none"> <li>Redcar Hydrogen Community - Consumer Offer</li> <li>Consumer Panel 7</li> <li>Heads of Terms</li> <li>Letters of Intent</li> </ul>

		<ul style="list-style-type: none"> <li>• Redcar Hydrogen Community - Network design plan</li> <li>• PQQ Documents</li> <li>• Procurement strategy submission</li> <li>• RACI Matrix</li> <li>• Rate card</li> <li>• Redcar Hydrogen Community - Exit Options</li> <li>• Redcar Hydrogen Community – Resourcing and Recruitment Plan.</li> <li>• Redcar Hydrogen Community - Training Plan</li> <li>• RHC Organogram</li> <li>• Redcar Hydrogen Community - Sectorisation plan</li> <li>• Supplier code of conduct</li> <li>• Supplier Status Table</li> <li>• Sustainable Procurement Strategy</li> </ul>
<p>Infrastructure and delivery</p>		<ul style="list-style-type: none"> <li>• Attachment C – Survey Data</li> <li>• Attachment L – Completed Cost Template</li> <li>• Above 7 barg Planning Strategy</li> <li>• Below Ground Storage Study</li> <li>• Biomethane Connection Schematic</li> <li>• NGN H2 Village Trial RAM Study - Phase 1 Base Assumptions Report</li> <li>• NGN H2 Village Trial RAM Study – Phase 1 Results</li> <li>• Heads of Terms</li> <li>• Hydrogen Model Direct and Hydrogen Model via Storage</li> <li>• Hydrogen Supply Agreements – [REDACTED]</li> <li>• Hydrogen Village Trial – Appliance Procurement Strategy.</li> <li>• Hydrogen Village Trial – Hydrogen Alternatives Report.</li> <li>• Hydrogen Village Trial Stage 2 Regulatory Framework.</li> <li>• Letters of interest</li> <li>• [REDACTED]</li> <li>• - Analysis &amp; Recommendations for Redcar Hydrogen Village Metering Installations</li> </ul>

		<ul style="list-style-type: none"> <li>• Redcar Hydrogen Community - Network Analysis plan February 2023</li> <li>• Redcar Hydrogen Community - Network Design Plan</li> <li>• Operating Modes</li> <li>• [REDACTED] Technical Proposal</li> <li>• Pre-qualification procurement documentation</li> <li>• Purge and Relight Framework Agreement</li> <li>• AGI &amp; Pipeline Materials Quotes from Vendors</li> <li>• Redcar Hydrogen Community: Domestic Survey Updates</li> <li>• Redcar Hydrogen Community: Electrical Alternatives Report</li> <li>• RRP Table 9.03 and 9.04</li> <li>• Redcar Hydrogen Community - Sectorisation Plan</li> <li>• System Control Process Flow</li> <li>• Upstream Design</li> </ul>
Public and local engagement	<ul style="list-style-type: none"> <li>• Attachment K – Consumer Protection Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Comms &amp; Engagement Strategy.</li> <li>• Comms and Stakeholder Engagement</li> <li>• Redcar Hydrogen Community - Consumer Offer.</li> </ul>
Costs and commercial	<ul style="list-style-type: none"> <li>• Attachment L – Completed Cost Template</li> </ul>	<ul style="list-style-type: none"> <li>• Redcar Hydrogen Community – Workforce and Recruitment Plan.</li> <li>• Redcar Hydrogen Community – Training Plan</li> <li>• Redcar Hydrogen Community – Network Design Plan.</li> <li>• Redcar Hydrogen Community – Network Analysis Plan.</li> <li>• Redcar Hydrogen Community – Sectorisation Plan.</li> <li>• Hydrogen Village Trials – Appliance Procurement Strategy.</li> <li>• [REDACTED] – Analysis &amp; Recommendations for</li> </ul>

		<p>Redcar Hydrogen Village Metering Installations.</p> <ul style="list-style-type: none"> <li>• ■ 10 Year Hydrogen Demand.</li> <li>• ■ Hydrogen Demand Assumptions.</li> <li>• ■ 10 Year Hydrogen Demand.</li> <li>• ■ Demand Emissions Reduction.</li> <li>• ■ NZHF RFI.</li> <li>• Annex E – Emissions Reduction Response.</li> <li>• Production Options.</li> </ul>
Grant funding agreement		<ul style="list-style-type: none"> <li>• Project Communication Plan</li> <li>• RHC_GFA List.doc.</li> </ul>

# 5. Project Overview

The purpose of this section is to provide assessors with a concise high-level overview of your project before conducting an assessment of each criteria. This will ensure that all assessors, regardless of the section they are reviewing, have a consistent understanding of your project and its status. This section can include information from any of your answers in this Application Form, but no additional supporting evidence can be submitted. This section is not assessed or scored.

## 5.1 High Level Project Summary (500 words)

Provide a high-level overview of the project including aims and objectives of activities, with details of the following: location, estimated uptake rates, trial duration, meter points, hydrogen supply and storage capacity, and any other key aspects of the project.

Diagrams are allowed within the answer.

**Answer:**

Following significant investment by Ofgem into research into network conversion to hydrogen, the RHC Project will provide UK Government and industry with further evidence that it is possible to convert an existing network to 100% hydrogen through a planned conversion programme. The primary objectives of the RHC Project are therefore both to determine consumer acceptability of hydrogen and to provide robust and transparent evidence to the UK Government, public and stakeholders that conversion to 100% hydrogen is economically and operationally viable.

Teesside is at the heart of the UK's green industrial revolution with significant hydrogen production facilities under development by major industrials, world-leading natural assets for storage and a range of industries seeking to decarbonise with hydrogen. With the vision for the development of a hydrogen economy through East Coast Hydrogen, Redcar is ideally placed to deliver an effective Hydrogen Village Trial (HVT).

The RHC Project comprises residential and commercial sites in the Warrenby and Coatham areas of Redcar, and an industrial site at Kirkleatham in Redcar. The total population of the project area is 5,866 and includes a diverse building stock of 2,677 properties including homes, shops, education establishments, leisure facilities and light industrial units.

The RHC Project area covers a total of 2,157 meter points consisting of 1,949 domestic and 208 industrial and commercial customers including hospitals, care homes, schools, shops and offices, hotels, pubs, restaurants, and industrial users. The local housing stock covers a range of building types from Victorian terrace houses through to large, detached homes. Initial local engagement has shown a very positive response to hydrogen for heating with 89% of the 699 residents surveyed indicating that they would choose a hydrogen heating option.

The RHC Project will convert this area – including its existing gas infrastructure and homes – from natural gas to 100% hydrogen. Hydrogen-ready appliances will be installed in

participating properties before converting the existing infrastructure to 100% hydrogen. Hydrogen-only appliances will be installed during the period of conversion. The live trial will run for two years to ensure that evidence over two consecutive heating seasons is generated.

The hydrogen supply to the RHC will come from [REDACTED] producing green hydrogen through electrolysis. The hydrogen will then be transported via a high-pressure pipeline to the above ground storage and above ground installation (AGI) facility as well as to the below ground storage. The intention of the above ground storage is to meet the individual peak day demand for the morning and evening loads – intraday demand (diurnal storage) – and will consist of 10 pressure vessels operating at 30 barg. The below ground storage, in the form of a salt cavern, is to ensure sufficient storage capacity in 1-in-20 winter peak demand can be met, providing several days’ contingency.

All dates within this proforma are based upon a DESNZ decision in September 2023.

## 5.2 Agreed Outputs (300 words)

**Agreed Outputs** are the deliverables (whether data, reports, or otherwise) that will be produced using the funding provided.

A subset of these Agreed Outputs should be identified as **Key Knowledge Deliverables (K KDs)**. A condition of receiving funding is that projects must agree to publish non-confidential project outputs and learning as K KDs to maximise the benefits and learning from the trial. Given the nature and purpose of the project, we expect you to adopt a strong presumption in favour of sharing learning where possible, and to consider the most appropriate means for disseminating this learning. Where you propose not to share an output as a K KD, there must be a clear reason (e.g. commercial sensitivity) which cannot be reasonably avoided (e.g. through redaction).

Provide a list of Agreed Outputs for Stages 3-5, identifying those which are K KDs. Your overarching approach to disseminating K KDs should be set out in section 6.3.6, but you may include any output-specific approaches to dissemination, where relevant, in the table below.

Table 2: Agreed Outputs

Agreed Output	Stage	Date	Is this a K KD	If the agreed output is a K KD, how will it be shared with industry? (Specific reference to your K KD plan in [6.3.6] is acceptable)
Consumer Evidence Report	3	Apr-24 (every 6 months)		
Decision on CDSP solution (MF or CF)	3	Jan-24	Yes	This work will be part of the collaboration group and shared more widely where necessary.
Finalise quantities of	3	Feb-24		

Domestic / I&C Boilers, Meters & Appliances including placing orders (Sector 1)				
HSE Letter of Assistance issued	3	Mar-24	Yes	Letter of Assistance will be a key sign-off for the trial and will validate the proposed mitigations, as well as the safety case. Sharing with all GDNs through the ENA.
Draft Proposed Mod and / or Derogation	3	Mar-24	Yes	Will be completed as part of the collaboration group and shared more widely where necessary.
Stage 3 Consumer Choice Engagement Complete	3	Apr-24	Yes	Shared with wider industry through collaborative work, especially regarding appliance supply chain as will influence OEM's R&D.
Finalise quantities of Domestic / I&C Boilers, Meters & Appliances including placing orders (Sectors 2–21)	3	May-24		
Develop HVT Training & Assessment Material – Upstream & Downstream	3	Aug-24	Yes	Shared through collaborative training projects, IGEM, wider industry stakeholders.
Training Material Certification – Downstream & Upstream	3	Oct-24	Yes	Shared through collaborative training projects, IGEM, wider industry stakeholders.
Install Hydrogen Ready Boilers & Meters (Sector 1)	3	May-25		
Install and pre-commission storage pressure vessels	3	Oct-25		
Commission AGI	3	Oct-25		
Hydrogen Production Site Commissioned	3	Nov-25		

Hydrogen Pipelines Commissioned	3	Dec-25	Yes	Commissioning of the pipeline will be of interest to the wider industry. Details could be shared through industry groups, e.g., Network Safety and Impacts working group.
Network Monitoring Report	4	Apr-26 (Every 3 months during live trial)		

# 6. Evidence Base

## 6.1 Detailed Evidence Generated during Stage 2 (2500 words)

6.1.1 Provide a summary of the evidence gathered against the Trials Evidence Framework during Stage 2, by evidence grouping, and information on how it has been assured.

Evidence grouping	Summary of evidence	Document reference (relevant page/section)
<b>Consumer</b>	<p>The project has used an independent research agency for consumer research throughout Stage 2, working with them to ensure engagement across consumer demographics in the area.</p> <p>A mixed method approach was taken to deliver the customer consultation and research stage. Research activities included:</p> <ul style="list-style-type: none"> <li>• Customer questionnaire               <ul style="list-style-type: none"> <li>○ 699 responses from trial area residents and property owners.</li> <li>○ Completed online, door-to-door, postal, telephone.</li> </ul> </li> <li>• Citizens' Panel               <ul style="list-style-type: none"> <li>○ 22 members recruited, including homeowners, business owner, renters and landlords.</li> <li>○ 8 sessions held across 3 months.</li> <li>○ Each session had a different focus, including trial detail, fairness and choice.</li> </ul> </li> <li>• Community consultation meeting               <ul style="list-style-type: none"> <li>○ 10 local area attendees.</li> <li>○ Q&amp;A forum for local residents.</li> </ul> </li> <li>• In-depth interviews with business owners               <ul style="list-style-type: none"> <li>○ 10 telephone interviews completed with local small business owners and the Council.</li> </ul> </li> <li>• Community round table               <ul style="list-style-type: none"> <li>○ Series of meetings with local community partners to discuss key issues and get their support.</li> </ul> </li> <li>• In-depth interviews with landlords               <ul style="list-style-type: none"> <li>○ 10 telephone interviews completed.</li> <li>○ Range of landlords captured, including social housing providers and [REDACTED].</li> </ul> </li> </ul>	<p>Stage 2 Consumer Research Report.</p> <p>Third Party research reports.</p>

	<ul style="list-style-type: none"> <li>○ Range of landlords captured, including social housing providers and [REDACTED].</li> </ul> <p>Detailed reports were produced after each activity, providing methodological detail, in-depth findings, conclusions, and suggested actions.</p> <p>The NGN Consumer Engagement Group (CEG), Local Authority and [REDACTED] were brought on the journey and any feedback was incorporated where appropriate.</p> <p>These have informed development of consumer offer and provided early insight on perceptions of hydrogen, which will continue to track as engagement increases.</p> <p>The project will continue to use an impartial third party throughout the trial to ensure all evidence collected can be relied upon without bias or influence.</p>	
<b>Safety</b>	<p>Stage 2 has also focused on reviewing and assessing research previously undertaken and planned, to ensure the case for safety of a converted hydrogen network can be met.</p> <p>The documents listed right are the fundamental documents issued as part of the Stage 2 submission to provide assurance that customers, members of the public and the workforce will not be disadvantaged in terms of supply reliability or safety because of the trials. These documents refer to and are supported by wider research projects and studies undertaken in programmes including Collaborative HVT projects, NSI, EUSE, HSS4H.</p> <p>Only following successful completion and issuing of this evidence to HSE's satisfaction, will the project be issued with the Letter of Assistance. The project will continue to engage with HSE's Evidence Review Group throughout the Comprehensive Formal Assessment for trials to deliver the required evidence throughout Stages 2.5 and 3 to enable trials to go live in line with the project programme. This will include iterative submissions of outstanding evidence work currently being delivered and planned under the ENA-led suite of projects, as well as providing further assurance required to the key documents issued at the end of the Stage 2 submission. This includes those listed right, but also other key deliverables (e.g., training &amp; competency) that support the safety dossier.</p> <p>The project recognises feedback received from previous evidence submissions, including the latest H21 Phase 2 QRA,</p>	<p>Attachment E: NGN Redcar HSE Trials Consideration spreadsheet (T0A – T63) - 10373780-1</p> <p>Attachment E: Companion report - 10373780-1</p> <p>Attachment E: Medium Pressure Transfer Pipe QRA – 10369984-1.</p> <p>Attachment E: Network and End User QRA 10369984-2</p> <p>Attachment E: Draft - Distribution Case for Safety - Redcar</p>

	<p>deliverables (e.g., training &amp; competency) that support the safety dossier.</p> <p>The project recognises feedback received from previous evidence submissions, including the latest H21 Phase 2 QRA, and will work with our project partners to prioritise our response to this feedback in April 2024.</p>	<p>Hydrogen Community</p> <p>Attachment E: Draft - End User Case for Safety - Redcar Hydrogen Community.</p>
<p><b>Delivery and learning for town/rollout</b></p>	<p>Throughout Stage 2, considerable work has been undertaken to access the distribution network. Network analysis of the trial area has been completed to determine the natural gas demand on the network and the hydrogen equivalent, as well as to determine appropriate sector sizes, number of sectorisation valves required, and percentage of metallic services in the trial area requiring replacement. A full network integrity assessment is being undertaken and will be developed through Stage 2.5 to link the network to the QRA and safety work already completed.</p> <p>The programme of technical surveys completed for both domestic, industrial and commercial (I&amp;C) identified a wide range of appliances. The surveys have not yet identified any domestic properties unsuitable for conversion, though they identified a range of appliances for which some like-for-like replacements are unavailable. However, these outputs have been fed into the collaborative project to identify the range of appliances that OEMs will need to provide ahead of trial.</p> <p>The I&amp;C surveys identified a range of appliances for which bespoke solutions are being evaluated.</p> <p>Work on the upstream, production and storage element of the RHC project has produced key pieces of evidence. This work included an assessment of the requirements for both diurnal and seasonal storage. An assessment of the suitability of an existing salt cavern to store hydrogen was also undertaken.</p> <p>Assessment has included a suitable location for the above ground storage site, considering local infrastructure and the presence of local population. The chosen location has undergone a QRA, which has demonstrated its suitability for our needs. We have liaised with local authority emergency planning to confirm their no objection to the location.</p> <p>The design of the above ground storage has reviewed many options including volume, orientation, and size. The current</p>	<p>Redcar Hydrogen Community – Sectorisation Plan.</p> <p>Redcar Hydrogen Community – Network Design Plan.</p> <p>End User Conversion Procedures.</p> <p>Attachment E: Above Ground Storage Facility and High-Pressure Pipelines QRA – 10369984-3.</p>

liaised with local authority emergency planning to confirm their no objection to the location.

The design of the above ground storage has reviewed many options including volume, orientation, and size. The current design is similar to existing natural gas vessels and has been spaced 9 metres apart, in-line with regulations.

The pipeline routing options have been undertaken considering landowners, proximity to infrastructure, minimising potential 'lock-out' areas, and design to current IGEM standards.

In conjunction with the salt cavern owner, NGN has engaged a specialist contractor to assess the suitability of re-purposing the existing nitrogen salt cavern storage. This identified several additional safety features now incorporated into the conceptual design.

The hydrogen production facilities are owned, operated and maintained by the production companies; therefore NGN will have no input into operation, maintenance or repair philosophies for these.

Additionally, the salt cavern storage will be owned and operated by [REDACTED] but we are working with them to develop an operating, maintenance, and repair philosophy for this, including operating the interconnecting pipeline at a lower pressure.

The above ground storage vessels and pressure reduction site have been designed to use equipment similar to that used on natural gas sites. This will ensure that existing NGN operatives are working on familiar equipment. Operation and maintenance procedures would only need updated for working in a hydrogen environment. The pressure reduction equipment has also been designed in line with IGEM standards, and all E&I equipment is similar to equipment in the natural gas network. E&I staff will require additional ATEX training for hydrogen environments.

The evidence has been generated through several different channels including third party agency, collaborative workstreams and input from other GDNs.

<p><b>Commercial and regulatory</b></p>	<p>The Hydrogen Village Trial Stage 2 Regulatory Framework focuses on the regulatory framework arrangements required for the trial. The document provides evidence on the work done throughout Stage 2 and the proposed approach for several key deliverables before the trial can proceed:</p> <ul style="list-style-type: none"> <li>• Documented proposal on the UNC modifications required to support trial.</li> <li>• Documented proposal on technical billing modifications.</li> <li>• Development of Commercial Assurance Framework.</li> <li>• Development of a Commercial Change Framework.</li> </ul> <p>Additional work has examined the commercial aspects of undertaking the work. Considerable engagement with OEMs, installers, designers, councils, and other stakeholders has been undertaken. Evidence on the training and upskilling required pre-trial has been evaluated and presented in the Training Plan.</p>	
---	---	--

6.1.2 Provide a summary of any evidence generated additional to the Trials Evidence Framework.

<p><b>Monitoring and evaluation evidence for consumer engagement:</b></p> <p>Additional evidence gathered from consumer engagement relates to ‘fairness’ of the trial:</p> <ul style="list-style-type: none"> <li>• Consumers clearly struggle to reconcile fairness and being forced into a trial scenario; however, they have started to separate the perceived fairness of what the trial is offering versus being chosen as the trial area.</li> <li>• Consumers consider it fair to have a breadth of options.</li> <li>• Any additional cost or financial disadvantage was repeatedly referenced as being unfair.</li> <li>• During in-depth interviews, business owners said they considered the project to be fair, or more than fair, to businesses.</li> </ul> <p>In terms of fairness, during in-depth interviews, some landlords told us that they wanted the project to provide assurances that tenants would be adequately compensated for their involvement, as it is they who would experience disruption in their homes, use new appliances, and pay energy bills. A few landlords expressed the importance of giving tenants the same level of service that would be afforded to property owners.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Stage 2 Consumer Research Report.</p>
---	--

<p>tenants the same level of service that would be afforded to property owners.</p>	
<p><b>Gas distribution network design and build for hydrogen:</b></p> <p>During Stage 2, a series of network analysis projects have been undertaken to generate evidence. These have identified the following considerations: the most appropriate location for sectorisation valves; required reinforcement on the LP network to ensure minimum pressures are met; the reinforcement required to deliver hydrogen from the AGI; as well as optimal location of district governors.</p> <p>The location of network pressure loggers, as well as gas quality monitoring has also been identified during Stage 2.</p> <p>The Sectorisation Plan has also provided insight into the methodology of purging the network and required valves to undertake sector purging. The Plan also identified the need to physically isolate the NG and hydrogen networks.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Redcar Hydrogen Community – Sectorisation Plan.</p> <p>Redcar Hydrogen Community – Network Design Plan.</p> <p>Attachment E: Medium Pressure Transfer Pipe QRA – 10369984-1.</p> <p>Attachment E: Network and End User QRA 10369984-2.</p> <p>Attachment E: Draft - Distribution Case for Safety – Redcar Hydrogen Community.</p> <p>Attachment E: Redcar Hydrogen Village Trial Repurposing Design and Integrity Report – PIE/R/22/571.</p>
<p><b>Other additional evidence:</b></p> <p>As part of the collaborative work, substantial evidence on end-user appliance availability, as well as the research and development required to offer a choice to domestic consumers, has been generated. The lead times, choice of appliances available and costs have come from this work. In addition, substantial market research has been done to identify available hydrogen I&amp;C appliances.</p> <p>The RHC project has investigated the use of electrical appliances as an alternative option to existing natural gas appliances, including an assessment of the electrical infrastructure in the trial area. Working alongside ██████████ using their network analysis predictions, the reinforcement required on the electricity grid has been assessed based on the percentage of domestic customers that choose an electrical alternative. The required service upgrades have</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Attachment F - Status Update on the 10 Collaborative End User Safety Evidence Projects</p> <p>Redcar Hydrogen Village – Residential Properties Electrification Report</p>

also been assessed. For the I&C customers several individual assessments have been undertaken to show how an uptake of electrical appliances would impact the electrical network. This has identified that to reinforce the electrical network, [REDACTED]

6.1.3 Summarise the Detailed Survey Data (Attachment C) and fill in the high-level overview table below.

**Answer:**

On behalf of NGN, Domestic surveys have been undertaken by [REDACTED] and Commercial surveys undertaken by [REDACTED]

- Within the trial area 2,157 properties identified with a meter point reference
- 1,949 Domestic Properties
- 208 Commercial Properties
- 668 Domestic Surveys Completed [REDACTED]
- 50 Gas, DSEAR, 51 Electrical Surveys Completed [REDACTED]

For the purpose of this report, any property used for 'work' is classified as commercial.

Domestic Surveys

- Most properties surveyed are terraced, 2 floors, brick construction, no cellar.
- Almost exactly half of homes surveyed had a CO alarm installed.
- Most central heating boilers are combi boilers.
- Other gas appliances found in the trial area were cooking appliances, gas fires, wall heaters, water heaters.
- [REDACTED] Surveys did not encounter any material unsuitable for transporting gas.
- Repurposing suitability will be subject to the formal hydrogen standards due to be published in 2023 by IGEM and BSI.
- During domestic surveys, a gas installation tightness test was undertaken. Most gas installations tested recorded 0mb pressure loss.
- [REDACTED] found some installations/appliances deemed to be unsafe and were categorised as per IGEM/G/11 Gas Industry Unsafe Situations Procedure.

Commercial Surveys

- Initially, [REDACTED] and NGN engineers carried out high-level surveys of these properties.
- [REDACTED] surveys initiated to assist [REDACTED] with QRA.
- Gas installation tightness test not carried out as too intrusive to business.
- Gas installation defects identified were measured against the requirements of current relevant legislation.

- All installations surveyed found to be 'Not to Current Standards' by differing degrees with DSEAR assessments uncovering similar number of failures.
- No materials encountered unsuitable for transporting gas.
- Survey results shared with Appliance Working Group to seek solutions for hydrogen replacements.
- NGN have engaged directly with OEMs and specialist service providers to seek further solutions before conversion.
- NGN are confident that the surveys so far have covered all the large commercial sites and scope of appliances within the trial area.

Building category (Domestic/ Commercial /Industrial)	Building type	No of properties	Tenure		
Domestic	House- Flat	1949	Mixed		
Commercial	Retail	84	Mixed		
Commercial	Retail- Leisure- Practice	78	Unknown		
Commercial	Retail- Hotel- Factory	23	Unknown		
Commercial	Retail- Factory	12	Unknown		
Commercial	Retail- School- Care Home	6	Unknown		
Commercial	Supermarket	1	Unknown		
Commercial	Retail	2	Unknown		
Industrial	Factory	1	Unknown		
Commercial	Retail	1	Unknown		
Commercial	Museum	1	Unknown		
Commercial	College	1	Unknown		
Commercial	Civic Centre	1	Unknown		
Commercial	Civic Centre	1	Unknown		
Industrial	Factory	1	Unknown		

6.1.4 Provide a summary of Detailed Survey Data (Attachment C) on the range of consumer types likely to be included in the trial, including demographic data, socio-economic classifications, an overview of vulnerable consumers and those with protected characteristics, such as age, disability, race. This should include, but is not limited to, the number of consumers anticipated to be on the Priority Services Register.

**Additional guidance:**

Outline your approach to ensuring that your consumer research is representative of different protected groups.

**Answer:**

The trial area comprises properties in three wards in the Redcar area – Coatham, Kirkleatham and Warrenby. Our research into the consumer demographic here has helped develop an offer, engagement strategy and protection plan built around consumers and their situation.

**Age**

Of the c.5,866 trial area residents, 47% are over 50:

- 17% 0-19 years old
- 12% 20-29 years old
- 12% 30-39 years old
- 12% 40-49 years old
- 16% 50-59 years old
- 13% 60-69 years old
- 10% 70-79 years old
- 8% 80+ years old

**Employment**

Residents over 16:

- 42% in employment
- 5% unemployed
- 25% retired
- 5% caring for home or family
- 13% long term sick or disabled
- 5% students
- 5% not in any of the above categories

The average UK unemployment is 3.7%, lower than in the trial area, indicating evidence of financial hardship.

**Ethnic Groups**

Census data shows residents are predominantly White (96%) some Asian (1%), some Mixed or Multiple ethnic groups (1%) and some Other ethnic groups (2%).

For 97% of residents, English is their first language. Among residents without English as their first language some are refugees who have moved into the area.

**Fuel Poverty & EPC Ratings**

**Document reference (relevant page/section):**

Attachment C – Detailed Survey Data - Demographics.

The average level of fuel poverty throughout the trial area is 17%, above the UK 2022 average of 13%. 73% properties in the area have an EPC rating of D or below. This influenced our decision to offer £2,000 efficiency upgrades for all consumers to help them keep heat within their homes.

### **Disability**

30% of residents in the trial are classed as disabled, with 16% having a disability which substantially impacts daily activities, much higher than UK averages of 17% and 7%.

### **PSR**

Currently [redacted] consumers are on the Priority Services Register (PSR) list ([redacted] prior to project, [redacted] since added), [redacted]% of households in the trial area. The top 3 PSR codes are below with percentage of consumers on the PSR assigned to it. Note some consumers have more than one code e.g., pensionable age and physical impairment.

1. Pensionable age – [redacted]
2. Chronic / serious illness – [redacted]
3. Physical impairment – [redacted]

Note that the PSR is voluntary for consumers to opt into, so may not capture all who fall into each code.

### **Benefits**

We do not have data on benefits specific to trial area postcodes. Data from the Redcar constituency contains a wider population than the trial but gives likely indication of claimants.

- 23% of households on universal credit
- 11% households on legacy benefits and tax credits

Overall, residents in the trial area are less affluent and face greater challenges than average UK residents. For this reason, we place emphasis on consumer protection and are committed to ensuring no consumer is left worse off by the trial.

## 6.2 Expected Benefits (1500 words)

6.2.1 With reference to the Trials Evidence Framework (Annex B), outline how evidence generated from your proposed village trial will inform the 2026 strategic decision on hydrogen for heat.

<p><b>Answer:</b></p> <p>As the RHC project progresses, a variety of evidence will be generated at different stages. The trials evidence framework sets out several categories against which evidence is expected to be generated. These evidence strands have been incorporated into the work done as part of Stage 2 – Detailed Design. Each of the evidence subsets as detailed below has been considered when designing the approach to undertaking Stages 3–5.</p> <p><b>Consumer attitudes &amp; perception:</b> Throughout every stage, consumer attitude and perception has been and will continue to be measured. How this evolves over the trial period will be assessed through a variety of different methods. How consumers react to these different methods will help to inform best approach for a wider roll out. The results of this will be relayed back to DESNZ and wider stakeholders at regular intervals.</p> <p><b>Consumer behaviour:</b> Understanding consumer behaviour and the rationale to how consumers behave will be key to informing the 2026 policy decision. Consumer behaviours will not only cover how consumers’ habits change as a result of hydrogen or electrical appliances, but also understanding why they chose the appliance. The availability of consumers, their willingness to attend appointments, and follow up evidence-gathering such as survey completion will help monitor how behaviour changes over time. Much of this evidence will be generated through interactions with consumers and analysis of the data from the survey booking platform.</p> <p><b>Consumer expectations</b> A substantial amount of the consumer expectation work has been carried out during Stage 2, with a number of Citizens’ Panels being undertaken to better understand consumer expectations with regards to hydrogen appliances and alternative options. The level of compensation has also been considered. Initial data identifies largely positive consumer expectations. How the consumer offer and the experience throughout the trial measures up against consumer expectations will be key.</p> <p><b>Impact and experience on premise-type and demographic</b> How the overall trial experience affects different end users will be monitored as part of the ongoing surveying of the consumers.</p> <p>Every touchpoint will be used to understand how the day to day lives of consumers are impacted – not just by conversion of their homes and businesses – but by wider changes to the gas and electricity networks. Data from such touchpoints will be evaluated and fed back to help inform policy.</p> <p><b>Pre and live trials safety outputs</b></p>	<p><b>Document reference (relevant page/section):</b></p> <p>Redcar Hydrogen Community – Monitoring &amp; Evaluation Plan.</p> <p>Attachment E - Safety Cases and QRAs.</p> <p>Redcar Hydrogen Community - Consumer Offer.</p> <p>Attachment K - Consumer Protection Plan.</p> <p>Redcar Hydrogen Community –Training Plan.</p> <p>Redcar Hydrogen Community – Expected Benefits.</p>
---	---

The safety work that is being carried out is already providing valuable evidence to a variety of stakeholders. Initial site surveys carried out on the properties have identified meter positions, routes of the proposed hydrogen infrastructure, as well as the proximity of the upstream network and storage buildings and other utilities. The work has helped inform the creation of the case for safety and associated QRAs. The work involved, time to install and consumer reaction involved in additional mitigation measures will be monitored.

### **Time and Cost**

The cost of conversion will be closely monitored throughout every stage of the trial to build a full understanding of the total costs. Not only the cost for the hydrogen conversion but also the electrical conversion required as part of the alternative offer. The time to undertake all aspects of conversion will also be tracked, including the time to obtain any permissions.

### **Design, Maintenance and Repair**

Evidence on the design of the network has been generated via network analysis for the trial area, and additional infrastructure that is required has been incorporated into the design. The maintenance and repair data for the network will be monitored through BAU processes such as reported leaks, poor pressures identified, repairs undertaken etc. From an end-user perspective, all appliances installed will have full maintenance reports throughout the trial to compare performance against natural gas equivalents.

### **Conversion & viability**

As part of the conversion, additional monitoring equipment will be installed on the network. Additional low-pressure loggers will be installed at extremity points as well as gas quality monitoring within the trial area. Evidence on required upskilling, as well as the updating of policies and procedures will also be collected and disseminated.

### **Commercial, regulatory and billing**

Continued collaboration work is ongoing to understand the implications of a hydrogen conversion on a range of different regulations. The impact on consumer billing is a key element to this. However, as this is a first-of-its-kind trial, a range of regulations and impact on consumers has been considered, such as effects on house prices and insurance premiums. Work with a range of key stakeholders will continue to inform policy and wider rollout.

### **Training and skills**

Training and upskilling required throughout the trial will be a key piece of evidence. Work has already been undertaken to identify all personnel that will be affected by the conversion. Several collaborative projects are ongoing to set the framework required to train against. The scale of training required will help inform plans for further rollout. The RHC project is partnered with local training facilities to ensure that training providers are involved at every opportunity and can feed into evidence generation.

### **Risks and mitigations**

A detailed risk register has been kept throughout Stage 2 and will continue in Stages 3 to 5. The risks are closely monitored, and mitigation

<p>measures put in place. A series of risk workshops has already taken place for the RHC project to identify potential risks in Stages 3 to 5. These risks will be monitored, and any additional risks added to the risk register with proposed mitigations. Should any of these risks materialise, the effectiveness of the mitigations will be assessed. Learning will be disseminated to all relevant stakeholders to help inform policy, as well as town pilot and further rollout.</p> <p>As the above evidence is generated for the different categories the outputs will be shared not only with DESNZ but also with the other GDNs and all relevant stakeholders where appropriate. This evidence – as well as the evidence generated by the counterfactual of electrifying a subset of consumers and the associated electricity network work required – will support a better understanding of the timescales, costs, consumer attitude, regulatory requirements, safety and operational requirements of a Net Zero heating solution, which will help inform the 2026 policy decision. Frequency of reporting against the different evidence strands will vary, depending on agreed outputs, as well as the body of evidence expected from each category.</p>	
--	--

6.2.2 Summarise key lessons learnt expected to be generated during the trial and how they will inform a potential Town Pilot and further hydrogen roll-out.

<p><b>Answer:</b></p> <p>Some of the key lessons that are expected to be realised throughout the trial include the relationship and interface between the production of hydrogen and the business-as-usual aspect of the GDN, identification of the resource requirements, evidence on the time and cost to undertake activities and supply chain readiness. The domestic and I&amp;C surveys have already provided key lessons in understanding the appliance requirements and have highlighted the supply chain restrictions / requirements and plans to resolve. As the consumer choice is confirmed, the impact on the electricity network will also provide valuable information on the interdependencies between the gas and electrical network. The impact on the electrical network has been assessed and the required upgrades based on the uptake of electrical alternatives has been outlined as part of Stage 2 completion requirements.</p> <p>Several collaborative workstreams have been initiated to examine the common areas that will affect all GDNs. Several of these collaborative projects will continue through to town pilot. As the village trial progress, the evidence generated will be fed into the appropriate collaborative workstreams and further stakeholders.</p>	<p><b>Document reference (relevant page/section):</b></p>
--	---

6.2.3 Outline any other benefits that will be generated by the trial. These benefits could include, but are not limited to, wider economic benefits, leadership in innovation and environmental benefits.

Where possible attempt to quantify these benefits, specify the period over which they would materialise, and propose how these benefits could be monitored and evaluated.

<b>Additional guidance:</b>	
For further information on benefits management, please see <a href="#">here</a> .	
<b>Answer:</b>	<b>Document reference (relevant page/section):</b>
<p>The Gross Value Added impact estimate started with the latest best working forecast for the lifetime (~10 year) spend of the project – currently approximately £200m over all phases. We then applied a conservative economic multiplier of 1.75 based on <a href="#">New Economics Foundation LM3 Modelling</a> (historically comparable projects have resulted in multipliers of 2.5+). We assumed that 85% of this would benefit the Tees Valley with the remainder benefiting UK plc – resulting in a Tees Valley GVA impact of approximately £300m over 10 years. Given the relative historic lack of opportunities and investment in Redcar in particular, we would expect this would represent a minimum impact with further leveraged benefits likely.</p> <p>With respect to jobs, we looked at North East Local Enterprise Partnership modelling which links GVA impact to jobs created. Even using the most conservative utilities ratio, a £300m GVA impact suggests creation of approximately 1,200 jobs. We applied a conservative 75% deadweight to this, resulting in 300 expected new, good quality jobs for the area, that are likely to endure. As above, it is our view that this represents a minimum impact and that further job creation is likely due to leveraged opportunities, some of which are highlighted below.</p> <p>The above does not include GVA and jobs from:</p> <ul style="list-style-type: none"> <li>• Hydrogen electrolysis production facility on site of former steel works (likely 60MW capital project just for RHC (approx. £60m) and potential to scale up to 600MW in future).</li> <li>• NGN Cannon Park, recruitment and training of hydrogen competencies.</li> <li>• [REDACTED] hydrogen training facilities and potential Department for Education Funding opportunities (unique in UK).</li> <li>• Further leveraged investment opportunities for local industry and domestically from hydrogen.</li> </ul>	<p>Redcar Hydrogen Community – Expected Benefits.</p>

## 6.3 Detailed Plan for Evidence Generation in Stages 3-5 (2000 words)

6.3.1 Provide a description of the different types of evidence expected to be generated during Stages 3-5.

In your response, you should refer to the Trials Evidence Framework developed by BEIS, including anything additional which could inform Government’s understanding of the potential role of hydrogen for decarbonising heating.

This should include a plan for how this evidence will be generated, including a high-level plan of the methodology, assurance processes and timings.

<p><b>Answer:</b></p> <p><b>Consumer</b></p> <p>As per Trials Evidence Framework (TEF) consumer evidence across the following subsets will be generated:</p> <ol style="list-style-type: none"> <li>1. Consumer attitudes and perception</li> <li>2. Consumer behaviour</li> <li>3. Consumer expectations</li> <li>4. Variations in the impact and experience across different segments such as premises types and demographics</li> </ol> <p>A range of methods will be used throughout each stage to produce robust evidence. The Engagement Plan will include further details on how consumer evidence will be gathered. Below is a snapshot of proposed methods:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #002060; color: white;"> <th>Evidence Source</th> <th>Stage</th> </tr> </thead> <tbody> <tr> <td>Periodic surveys</td> <td>All</td> </tr> <tr> <td>Consumer panels</td> <td>All</td> </tr> <tr> <td>Technical surveys</td> <td>Design/operation</td> </tr> <tr> <td>Installer surveys</td> <td>Preparation/conversion/operation</td> </tr> <tr> <td>Energy usage data</td> <td>Design/operation</td> </tr> <tr> <td>Qualitative and quantitative research using a range of methods</td> <td>All</td> </tr> <tr> <td>Helpline</td> <td>Preparation/conversion/operation</td> </tr> <tr> <td>All media sentiment analysis</td> <td>All</td> </tr> </tbody> </table>	Evidence Source	Stage	Periodic surveys	All	Consumer panels	All	Technical surveys	Design/operation	Installer surveys	Preparation/conversion/operation	Energy usage data	Design/operation	Qualitative and quantitative research using a range of methods	All	Helpline	Preparation/conversion/operation	All media sentiment analysis	All	<p><b>Document reference (relevant page/section):</b></p> <p>Attachment B</p> <p>Redcar Hydrogen Community – Expected Benefits.</p>
Evidence Source	Stage																		
Periodic surveys	All																		
Consumer panels	All																		
Technical surveys	Design/operation																		
Installer surveys	Preparation/conversion/operation																		
Energy usage data	Design/operation																		
Qualitative and quantitative research using a range of methods	All																		
Helpline	Preparation/conversion/operation																		
All media sentiment analysis	All																		

Analysis of feedback from email/online/face to face/ and other engagement including tailored methods for some groups e.g., vulnerable customers and their representatives/businesses	All
Hydrogen Hub visits	All

Every interaction with consumers is an opportunity to gain insight and evidence.

**Detailed Design (Stage 2) / Prepare and Build (Stage 3):** We will build on existing knowledge about the area's demographic by capturing consumer information during engagement events and property surveys. All insight captured will be retained to data protection principles. This will allow us to monitor and provide evidence on changing sentiment and identify trends within specific consumer groups. Consumer attitudes to hydrogen and willingness to participate in the trial will be measured through research, drop in events, door to door surveys, and on and offline feedback opportunities.

**Go-live and Operate (Stage 4):** A research programme including periodic surveys, qualitative and quantitative research, on and offline feedback opportunities will provide insight into the whole consumer experience. Seasonal impacts on sentiment and usage will be monitored. During regular maintenance/survey works, installer surveys will gather information on behaviour relating to hydrogen appliances and check against current/historic energy usage data to understand unusual demand profiles.

**Safety:** Alongside collaborative safety work and other ongoing projects (H100, Hydrogen Homes, H21 etc) in line with the TEF the trial will evidence the safety of hydrogen for use in buildings.

Evidence Source	Relevant Phase
Call/emergency line	Operation
Quantitative risk assessment (QRA)	All

The RHC project will evidence the effectiveness of safety communications and training given to participants, by monitoring how frequently and accurately the hydrogen emergency line is contacted. Emergency calls will be evaluated, evidencing whether consumers accurately follow safety instructions.

The Quantitative Risk Assessment (QRA) will form a comprehensive evidence log, such as the effectiveness of additional safety equipment

and mitigations, safety of operatives undertaking maintenance/repair and additional PPE requirements.

**Delivery and learning for town/roll-out:**

As per the TEF, evidence across the following subsets will be generated:

1. Viability of converting the gas network to hydrogen
2. Design/maintenance/repair requirements of a hydrogen network
3. Time/costs associated with conversion to hydrogen
4. Emergency response, to leaks reported outside of homes etc.

Evidence Source	Relevant Phase
Design/FEED study into network conversion	Design/preparation
Itemised list of equipment needing replacement	Design/preparation/conversion
Housing surveys	Design/preparation/conversion
Maintenance and repair schedule	Operation
Real-time network operation data	Operation
Costed project schedule	All

The project timelines will track the timing of every aspect of the trial. Where possible, costs will be included. Separate cost evidence will also be collected on a line-by-line basis.

**Detailed Design (Stage 2) / Prepare and Build (Stage 3):** The design work necessary and the best approach to the conversion process will be evidenced. This will include HP pipeline and storage interface detailed design, grid entry unit detailed design, network reinforcement and sectorisation plan. Housing surveys will evidence the nature/proportion of homes already suitable for hydrogen operation, those requiring additional work, as well as a bill of materials for appliances within the different premises.

**Go-live and Operate (Stage 4):** Differences in operating a hydrogen versus natural gas grid will be identified by comparing real-time network operations data with natural gas equivalents. Current maintenance/repair schedules (including time and cost) will be modified to reflect hydrogen network requirements. Flexibility to meet seasonal demand will be evidenced by monitoring frequency of storage use as well as volumes of hydrogen entering the network from the production facility.

**Commercial and Regulatory:**

As per the TEF, evidence across the following subsets will be generated:

1. Commercial, regulatory and billing considerations for converting to hydrogen.
2. Additional training and skills needed.
3. Risks associated with converting to hydrogen, including associated mitigations.

Evidence Source	Relevant Phase
Collaborative GDN work	Design/preparation
Supplier engagement and contracts/questionnaires	Outline/design/preparation/conversion
Regulatory plan	Design/preparation
Consumer	Operation
Energy usage data	Operation
Installer interviews/surveys	Preparation/conversion
Risk register	All

- **Detailed Design (Stage 2) / Prepare and Build (Stage 3):** The maturity of the end-to-end hydrogen appliance supply chain and its ability to deliver equipment to schedule will be demonstrated. This will be assessed through supplier engagement. Further gaps in product offering and/or snags in equipment delivery will be recorded. Employed installers will be interviewed and/or surveyed to understand retraining/upskilling work necessary, and best practice for overcoming skills gaps.
- **Go-live and Operate (Stage 4):** Consumer evidence sources will be leveraged to indicate the effectiveness of the chosen billing method. Energy usage data will indicate the effectiveness of metering billing.

The ongoing collaborative GDN work “Commercial, billing and settlement arrangements to support the conveyance of hydrogen to customers in GB” will provide a common approach to inform the regulatory plan.

In all cases, evidence will be assured by independent, suitably qualified bodies. Ongoing customer surveys will continue to be designed by an external organisation with input from the RHC team. The RHC project plans to have engineering oversight in Stages 3 to 5 to assure network design and storage evidence. Safety evidence, as well as other evidence where appropriate, will be shared among GDNs for collaborative review.

Evidence will be shared with competent bodies and relevant institutions such as IGEM. The RHC project will take a common approach to evidence generation, ensuring a clear methodology is set out with QA processes in place.

6.3.2 Provide an updated monitoring and evaluation plan for the trial, including how consumer evidence and lessons learned from delivery will be generated. See the Trials Evidence Framework Annex B for further information on monitoring and evaluation.

<p><b>Answer:</b></p> <p>The deliverables of the M&amp;E Plan are to gather, learn from, and disseminate the data gathered from each of the following evidence strands – Consumer, Safety, Delivery &amp; Learning for Town Roll-out, Commercial &amp; Regulatory.</p> <p><b>M&amp;E data requirements and collection methods</b></p> <p>The M&amp;E plan will collect both quantitative and qualitative information from all key actors in the RHC Project: consumers, both commercial and domestic; installers; operatives involved in enabling works, purge &amp; relights; hydrogen production and storage; and network employees.</p> <p>Evidence collected from ‘service provider’ elements of the trial will be founded in the BAU process, and include measurable indicators such as number of call outs etc. With regards to evidence generated by the in-home experience, similar metrics will be used, including measurable evidence such as install times, call-out frequency, repair times, maintenance reports etc.</p> <p>In conjunction with previous research, alongside data already collected in Stage 2, this will provide:</p> <ul style="list-style-type: none"> <li>• Monitoring information: is the RHC project being delivered and creating outputs as intended?</li> <li>• Process evaluation: What can be learned from how the RHC project is being delivered? What is working well, less well and why? What could be improved?</li> <li>• Impact evaluation: What measurable outcomes have occurred? What groups have been impacted in what ways? What are the lessons learned about whether the RHC project can be reproduced or scaled up for town rollout?</li> <li>• Value for money evaluation: Is the project a good use of resources?</li> </ul> <p><b>Qualitative data collection</b></p> <p>Qualitative data collection throughout the trial’s duration generates evidence of the ‘experience’ of conversion, as evidenced by the consumer, service providers, and stakeholders. Qualitative data will be gathered by NGN from all such actors within the RHC, with a substantial body of consumer evidence already having been captured by third party</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Redcar Hydrogen Community – Monitoring &amp; Evaluation Plan.</p>
--	--

<p>research and indicating a largely positive consumer attitude to the project's aims.</p> <p><b>Lessons learned and dissemination of findings:</b></p> <p><b>Interim reporting</b></p> <p>Interim reports will be produced at the close of Stage 3 Prepare and Build in order that immediate findings can be disseminated, as well as to inform and impact decision-making on the final exit plan.</p> <p>Information will also be shared at the interim stage and final stage on the RHC website, with appropriate key messages shared on related social and local media.</p> <p><b>Final Report</b></p> <p>NGN will provide a Final Report upon exit, and this will include (but is not limited to) the following:</p> <ul style="list-style-type: none"> <li>• Project outcomes.</li> <li>• Objectives met successfully.</li> <li>• Objectives not met successfully.</li> <li>• Main learning generated.</li> <li>• Performance compared to original project aims, objectives and deliverables.</li> <li>• Required modifications necessary during the course of RHC project.</li> <li>• Significant variance in expected costs.</li> <li>• Lessons learned for the proposed town rollout.</li> <li>• Planned implementation.</li> <li>• Learning dissemination.</li> </ul>	
---	--

6.3.3 Provide plans on how you will work with other GDNs, Ofgem and BEIS to identify and address any emerging evidence gaps that may inform the Government's understanding of the potential role of hydrogen for decarbonising heating.

<p><b>Answer:</b></p> <p>To ensure that any evidence gaps are identified and resolved, the RHC project will continue to work with the collaboration projects. Any lessons from the work being undertaken as part of the H100 project will be incorporated into the remaining stages.</p> <p>As the design stage of the town pilot work continues, the RHC project will feed any information into this work, sharing the findings of all projects where appropriate with other GDNs.</p>	<p><b>Document reference (relevant page/section):</b></p>
---	---

<p>NGN will work with the Energy Networks Association (ENA) to help identify potential gaps through the various boards such as Network Safety and Impacts. Providing periodic updates from the project across industry will be key to ensuring that a variety of stakeholders are involved.</p> <p>Close collaboration with IGEM will help ensure that standards are updated and amended, based on the real-life experience of hydrogen, such as the effectiveness of safety mitigations, required upskilling, and any cross-industry work required.</p>	
--	--

6.3.4 Summarise any substantial evidence gaps expected to remain after the completion of the trial and their implications.

<p><b>Answer:</b></p> <p>The project has completed the Trials Evidence Framework and no substantial gaps have been identified.</p> <p>There are a number of different collaborative working groups and boards with representation from all the GDNs as well as the wider industry. These groups are focused on evidence generation for various elements of the hydrogen for heat conversion.</p> <p>Work is ongoing to establish the evidence coverage by the various groups and how any gaps can be filled through additional work. NGN/WWU are active members of these groups and will endeavour to ensure that there are no substantial gaps.</p> <p>Where gaps remain, their implications will be assessed and a plan to close them out will be looked at in conjunction with the wider industry.</p>	<p><b>Document reference (relevant page/section):</b></p>
---	---

6.3.5 Provide a concise summary of how evidence will be collected, stored, measured, and assured. Include a clear plan on how you will work with Ofgem and BEIS to ensure data is shared in an interoperable format, including contributing to the design of a possible Evidence Management System being considered by BEIS.

<p><b>Additional guidance:</b></p> <p>BEIS is developing an Evidence Management System to capture our evidence needs, status of evidence and assurance of evidence in a systematic and efficient way to ensure a robust, comprehensive, and auditable evidence base to inform policy decisions on hydrogen for heating.</p> <p>Within your answer, summarise how you are storing and protecting consumer data as well as how you are following the latest Data Protection Rules and ICO guidance.</p>
---

<p><b>Answer:</b></p> <p>The project will collect a variety of data throughout the different stages. Much of the data will be collected from the network activities and will be stored in NGN's core systems such as SAP and GIS mapping systems. Pressure data, maintenance and repair information and all other network information will be collected measured and assured through the normal BAU processes. This data can then be extracted and reported on to help inform the Evidence Management System being developed.</p> <p>Consumer evidence will be collected through feedback activity, which includes consumer surveys, panels and interviews. It will be collected by an independent agency with consumer consent. NGN will work with these independent agencies to ensure that consumer information is only stored where essential and will be deleted within an agreed timeframe.</p> <p>Any evidence or data held by the project will be kept in line with NGN data protection policies set out by the Data Protection Officer. Data will be appropriately stored in Excel, PowerPoint, Word or PDF formats so that it is accessible to users. See NGN's GDPR policy attached.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>NGN Personal Data Privacy Notice.</p>
---	--

6.3.6 Provide a concise plan of how you will disseminate the Key Knowledge Deliverables (KKDs) with other GDNs and interested parties, including plans on data sharing and collaboration.

<p><b>Answer:</b></p> <p>The GDNs have well-established collaboration. We envisage that the sharing of KKD's will be completed through appropriate collaborative working groups.</p> <p>Many of the KKD's will need to be anonymised to comply with GDPR. The RHC project sees the ENA having a role to play in dissemination of key findings. KKD's that are required to be shared more widely will need to be shared as part of wider discussions and a process established where multiple KKD's need to be shared with stakeholders.</p> <p>The Evidence Management System that has been generated by DESNZ and is being used by the HVT collaborative working group and the End User Safety Evidence working group will be a central repository for the evidence generated not only from the trial but also the wider projects that have been undertaken.</p>	<p><b>Document reference (relevant page/section):</b></p>
---	---

## 6.4 Case for Safety (1000 words)

6.4.1 With reference to Attachment E – Final Detailed Plan for Safety Evidence, provide a short summary of key conclusions of your safety evidence work so far, views from HSE (if applicable), remaining safety evidence gaps and how you anticipate resolving them.

<p><b>Answer:</b></p> <p>The Redcar Hydrogen Community Project Case for Safety work undertaken in Stage 2 of this project has been closely informed by research and development projects undertaken by networks and wider industry under the Hydrogen Research and Development programmes.</p> <p><b>Safety Evidence Work So Far:</b></p> <p>Work has been undertaken to address line items in the HSE’s Trials Considerations document and a revised copy of this spreadsheet (Attachment E) has been supplied for the RHC trials signposting to wider projects and RHC Stage 2 deliverables that intend to address the considerations. This spreadsheet and companion report includes the work to date and remaining work being undertaken, including by others, that will be completed prior to trial, to close out remaining safety evidence requirements. The spreadsheet also identifies safety evidence that will be captured during the trial period.</p> <p>The project submitted an interim revision of the spreadsheet to the HSE in December 2022, feedback returned and reviewed by NGN and a response returned February 23. A further revision of the spreadsheet/evidence plan is part of this submission, and ongoing workshops with the HSE ensure their requirements are captured.</p> <p><b>Cases for Safety:</b></p> <p>NGN have developed two draft Cases for Safety covering specific areas of the RHC trial system that NGN intends to own, operate, and maintain. These are:</p> <ul style="list-style-type: none"> <li>• Draft Distribution Case for Safety.</li> <li>• Draft End User Case for Safety.</li> </ul> <p><b>QRAs:</b></p> <p>This submission intends to provide assurance that both the new hydrogen trial infrastructure and converted hydrogen system will result in at least the same levels of safety as the existing natural gas system and align to HSE’s framework criteria for safety. Accordingly, three QRAs have been submitted and relate specifically to defined areas of the trial including:</p> <ol style="list-style-type: none"> <li>i) Upstream HP mains and above ground storage and pressure reduction facility.</li> <li>ii) The new hydrogen MP main.</li> <li>iii) The converted hydrogen network and downstream installations.</li> </ol> <p>The QRAs are attached but further calculations/updates will continue as the detailed design is refined and further research completed.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Attachment E: NGN Redcar HSE Trials Consideration spreadsheet (T0A – T63) – 10373780-1.</p> <p>Attachment E: Companion report – 10373780-1.</p> <p>Attachment E: Above Ground Storage Facility and High-Pressure Pipelines QRA – 10369984-3.</p> <p>Attachment E: Medium Pressure Transfer Pipe QRA – 10369984-1.</p> <p>Attachment E: Network and End User QRA 10369984-2.</p> <p>Attachment E: Hydrogen Safety Case Framework 10377759-02.</p> <p>Attachment E: Draft - Distribution Case for Safety – Redcar Hydrogen Community.</p> <p>Attachment E: Draft - End User Case for Safety – Redcar Hydrogen Community.</p> <p>Attachment E: Redcar Hydrogen Village Trial Repurposing Design and Integrity Report – PIE/R/22/571.</p>
--	--

**Key Conclusions:**

The net conclusion of the QRAs indicates that additional mitigations will be implemented to achieve the same or improved levels of safety calculated for the natural gas network. The mitigation measures reviewed and proposed include:

- Replacement of iron mains within 30 m of buildings. Two sections of low pressure 6” iron is proposed to remain live for research purposes and appropriately managed. All domestic below ground steel services (2” and below) replaced with PE.
- Meters moved to an external position where possible, with a target of at least 30% of the total population of services terminating in external meter boxes.
- Network design pressure between 23-50 mbar to alleviate any existing service capacity issues.
- Two excess flow valves will be installed in every domestic service including one in the meter and one between the network ECV and meter inlet and the equivalent for non-domestic users.
- Hydrogen gas detection in every home with remote activation to local NGN control centre.
- Internal inspection and tightness test of all downstream installations in line with approved IGEM H2 and H3 standards, including the installation of any secondary non-domestic safety control devices as determined by the standards.
- All existing appliances to be replaced with new or converted to include the latest safety devices.

By implementing these mitigation measures, the research has calculated that the project can outperform the levels of safety of the natural gas network. The project will continue to refine the QRA/Risk assessment model through future stages as evidence from wider in-progress projects becomes available.

Evidence from this project and others already complete, in progress, or planned, should enable the HSE to have the confidence to issue a ‘Letter of Assistance’ for the trials to go live in line with the current schedule. This project has addressed all evidence lines in the spreadsheet and signposted to other projects also delivering answers to the key areas raised by HSE.

**Future Work:**

NGN intends to work with DESNZ, HSE and [REDACTED] during Stage 3 to address all feedback received on Stage 2 submissions, including the H21 Phase 2 and village trial-specific QRAs, Evidence Plan and Draft Cases for Safety to achieve the required ‘Letter of Assistance’. This will be supported with ongoing evidence being delivered by DESNZ under the HSS4H programmes, and the network programmes coordinated by the ENA, including Network Safety & Impacts (NSI) and End User Safety Evidence (EUSE).

Attachment E: EUSE status summary report for Hydrogen Village Trial Stage 2 submission.

6.4.2 Summarise any site-specific design safety considerations and where in corresponding Attachments these have been captured (e.g. Hazard Identification (HAZID), Hazard and Operability Study (HAZOP), Hazardous Area Classification, etc.)

<p><b>Answer:</b>          Within the design of above and below ground storage, Formal Process Safety Assessments (FPSA) were conducted in accordance with the NGN HAZ9 specifications by [REDACTED] (above ground) and [REDACTED] (below ground). Key safety considerations are incorporated into the design:</p> <ul style="list-style-type: none"> <li>- Relocation of above ground storage and PRS site due to proximity to network rail assets.</li> <li>- Pipeline routing – no safe route through Teesworks, route being developed through the [REDACTED] site utilising existing pipe racks where possible.</li> <li>- Design of above ground storage considers access to the top of the storage vessels for maintenance and design of the storage vessels is now horizontal to reduce height.</li> <li>- Above ground storage vessels are spaced 9m apart, taking jet fires into consideration.</li> <li>- Interconnecting pipeline between the above and below ground storage has been designed to operate at lower pressure to minimise pressure in the pipeline crossing third-party land.</li> <li>- Current well strings on below ground storage do not have a sub-surface safety valve: new design will incorporate this.</li> <li>- The location of the ancillary equipment associated with the below ground salt caverns has been assessed to minimise impact on existing local infrastructure.</li> </ul> <p>These safety considerations were part of the initial design and in response to HAZID and HAZOP workshops which reviewed the hazard identification and hazards in operations for both above and below ground facilities, including associated high-pressure pipelines. Any hazards identified in these FPSAs have been incorporated into the design.</p> <p>Hazardous area calculations and drawings have also been prepared for the storage bullets and pressure reduction site (PRS). The project has undertaken a site location QRA, determining that the proposed location on Teesworks poses tolerable societal risk.</p>	<p><b>Document reference (relevant page/section):</b>           HAZID &amp; HAZOP Studies.</p>
--	--

# 7. Planning and Project Delivery Risk Mitigation

## 7.1 Detailed Plan, Schedule, and Scope of Work for Stages 3-5 (1500 words)

7.1.1 Provide a schedule of the Agreed Outputs and Milestones to be met during Stages 3 to 5.

Your response should include the following:

- Detailed project plan for Stage 3 (Build and Prepare)
- Plan and schedule for Stages 4 (Operational) and 5 (Exit)
- Critical path and analysis, including identifying long-lead time tasks and impact of delays on project delivery.

Each Stage should clearly state the following:

- Scope of work
- Agreed Outputs and Key Knowledge Deliverables (defined in Section 5.2)
- Milestones - Key points in the project plan to which payments are linked
- Dependencies.

### **Additional guidance:**

Information provided should include:

- A detailed project schedule, such as a Gantt chart and list of activities for each Stage (Attachment J – Detailed Project Schedule)
- A range of project plans to consider the complexity and uncertainty in forward planning to the trial start date, such as for optimistic, central and pessimistic timeframes. The underlying assumptions of these scenarios should be clearly stated, as well as any impact on project costs
- Milestones (name and date) clearly labelled on the project schedule and also presented in table format. These milestones should be consistent with the milestones listed in Table 4: Stage 3-5 milestones(section 7.1) below. We also ask that you include suggested dates for suitable HSE assurance points in the project based on your plans to deliver safety evidence
- Agreed Outputs and Key Knowledge Deliverables (name and date) clearly labelled on the project schedule. These should be consistent with those presented in Table 2: Agreed Outputs (section 5.2). Subject to consultation, some of these are anticipated to be included as part of Ofgem’s NZASP funding decision. Identification of project dependencies including the date at which these occur and the impact of a delay to a dependency on project delivery (this can be presented as a table). Highlight any external dependencies where delays from BEIS/ HSE/ Ofgem risk delivery date
- A summary of assurance undertaken on the achievability of the schedule
- A RACI matrix identifying roles and responsibilities for tasks, milestones, and decisions.

Identification of when you expect to meet the minimum thresholds and targets, as set out in Hydrogen Heating Village Trial Stages 3 to 5 Funding Application Guidance.

<b>Answer:</b>	<b>Document reference (relevant pages/sections):</b>
Please see items below and associated document reference:	
<ul style="list-style-type: none"> <li>• Detailed Plan for Stage 3 (Build and Prepare), 4 (Operational) and 5 (Exit)</li> </ul>	Attachment J – Detailed Project Schedule.
<ul style="list-style-type: none"> <li>• Critical Path Analysis</li> </ul>	Attachment J – Additional Attachment Section.
<ul style="list-style-type: none"> <li>• Optimistic, central and pessimistic timeframes</li> </ul>	Attachment J – Optimistic, Central and Pessimistic Timeframe Options.
<ul style="list-style-type: none"> <li>• Milestones including HSE Assurance Points</li> </ul>	Attachment J – Detailed Project Schedule plus Additional Attachments – Safety Workstream – HSE Assurance.
<ul style="list-style-type: none"> <li>• Agreed Outputs and Key Knowledge Deliverables – Milestones</li> </ul>	Attachment J – Detailed Project Schedule plus Additional Attachments – Agreed Outputs and Key Knowledge Deliverables.
<ul style="list-style-type: none"> <li>• Minimum thresholds and targets</li> </ul>	Attachment J – Detailed Project Schedule – Key Milestones Stage 3 plus 7.1.2 Table 4. Attachment J – Additional Attachments Section.
<ul style="list-style-type: none"> <li>• Project dependencies</li> </ul>	Attachment J – Dependencies Table

<ul style="list-style-type: none"> <li>• RACI Matrix – A high level RACI has been produced based on the key programme tasks and milestones. A more detailed RACI for each workstream will be generated during Stage 3 once workstream resources have been appointed.</li> </ul> <p>Summary of assurances – The detailed Project Schedule was developed in conjunction with the Workstream Leads and has been reviewed by them at each stage. The structure of the Schedule has been checked to ensure all activities have the relevant predecessor and successor so that the correct logic drives the programme. A series of workshops have been held to challenge and review the Schedule including reviewing a Critical Path Analysis. The Senior Programme Lead and Steering Board have undertaken a review to ensure commitments within the Schedule are achievable.</p>	<p>RACI Matrix.</p>
--	---------------------

7.1.2 List the key milestones in your project below. Relevant milestones for funding purposes should be listed with additional information in section 10.1 Cost and Funding Plans.

**Table 4: Stage 3 – 5 Milestones**

<b>Milestone</b>	<b>Approximate date (MM/YYYY)</b>
Level of hydrogen supply availability confirmation (See Q8.1.1 Contractual Agreements)	09/2023
DESNZ HVT Decision	02/10/2023
Grant Funding Agreement signed	12/2023
HSE Assurance – NGN Case for Safety responses (QRA/Safety Case/Evidence Plan)	12/2023
HSE Assurance – External Projects (See Attachment J – Detailed Schedule Stage 3 – 5 Key Milestones, External Dependencies for detail dates)	04/2023 to 12/2023
HSE Letter of Assistance issued	03/2024
Training & Assessment Centre complete – Downstream	04/2024
Training & Assessment Centre complete – Upstream	04/2024
Consumer Choice Engagement complete	04/2024
Minimum Threshold Determination – Boilers	04/2024
Minimum Threshold Determination – Cookers	04/2024
Upstream Training complete	01/2025
Permits/Licences for Production / Storage / HAGI complete	04/2025
Procurement of Appliances and Meters complete	05/2025

Downstream Training complete	08/2025
H2 Above Ground Storage commissioned	10/2025
Electrical Supply Network Reinforcement complete	10/2025
Hydrogen Production Site commissioned	11/2025
H2 Above Ground Storage commissioned	12/2025
H2 Pipelines commissioned	12/2025
Stage 3 Build & Prepare complete	01/2026
Ready to Go Live	10/2025
Commence Stage 4 Trial Period	11/2025
DESNZ Future Policy Decision – Domestic Heat	09/2026
Sector Conversion complete	09/2026
Stage 4 Go Live complete	11/2027
Commence Stage 5 Exit Plan	12/2027
Continuation of Trial to Exit Plan complete	04/2028
HVT complete	09/2028
Payment Milestones – See Table 10.1.1	

7.1.3 Provide a concise summary of the key delivery risks to the project and how the schedule takes account of these e.g. provision of contingency time.

<p><b>Answer:</b></p> <p>Key delivery risks</p> <ul style="list-style-type: none"> <li>Stakeholder Engagement – Allowing sufficient time &amp; support for Consumer Choice stage. The NGN Trial will be undertaken in a staged approach (Sector 1 followed by Sectors 2–21) enabling learning from the more focused initial phase to be addressed in wider rollout.</li> <li>Training – Ensuring sufficient time for the required training. The NGN Schedule recognises the need to deliver upstream training ahead of downstream. The schedule identifies Upstream Training will be delivered approximately 9 months before commissioning activities commence. Downstream training has a contingency of approximately 2 months before Sector 1 conversion; however, due to the phased approach, most trained personnel will not be required until approximately 8 months after training is scheduled for completion.</li> </ul>	<p><b>Document reference (relevant page/section):</b></p> <p>Attachment J – Detailed Project Schedule Stage 3 Build and Prepare, Stakeholder Engagement.</p> <p>Attachment J – Detailed Project Schedule Stage 3 Build and Prepare, Training.</p>
--	---

<ul style="list-style-type: none"> <li>• Regulatory – The schedule identifies approximately 2 months of contingency within this workstream.</li> <li>• Build – Above 7 bar network – Key risks include procurement of long lead items and the Production Facility build. The schedule shows that the procurement of the pressure vessels for above ground storage is on the critical path. There is no built-in contingency; however, there is a contingency plan in 7.1.4 below. The Production Plant build is a key delivery risk due to delivery timescales and the requirement for supporting the new hydrogen network. The current schedule identifies the plant commissioned by November 2025. Either of the production plants can supply hydrogen for Sector 1 but to maintain the target to convert Sector 1 in 2025, in the event both are delayed, NGN have planned for two of the initial above ground storage vessels to be commissioned utilising hydrogen delivered by tankers. The use of two of the ten above ground storage vessels has been assessed as suitable for supporting Sector 1 conversion. This means that the project has in-built contingency of around 3 months for commissioning the Production Plant – the period from current proposed completion date to commencement of Sector 2 conversion, less the post-commissioning activities.</li> <li>• Build – Below 7 Bar network – Key risks include the construction of the new MP network (critical path), reinforcement of the existing LP network and completion of the mains replacement works. NGN have taken a pessimistic view on the timescales associated with MP main, allowing 18 months to install 10.5 km of predominately 250 mm PE pipe. NGN believe around 3 months of contingency is built into the duration. The LP network reinforcement, along with mains replacement works, are currently programmed for over an 18–24-month period. The actual work is estimated at 12 months and therefore includes significant contingency.</li> <li>• Conversion – Key risks include the initial identification of appliances, conversion preparation works and conversion. The conversion of properties is planned over a 5-day period with the consumer without hot water/heating for one day. NGN have identified that advanced installation of boilers/meters will minimise the risk of overrun. NGN will undertake property surveys at the earliest opportunity accounting for the Customer Engagement processes. This early assessment allows for the procurement phase to commence, allowing early installation of hydrogen-ready appliances. NGN will follow a two-phase approach for these installation works, Sector 1 first, followed by Sectors 2 to 21. The proposed order cut-off point for commercial boilers supplier of end of Q1 2025 has also been included, with early surveys of all commercial properties across the 21 Sectors included in the schedule. Also identified is the upfront conversion to electric alternatives, de-risking the conversion period, with planned implementation February 2025 to January 2026, approximately 3 months ahead of the hydrogen conversion. The schedule shows</li> </ul>	<p>Attachment J – Detailed Project Schedule Stage 3 Build and Prepare, Regulatory.</p> <p>Attachment J – Detailed Project Schedule Stage 3 Build and Prepare, Build, Above 7 Bar Network.</p> <p>Attachment J – Detailed Project Schedule Stage 3 Build and Prepare, Build, Below 7 Bar Network.</p> <p>Attachment J – Detailed Project Schedule Stage 4 Go Live, Conversion.</p>
--	---

<p>Sector 1 conversion in Q3 2025 and the remaining sectors from the start of Q2 to the end of Q3 2026, a pessimistic approach to the works. The Sectorisation Plan identifies that Sectors 1–11 could be converted simultaneously with Sectors 12–19 and also Sectors 20–21, creating contingency within the sector sequencing. Even with the current pessimistic approach there is a further contingency period of 22 days (calendar), identified separately on the schedule.</p>	
---	--

7.1.4 Summarise contingency plans for any significant risks that would put at risk aspects of the trial delivery which are critical to your overall project timeline.

<p><b>Answer:</b></p> <p>NGN have several contingency plans in place to address the significant risks that may impact the overall project timeline.</p> <p>The list below identifies the significant risks and summarises contingency plans.</p> <ul style="list-style-type: none"> <li>• Supply of Above Ground Storage Pressure Vessels – currently the order for these will be placed following the award of the project and prior to signing GFA. NGN recognise that this activity is driving the critical path and consequently are in discussions with third parties to take on this activity with the aim of either placing an order earlier (using the current lead time) or negotiating a shorter lead time. Should neither be possible, NGN recognise there may be a requirement to delay the conversion of Sector 1 in Q4 2025. However, there is approximately a month of contingency included in Sector 1 conversion before needing rescheduling to the start of Q2 2026. The 2026 conversion period can include Sector 1 as there is a contingency period of 22 days following the final sector conversion (end of September).</li> <li>• Production Plant – the Production Plants are scheduled for completion by early November 2025 as advised by [REDACTED] but are reliant on the NZHF and HBM submissions. Until funding for the producers is in place, there is uncertainty in the November 2025 target. The schedule includes mitigation for the potential impact of Production Plant delays by incorporating a tanker off-loading facility within the hydrogen Above Ground Installation/Above Ground Storage facility. Should the production plants be delayed then the tanker option can be utilised for Sector 1. Should the plants be delayed beyond the start of April 2026, there is contingency within the Sectorisation Plan allowing for the start of conversion to be delayed by approximately 6–8 weeks as the sectors could be converted in parallel (1–11, 12–19 and 20–21). This would require additional trained resources but as there is contingency time within the delivery of training, this could be accommodated by delivering further training between August 2025 and the start of the re-scheduled conversions in May/June 2026.</li> </ul>	<p><b>Document reference (relevant page/section):</b></p> <p>Attachment J – Detailed Project Schedule.</p> <p>Attachment J – Detailed Project Schedule.</p>
---	---

<ul style="list-style-type: none"> <li>Supply of hydrogen appliances – this area is of high risk as OEMs need to provide “new” equipment. The schedule identifies early engagement with consumers is vital to identify types and quantities. Once the consumer choice process is concluded orders will be placed with suppliers already established on NGN Procurement systems. The schedule shows that, using currently advised lead times, delivery of both domestic and commercial boilers, meters and appliances will be mid-February 2025 to mid-May 2025. NGN intend to undertake advanced installation of the hydrogen-ready appliances from April 2025 through to January 2026, approximately 3 months before the main conversion works are due to commence. In addition, as noted above, the start of the main conversion could be delayed by up to 2 months should there be delays with the supply of boilers/meters.</li> </ul>	Attachment J – Detailed Project Schedule.
--	---

7.1.5 **Cadent only:** Provide a mitigation plan against delivery risks associated with the 6km pipeline. (300 words, in addition to overall word count for Section 7)

<b>Answer:</b>  Not applicable.	<b>Document reference (relevant page/section):</b>
---------------------------------------	--

## 7.2 Organisation of Responsibilities (1000 words)

7.2.1 Share an overall organisational structure of the project delivery team.

<b>Answer:</b>  Please refer to the RHC Organogram document for the organisational structure for Stage 3–5.	<b>Document reference (relevant page/section):</b>  RHC Organogram.
---	---

7.2.2 Provide a detailed description of overall strategy for management of the project, management processes, governance structure, ownership of responsibilities and description of capabilities.

<b>Additional Guidance:</b> Your answer should include detail of the individuals and/or roles with responsibility and accountability for management of the various aspects of the trial. Your response should demonstrate your competence to manage a project of this scale and complexity, and access to the required competence, skills and capabilities.
--

<p><b>Answer:</b></p> <p>We propose that in Stages 3–5 the RHC project team will be split into different workstreams; a similar approach was taken for Stage 2. Each workstream will have a workstream lead with an aligned skillset. They will have ultimate responsibility for delivery of requirements within their area, in order to ensure the most effective team delivery effort. The effectiveness of this approach has been demonstrated throughout Stage 2 and throughout the portfolio of projects undertaken by NGN. Many of the workstreams are not dissimilar to those undertaken by NGN/WWU on a daily basis and for which they have a proven track record. Where workstreams differ from BAU processes we seek to partner with industry experts to prevent knowledge or skills gaps. Refer to project RACI, Organogram and Workforce Plan for further details.</p> <p>To ensure the success of the RHC project we will adopt a number of key techniques to ensure effective project management.</p> <p>To undertake elements of the large-scale construction work, we will partner with SMEs with experience and expertise in projects of a similar nature and scale.</p> <p>An external Project Management Office (PMO) will be appointed to the project to help with building upon existing processes and to implement the following:</p> <ul style="list-style-type: none"> <li>• Programme Assurance – delivered on time, to the agreed standard and budget.</li> <li>• Develop processes required for successful programme (and workstream) delivery.</li> <li>• Offer expertise, support tools and advisory services to support execution.</li> <li>• Deliver a single integrated view of programme status.</li> <li>• Enable effective decision making.</li> <li>• Reporting and Risk Management</li> </ul> <p>The governance framework was established at the start of the programme and although it may change during the life of the programme, effective governance should be sustained to completion and review of programme outcomes. To augment this, the project will also engage expert advisors to the steering board as and when required.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>RACI Matrix.</p> <p>RHC Organogram.</p> <p>Attachment I – Detailed Workforce Plan.</p> <p>Redcar Hydrogen Community –Training Plan.</p>
--	--



The escalation process is designed to ensure the programme actively manages risks and issues:

- Risks and issue management is first addressed at workstream level. If this fails, or if any may affect milestones and/or require management, these are escalated to the PMB.
- Risks and issues needing further escalation will move to the Governance Forum, and finally escalated to the Steering Board if necessary.

To ensure a successful delivery of Stages 3 and 4, the project will employ 3 key factors for success:

**Accountability:** All members of the programme will have a firm understanding of their role and take ownership for delivering on their commitment.

**Plan:** A clear, understood and agreed plan of how we will deliver the project milestones for all stages within the agreed timeline.

**Communication:** Clear and articulate communication across the programme to ensure alignment within each workstream and risks/ issues are raised and mitigated accordingly.

### 7.2.3 Outline your overall supply chain strategy.

List partners, contractors and suppliers, with firm agreements / arrangements in place where appropriate (including memorandums of understanding and letters of intent) detailing their responsibilities including for procurement, ownership and delivery of assets and services.

Provide evidence justifying how this strategy will secure a fair market value for goods and services and deliver value for money overall.

**Additional guidance:**

Where relevant, your response should include:

- Details of how fraud risk will be mitigated in the supply chain and fraud controls identified
- Percentage of SMEs in the supply chain
- Rate card provided for any professional services
- Social value and how it will be addressed in the proposal. The proposal should demonstrate and describe existing or planned understanding of the level of Small, Medium and Large organisations and Voluntary, Community and Social Enterprises (VCSE) and Mutuals' participation in the grant supply chain. It should also identify opportunities to grow supplier diversity in the grant supply chain or in the location/community where the grant is performed, including SME and VCSE participation and new business creation.

**Answer:**

For the RHC, NGN's supply chain in terms of procurement ownership/responsibility is divided into 6 sections:

- Hydrogen supply & storage
- Network conversion
- Appliance/equipment provision (domestic)
- Industrial and commercial
- Metering
- Logistics

The list of partners, contractors and suppliers are provided in the attached Supply Chain Status Table.

Due to the current stage of the project many of these arrangements and relationships have progressed as far as they reasonably can and maintained to enable progression to contractual status at pace.

With regard to hydrogen supply, Heads of Terms are in place and supply agreements are currently in draft. NGN have identified potential suppliers for above ground high pressure storage vessels and are at RFQ stage for that requirement. A Memorandum of Understanding (MOU) is in the latter stage of negotiation for underground storage. The required installation work to connect the hydrogen supply to Redcar will be undertaken by NGN's existing supply chain under its existing Framework Agreement and contracts.

The appliance supply chain will be established and contracted in accordance with NGN's procurement strategy (attached). NGN will contract separately with a third-party logistics provider to coordinate storage and distribution of appliances and associated equipment in the trial area.

Effective management of our supply chain will be a fundamental aspect of achieving successful project delivery. We will be following established and effective NGN company policies and processes including events, such as tenders and single sourcing, as needed to meet supply chain requirements. In liaison with Commercial and Project teams, these processes will be managed and conducted by our dedicated Procurement Team and specific Procurement Manager.

**Document reference (relevant page/section):**

Supplier Chain Status Table.

Heads of Terms.

Procurement strategy submission.

Supplier code of conduct.

Rate card.

PQQ Documents.

Sustainable Procurement Strategy.

Letters of Intent.

Our Procurement processes and policies have been developed under rigorous regulatory guidelines, are continuously improved and updated, and the process subject to regular audit to ensure compliance and transparency. See attached NGN's supplier code of conduct, a requirement from Ofgem and a pre-requisite for any contract. Approved vendor lists and frameworks of suppliers are assessed regularly and will be utilised where appropriate. See attached rate card for NGN's professional services framework. Utilising established and vetted suppliers ensures the most responsible use of funding practicable.

Attached are our standard PQQ documents, with references to Fraud, Sustainability, and SMEs etc. all of which are assessed and scored as part of procurement exercises. Any supplier with a contract of substance will undergo PQQ and be required to sign the code of conduct.

NGN cannot discriminate in favour of SMEs. We do however monitor the use of SMEs as part of the PQQ process and ensure, by how documents are structured and assessed, that working with NGN is accessible to SMEs. The current percentage of SMEs in the supply chain status table is 64%.

You will also see attached NGN's Sustainable Procurement Strategy which details SME and third-sector initiatives, also with the stated aim that NGN follow the principles of the "Triple Bottom Line", which means that in addition to generating Profit, we are also committed to creating a greater value for People and Environment.

## 7.3 Workforce and Training (1000 words)

Provide a detailed plan on recruitment and training throughout Stages 3-5.

In your response you must cover the following:

- Detailed workforce plan (Attachment I)
- Recruitment plan
- Training plan
- Contingency plans to mitigate workforce attrition during the trial
- Evidence of GDN training standards and courses developed.

### **Additional guidance:**

- Outline the proposed workforce for all activities in Stages 3-5 of the village trial including the roles, scale of resource proposed and the appropriate skillset/experience for the roles

- Include an overview of any roles where there is concern about access to the capabilities/skillset needed or access to the right volume of resource and what the contingency is to deal with this
- Include an explanation of what assurance has been undertaken to ensure sufficient resourcing
- Explain how the training plan will provide sufficient trained operatives to support supply resilience and enable effective restoration of hydrogen supply in the event of an interruption. This should include consideration of mutual aid between networks
- The recruitment and training plans should include: timings; detail of other organisations working to deliver the recruitment plan; identification of risks and mitigations; identification of dependencies and when these intersect with the timeline.

All responses to this section should cover all resource, and not only technical staff.

**Answer:**

**Workforce Plan**

The proposed outline workforce for all activities in Stages 3-5 of the village trial is included in Attachment I – Workforce Plan.

**Training Plan**

The RHC Training Plan sets out the initial plan for managing required training and competency to successfully undertake the RHC.

With the project being a first of its kind trial, it's extremely important to ensure that the resources required to undertake the project are trained and competent for the roles they undertake. The gas industry is currently researching the requirements to convert, operate and maintain a 100% hydrogen network and therefore it is of utmost importance that the required changes are captured, resources retrained, and the work audited for compliance.

The plan builds upon the work being undertaken by other projects such as those being undertaken by Energy & Utilities Skills, collaborative training projects by the gas distribution networks and projects such as HyDeploy and H100.

The RHC Training Plan divides the requirements for training into two separate sections:

- Downstream of Emergency Control Valve (ECV) training – including training for appliance installation engineers and metering engineers.
- Upstream of ECV training – including construction activities, commissioning, operation, maintenance, and emergency response.

**Document reference (relevant page/section):**

Attachment I – Workforce Plan.

Redcar Hydrogen Community – Training Plan.

The plan sets out the routes for development of the required training, implementation of training and competency for the various resources that will be required for the project, training compliance, and assurance. The document details the plan to develop and deliver training, underpin resilience of skilled resource, and describes the GDN training standards in development, as follows:

- Details of courses and routes to development of training material.
- Details of engagement of training providers.
- Details of training facilities, including the use of the H21 DNV Spadeadam site and H21 Phase 2b South Bank site for field assessments.
- Details of the various project roles and training requirements.
- External and internal training and competency assessment systems and safe control of operations system changes.
- Details of Emergency Management, including Major Accident Prevention.
- Internal stakeholder training.
- Training assurance.

### **Resourcing and Recruitment Plan**

The RHC project will require a large number of resources to be recruited over a relatively short period of time. As a result, the recruitment strategy will look to ensure that the most suitable candidates for the roles are recruited as quickly as possible.

The majority of the resources are required in Stage 3 of the project, during which a substantial body of construction, surveying and pre-installation work will be required. As a flagship project for the UK, the RHC project will attract public and media attention. This means that effective and timely recruitment will be more important than ever, securing high-quality, competent, and consistent people resource throughout the project's duration.

### **Requirements Summary**

All requirements will be considered internally, with absorption of work being considered alongside short-term reallocation of resource whilst full recruitment campaigns take place.

To support us in meeting these requirements we would identify the most appropriate route from those listed below. NGN's in-house recruitment team would be supplemented with additional resource to support activity. Throughout all recruitment activity we would ensure opportunities are available to everyone internally and offered in a fair

Redcar Hydrogen  
Community –  
Resourcing and  
Recruitment Plan.

and consistent way. We would continue to focus efforts that engage a diverse talent pool, and to ensure inclusion and belonging are at the forefront of any recruitment campaign.

### Resourcing Routes

- i. Internal Movement – Offering opportunities for our existing colleague base who already support and serve the region, we have a range of existing progression paths that provide lateral and vertical development. Secondments, fixed term, absorption into BAU or project work would all be considered.
- ii. External recruitment – When internal movement isn't appropriate, or a skills gap has been identified, external recruitment from our inhouse recruitment team will be initiated. Attraction sources include LinkedIn, specialised and general job boards, energy and utility partnership with the ability to cv mine from this partner. Focused and proactive search activity through direct sourcing methods would be an option. Planned job fair and events would also be a potential option.
- iii. Agency Support – Through the deployment of our preferred supplier list we would seek to recruit into our specialist roles through our preferred agencies if required. The suppliers considered will have been through a tender process and will be a mix of national and local agencies. These agencies are currently tendering and would align with our commitments and business objectives around inclusion and community.
- iv. Contractor Framework – In some instances we may not be able to recruit into the business in the timescales required, or with the skills needed; and in such an instance we will look to our framework for interim contractors. This is already established and integrated in the business.
- v. Partnerships – We have identified partnerships with [REDACTED]  
[REDACTED]  
[REDACTED] We will utilise these connections in order to promote candidates from all backgrounds to continue or step into the energy sector.
- vi. Early Careers/Apprenticeship – Our apprenticeship programmes continue to develop. Our recent campaign for non-operational apprentices did not require any candidates to possess GCSE level qualifications, recognising this is a barrier for many to entering work.
- vii. Local Communities – At a local level we work with Business in the Community and have in place a programme for offering work experience opportunities to people for whom finding employment has proven a challenge – we would continue to build and develop our work in this area.
- viii. We are setting up education and training partnerships – with the purpose of offering internships and graduate placements as well as work experience and access to our partnerships with STEMazing and Solutions for the Planet.
- ix. [REDACTED] will be a fundamental partner in the creation of our green development and apprenticeship offering.

## 7.4 Development of the Exit Plan (750 words)

7.4.1 Outline your approach for reverting to natural gas. Summarise a decision-making process, identifying key considerations and stating the preferred scenario. Work should include:

- Cost estimates and funding routes
- Analysis of the impact on consumers, including a strategy for handling any appliance installations, de-installations, and replacements
- Evidence of consumer engagement on all potential exit plans, and consumer awareness of any long-term opportunities and risks
- Identification of necessary long-term market and regulatory changes to enable the option (if temporary exemptions were granted during the trial)
- Impact on the grid / energy supply
- Any other relevant information.

<b>Answer:</b>	<b>Document reference (relevant page/section):</b>
<p>If the trial area reverts to natural gas, new boilers or appliances (hydrogen or electric) will be replaced with natural gas. Consumers can choose to keep electric boilers or appliances but will no longer receive bill subsidies. At exit, consumers become owners of the appliances they agreed to, whether new or used during the trial.</p>	<p>Redcar Hydrogen Community – Exit Options.</p>
<p>For commercial consumers with a turnover of [REDACTED] and public bodies, exit options away from electrification must be reviewed with NGN and DESNZ.</p>	<p>Redcar Hydrogen Community – Consumer Offer.</p>
<p>It is important to consumers to have protection from financial disadvantage at exit, and we will support this by ensuring that protection principles from initial install will apply at exit.</p>	
<p>Reversion to natural gas would follow the Sectorisation Plan but in reverse, starting at the last location/sector completed.</p>	
<p>No additional energy will be required in reversion; capacity will likely be released by moving consumers from electricity back to natural gas.</p>	
<p>Costs for reverting to natural gas are included in Stage 5 and are to be funded as Phases 3 and 4, with funding from DESNZ, Ofgem and the appropriate levels of match funding.</p>	
<p>Costs have been estimated on the assumption that all properties connected to the gas network at the start of the trial would revert during Phase 5. Our preferred in-home supplier has provided bottom-up cost estimates for procurement of boilers and appliances and a resource plan costed using internal rates exclusive of business overhead and profit for installation works. Costs for reconnection of isolated mains to the gas network have been estimated by NGN’s operational and commercial colleagues using network design and historic unit cost information. Where consumers have chosen a heat pump, they will remain on this solution and no additional costs have been included in Phase 5. It has been</p>	

assumed domestic meters are dual-fuelled and can remain in situ, whereas costs have been included for I&C meters on the recommendation of [REDACTED]	
--	--

7.4.2 If desired, outline plans for full electrification and / or continuation on hydrogen. Provide a separate excel worksheet for detailed plans for each option in Attachment H – Exit Plan. Each option should include all work outlined in 7.4.1.

<p><b>Answer:</b></p> <p>Our preference is to remain on hydrogen at trial exit to minimise consumer disruption. This will only be considered an option if:</p> <ol style="list-style-type: none"> <li>1. Government legislates in favour of hydrogen for heat.</li> <li>2. Mechanism and funding for consumers to continue to pay natural gas prices are in place.</li> <li>3. Longer term regulatory solution identified.</li> </ol> <p>Hydrogen consumers would have the option to stay on hydrogen or choose an electric alternative. Consumers opting for electric during trial could request a project evaluation and potentially switch to hydrogen for free. Consumers on hydrogen would continue to be protected from bill increases above the cost of natural gas but electricity bill subsidy would end. Our consumer panel of residents have expressed that they felt this logical and fair, if protection from increased cost of hydrogen could be guaranteed.</p> <p>For this to be viable, further modification / derogation to the UNC / OAD would be required to enact an extension of the arrangements for the RHC as it is anticipated that these will be aligned to the duration of the trial.</p> <p>There is no anticipated requirement for additional grid capacity or additional work to the gas network.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Redcar Hydrogen Community – Exit Options.</p> <p>Redcar Hydrogen Community - Consumer Offer.</p> <p>Consumer Panel 7.</p>
--	--

7.4.3 As a condition of funding, you will be required to maintain an ‘early exit plan’ detailing how smooth cessation of the project will be managed in the event of an early exit. Describe below your early exit plan, including the principles on which this exit plan will be maintained, for example, including considerations around consumer protections and the management of liabilities.

<p><b>Answer:</b></p> <p>Reconversion would reverse the process explained in the Sectorisation Plan. All hydrogen-specific items/appliances would be removed during re-conversion of that sector.</p> <p>Dependent on timing of early exit decision, some homes may not have been converted to hydrogen, so would continue to use existing gas boilers and appliances, without replacements. However, NGN would honour provision of fabric upgrades to [REDACTED], ensuring parity.</p> <p>Any consumers who have already had new installations have the same options and protections as the natural gas exit above.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Redcar Hydrogen Community – Network Design Plan.</p> <p>Redcar Hydrogen Community – Sectorisation Plan</p>
--	---

<p>Participation payments would be paid proportionate to activity completed by the consumer.</p> <p>District Governors would be isolated and decommissioned once the sectors they feed are returned to natural gas, then removed. All services would stay in situ and revert to natural gas with additional services added or removed in conjunction with consumer offer.</p> <p>Once all sections are reverted, the medium pressure PE main would be decommissioned back to the pressure reduction station. All hydrogen labelled items would be removed.</p> <p>The above ground storage facilities are designed to allow ramp up in gas demand, including low flow stream for initial phases. We have also agreed the ramp up rate in production. This philosophy would operate in reverse for the exit or early exit plan.</p> <p>Hydrogen Supply Agreements are being negotiated with each producer: provisions for early exit will be agreed within this, potentially including liabilities. Storage Allocation Agreements will be created in coming months and early exit provisions agreed, potentially including liabilities.</p>	<p>Redcar Hydrogen Community – Exit Options.</p> <p>Redcar Hydrogen Community - Consumer Offer (Exit Section).</p>
--	--

## 7.5 Risk Register (750 words)

7.5.1 Provide a summary of highest scored risks for Stages 3-5 based on the full project Quantitative Risk Assessment (QRA), their causes, impact and proposed mitigation strategies.

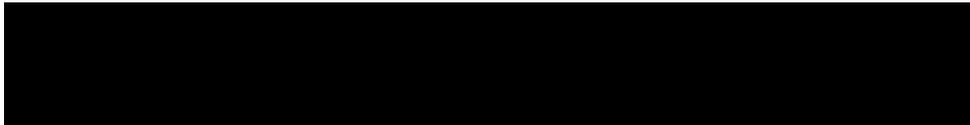
<p><b>Additional guidance:</b></p> <p>Provide an updated detailed Risk Register in Attachment G. Within the project risk register outline risks identified for Stages 3-5, including any risks which remain relevant from Stage 2, using the categories below:</p> <ul style="list-style-type: none"> <li>• Risk ID</li> <li>• Open or closed</li> <li>• Risk owner</li> <li>• Risk description</li> <li>• Risk impact description</li> <li>• Risk proximity</li> <li>• Probability rating: 1-5</li> <li>• Impact rating: 1-5</li> <li>• Pre-mitigation risk rating score</li> <li>• Mitigation description</li> <li>• Mitigation owner</li> <li>• Post-mitigation Probability rating: 1-5</li> <li>• Post-mitigation Impact rating: 1-5</li> <li>• Post-mitigation risk rating score</li> <li>• Date risk was last reviewed</li> </ul> <p>Include all project risks, mitigations and pre and post mitigation scoring and RAG status.</p>
---

### Stage 3:

The key risks throughout Stage 3 are outlined in Attachment G – the Risk Register. Some of the highest scoring risks are outlined below.



**Impact:** This would result in NGN removing themselves from the trial and no further work would be contributed from their side.



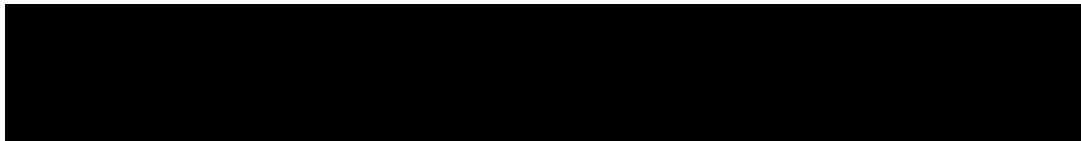
#### Pre-Mitigation

Impact: High  
Probability: Possible

#### Post-Mitigation

Impact: High  
Probability: Unlikely

**Risk:** HSE letter of assurance is not expected to be received until implementation of the RHC is underway.



**Mitigation:** NGN has kept in constant engagement with appropriate HSE officials to ensure there is alignment and understanding between both parties. This will continue until agreement is reached.

#### Pre-Mitigation

Impact: High  
Probability: Possible

#### Post-Mitigation

Impact: High  
Probability: Unlikely

**Risk:** [REDACTED] applying for third-party funding as part of their participation in the trial. NGN is dependent on [REDACTED] for supply of hydrogen, and there is a risk that the funding process is delayed.

**Impact:** Any delays would likely impact [REDACTED] participation in the trial. As [REDACTED] [REDACTED] of hydrogen, any impact on [REDACTED] would in turn negatively affect NGN's timelines.

**Mitigation:** NGN is in constant communication with [REDACTED] timescales. A tanker off-loading facility has been incorporated into the project design, which will

allow the commissioning of the above ground facility and run Sector 1. The hydrogen supply from either [REDACTED] would also run Sector 1.

**Pre-Mitigation**

Impact: V. High  
Probability: Likely

**Post-Mitigation**

Impact: V. High  
Probability: Possible

**Stage 4:**

**Risk:** Late availability of hydrogen [REDACTED] – Advised December 2025, which is 5 months after Gas on date in NGN programme.

**Impact:** Only able to run a number of sectors until [REDACTED] operational.

**Mitigation:** The initial sectors can be operated with [REDACTED] and tanker off-loading as a back-up.

**Pre-Mitigation**

Impact: High  
Probability: Possible

**Post-Mitigation**

Impact: High  
Probability: Unlikely

**Risk:** Inability to access properties in the sector to enable hydrogen appliances to be fitted.

**Impact:** Inability to access properties could cause delays to the rollout of the implementation and would require additional visits, resulting in increased cost.

**Mitigation:** On the ground activity to understand individual consumer sentiment and identify challenging properties. Appointment booking system, increased number of customer-facing roles within the team and information collected on preferred methods of customer contact. Appointment reminders via preferred contact method.

**Pre-Mitigation**

Impact: High  
Probability: Possible

**Post-Mitigation**

Impact: Med  
Probability: Unlikely

**Stage 5:**

**Risk:** Risk of commercial assumptions being inaccurate (e.g. unit costs, quantities, inflation etc.)

**Impact:** Commercial model will be materially different to real world, impacting project NPV and associated financial metrics.

**Mitigation:** Contingency to be included within the Cost Template for inaccuracies in assumptions. NGN to qualify out of the price the two significant cost risks in relation to construction of the above ground and below ground storage.

**Pre-Mitigation**

Impact: Med

Probability: Possible

**Post-Mitigation**

Impact: V. Low

Probability: Possible

# 8. Infrastructure and Delivery

## 8.1 Plan to provide Resilient Supply (2500 words)

8.1.1 Summarise your plan to provide resilient hydrogen supply. This should include:

- Detailed plan for hydrogen production and transportation to the village trial location including location and design of facilities, list of required equipment, and where possible, a preliminary Reliability, Availability and Maintainability (RAM) study, evidence of offtake agreements signed with producers, evidence of FIDs taken by producers, evidence of access agreements / permits if relevant
- Detail on greenhouse gas emissions associated with hydrogen production using the methodology set out in the Low Carbon Hydrogen Standard guidance and, where appropriate, evidence that the Low Carbon Hydrogen Standard has been met in order to be able to seek financial support through relevant government funds (Net Zero Hydrogen Fund, Hydrogen Business Model)
- Detailed plan for storage and other strategies for supply resilience such as back up sources, including evidence of agreement signed with partners and evidence of access agreements if relevant
- Detail on Technology Readiness Level (TRL) of new technological solutions and how risks associated with these will be managed
- Where the commercial approach involves procurement, include demonstration of readiness to procure including evidence of market engagement (including quotations where relevant), confirmation of internal approvals, and preparation of invitation to tender materials.

### **Additional guidance:**

Hydrogen supply availability should, at minimum, match the electricity network availability rating of 99.98%. There should be a common approach to measuring availability across the two proposals, to the extent that this is appropriate. For the two-year trial, you should provide:

- The failure rate - This should be based on the reliability of the distribution network, resilience of hydrogen production and storage sources and supply/demand forecasting. Where quantitative data from producers is not available, GDNs should provide qualitative detail on the methodology and categories of data that are required from the producers to provide a concrete failure rate figure.
- The outage duration – We expect GDNs to measure outage duration in a consistent way (in line with RIIO-GD2 Regulatory Report Pack (RRP) Guidance). Within the applications we expect to see anticipated restoration times for:
  - a) Planned interruptions
  - b) Unplanned interruption (non-Major Incident)
  - c) Unplanned interruption (Major Incident (>250 homes))

In all cases we want to understand both the anticipated restoration time (i) to the Emergency Control Valve (ECV) and (ii) total time off gas (i.e. restoration time within properties). We expect GDNs to compare the anticipated outage duration to natural gas and clearly explain what is driving any difference.

We expect GDNs to provide satisfactory consumer protection plans to mitigate any risks posed by resilience of hydrogen not being equal to resilience of natural gas, including specific protections for vulnerable consumers during any unplanned interruptions and consideration of appropriate compensation. This can be covered in the Consumer Protection Plan.

<p><b>Answer:</b></p> <p><b>Hydrogen Transportation and Storage Design</b></p> <p>The design philosophy for RHC is to provide a resilient hydrogen supply which has been enabled by the utilisation of connections to two production facilities, as well as above ground and below ground storage to manage the inter day and inter seasonal peaks in demand.</p> <p>The above ground storage is provided by 10 individual 1 tonne storage vessels operating at 30 barg, which are similar to the storage philosophy of storing natural gas for the networks in the past. To provide hydrogen during periods of high demand it is proposed to re-purpose an existing below ground salt cavern operating at 70 barg, owned and operated by [REDACTED]. The proposed cavern currently holds nitrogen, and the conceptual design in the attachments details how an existing mothballed cavern will be re-purposed to store hydrogen.</p> <p>In the event of [REDACTED] production facilities being delayed, we have incorporated a tankering offloading facility which can be used for early deployment of hydrogen for Sector 1. Please refer to the Operating Mode Schematics for further detail.</p> <p>[REDACTED] have completed the conceptual design study for the upstream above 7 bar infrastructure. Their design covers all aspects of the interconnecting high-pressure pipelines between the hydrogen producers, above ground and below ground storage sites, including a Pressure Reduction Site which will supply a downstream pressure of 2 barg to the RHC project area. Further details can be found in the Upstream Design attachments.</p> <p>Design of hydrogen production facilities is the sole responsibility [REDACTED] and we are communicating regularly [REDACTED] on both commercial and technical aspects.</p> <p>[REDACTED] have provided NGN with a high-level Material Take Off (MTO) register and using this, NGN have approached various vendors to obtain indicative costs and lead times.</p> <p><b>RAM Study</b></p> <p>A Reliability, Availability and Maintainability (RAM) Study covers the availability assessment of the proposed hydrogen supply chain, including the following:</p> <ul style="list-style-type: none"> <li>Hydrogen production (by electrolysis from two different suppliers [REDACTED])</li> </ul>	<p><b>Document reference (relevant page/section):</b></p> <p>Upstream Design.</p> <p>Below Ground Storage Study.</p> <p>Operating Modes.</p> <p>Above 7 barg Planning Strategy</p> <p>AGI &amp; Pipeline Materials Quotes from Vendors.</p> <p>NGN H2 Village Trial RAM Study – Phase 1 Results.</p> <p>NGN H2 Village Trial RAM Study – Phase 1</p>
--	--

- NGN AGI – including ground storage bullets, pressure reduction system, odorant injection and metering.
- [REDACTED] [REDACTED] – including associated compression (injection) and gas treatment (withdrawal) facilities.
- Supply mains line to H2 distribution network.

Base Assumption Report.

[REDACTED]



The RAM study is split in to two phases due to timescales and the availability of information from the producers and salt cavern operator.

DNV conducted the RAMS utilising their TARO software. The software predicts the performance of a system using a Monte Carlo simulation technique.

Phase 1: (report attached)

- Phase 1 of the study is a high-level RAM assessment of the hydrogen supply chain against the assumption of the full demand scenario (i.e. supply all sectors within the scheme, while accounting for seasonal and daily variations during the trial period).
- There were two extremes used: Base and Sensitivity cases – the sensitivity case is the worst case, in that the producers could only provide a flat rate of hydrogen throughout the year. The project is working with [REDACTED] on various predicted supply scenarios on the last 5 years' demand profile.
- As seen in the attachments the Availability is 99.995% and 99.973% respectively, which meet the minimum requirements on worse case.

Phase 2: (Future planned work)

- More detailed representation of all facilities to reflect the updated designs.
- Performance optimisation analysis, to investigate the performance impact of varying a range of model input parameters that are of particular interest to the project.



### Details on Greenhouse Gas Emissions

The UK Low Carbon Hydrogen Standard (LCHS) requires a project to meet a GHG emissions intensity of 20gCO<sub>2</sub>e/MJ<sub>LHV</sub> of produced hydrogen or less for the hydrogen to be considered low carbon hydrogen. Hydrogen production will come from multiple sources and their emissions are discussed below:



█ have previously provided DESNZ with their bid basis plant design in their October submission. A prerequisite for the LCHS Agreement Contract for Differences (CfD) funding is that the project will meet the requirements of the LCHS. The detail on overall greenhouse gas emissions is still to be developed, but in order to meet the LCHS agreement, it will be within the LCHS limit of max 20gCO<sub>2</sub>e/MJ<sub>LHV</sub>.



#### Summary dashboard

Has the user answered all relevant questions?	Yes
What pathway technology is proposed?	Electrolysis using mixed electricity inputs
Is the project sited in the UK and yet to be built?	Yes
What are the pathway GHG emissions (weighted average across all consignments)?	2.5 gCO <sub>2</sub> e/MJ <sub>LHV</sub> H <sub>2</sub>
What percentage of the total electricity input is low carbon?	100%
Has the project agreed to report fugitive hydrogen emissions?	Yes
Is the project likely to be compliant with the Low Carbon Hydrogen Standard?	Yes

#### Consignments - please list all your consignments

Please list all your hydrogen consignments, specifying the electricity source used for each	Data location	Consignment % of total hydrogen (MJ <sub>LHV</sub> basis)	Consignment GHG emissions (gCO <sub>2</sub> e/MJ <sub>LHV</sub> H <sub>2</sub> )
Wind/solar electricity	Analysed in this workbook	73%	0.2
Nuclear electricity	Analysed in this workbook	27%	8.8
Grid electricity	Analysed in this workbook	0%	Pathway not chosen
Other electricity source - please specify	Analysed in this workbook	0%	Pathway not chosen
Enter feedstock consignment 5 (if required)	Not required		
Enter feedstock consignment 6 (if required)	Not required		
<b>Weighted average</b>			<b>2.5</b>

The table above was provided by [REDACTED] and details their calculation for the greenhouse gas emissions for their project, totalling 2.5gCO<sub>2</sub>e/MJ<sub>LHV</sub>, well below the target of less than 20gCO<sub>2</sub>e/MJ<sub>LHV</sub>.

### **Outage Duration**

There are no specific natural gas outage targets for planned and unplanned outages. However, NGN have agreed with Ofgem that we will aim to have an average unplanned interruption duration of less than 11 hours.

For the trial we are aiming to meet the same target agreed with Ofgem and anticipate no change in the achievement of this with hydrogen. Presented below is the data for last year's outages for information.

Planned and unplanned interruptions are reported yearly by NGN and included on RRP Table 9.03 (Planned and Unplanned – Non-major) and RRP Table 9.04 (Unplanned – Major Incident >250 homes). The average interruptions for last year were:

- Planned = 286 minutes (59,467 interruptions totalling 17,045,671 minutes).
- Unplanned (Non-major) = 300 minutes (10,508 interruptions totalling 3,155,504 minutes).
- Unplanned (Major) = 2,784 minutes (3,143 interruptions totalling 8,750,112 minutes).

For planned interruptions as per RRP Table 9.03, we report this yearly; and last year the network average planned interruption was 286 minutes (59,467 interruptions totalling 17,045,671 minutes).

With regards to unplanned interruption (Non-major Incident) as per of RRP Table 9.03 we report this yearly; and last year the network average unplanned interruption (Non-major Incident) was 300 minutes (10,508 interruptions totalling 3,155,504 minutes).

Unplanned interruption classified as a Major Incident (>250 homes) as per RRP Table 9.04, we report this yearly; and last year the network average unplanned interruption (Major Incident) was 2,784 minutes (3,143 interruptions totalling 8,750,112 minutes).

The time periods above relate to the interruption duration measured only from start of interruption to gas returned to the ECV. This is currently all that Ofgem requires the networks to measure and report upon. Therefore, as a network NGN currently do not include the time take to restore gas to the appliances in measurement of the interruption period.

RRP Table 9.03 and 9.04.



ahead and the Producers being successful in their NZHF and HBM submissions, HSA agreements will be drawn up and signed. A period of negotiation is expected to take place between DESNZ, NGN, [REDACTED] and Shipper with regards to the agreements and any extra additional measures that will need to be incorporated into the LCHA or the Grant Funding Agreement (GFA).

Agreements between NGN and the above and below ground Storage Operators will also be put in place to confirm the leasing of storage, and the operation and maintenance of this by the Operators once the project has received funding approval. As with [REDACTED], Heads of Terms are being drawn up between NGN and the Storage Operators.

Additionally, NGN identified that tripartite agreements will also be required between NGN, the Shipper, and the below ground hydrogen Storage Operator company. This agreement will commit the Storage Operators and [REDACTED] to a specific allocation of hydrogen being stored within the caverns for the sole use of the project, ensuring that it can be utilised as and when the network demand requires it. This agreement will be developed post Stage 2 and will be completed prior to the end of Stage 3.

The commercial agreement models for both hydrogen supply through to the network and hydrogen supply through to the network via storage can be found attached.

#### **Technology Readiness Level (TRL)**

The equipment used for the above ground storage and pressure reduction is already familiar to the operations and maintenance staff. This will enable use of the existing NGN O&M teams with only additional hydrogen awareness training.

The project is still exploring the use of bio-methane, from [REDACTED] to convert to hydrogen using pyrolysis. Currently the use of pyrolysis technology is only around TRL 7 (System prototype demonstration). It is proposed to take a feed off the 2 barg bio-methane pipeline supplying the Redcar area to build a pyrolysis facility close to the above ground storage site. A schematic of the connection and location of the pyrolysis unit is shown in the attachments.

See below definitions of TRL levels:

Biomethane  
Connection  
Schematic.

System Test, Launch & Operations	TRL 9	TRL 9 Actual system "commercially proven" through successful deployment Fully integrated with operational hardware/software systems. Actual system has been thoroughly demonstrated and tested in its operational environment. All documentation completed. Successful operational experience. Sustaining engineering support in place.	<p><b>System Control</b></p> <p>Changes to NGN's system control function have been assessed and planned for. To enable minimal change, a new Local Distribution Zone (LDZ) will be created on the Business Administration system, which will be managed in a way similar to that in which a biomethane injection point on the network is managed. Quotes for implementing this change to the system are currently being gathered.</p> <p>For demand forecasting, NGN propose to utilise the existing forecasting tool which indicates the percentage of total demand that the prevailing LDZ demand estimate represents, before applying this to the RHC. The demographic of the consumers involved in the trial has been analysed further to refine demand turndown for the project. Additionally, extra resource for the forecasting of demand and allocation of this to Shippers and ██████████ will be put in place.</p> <p>For further information on the process that the system control function will follow, please refer to the System Control Function attachment.</p>
System/Subsystem Development	TRL 8	TRL 8 Actual system completed and "commercially ready" through test and demonstration in an operational environment (ground or space) End of system development. Fully integrated with operational hardware and software systems. Most user documentation, training documentation, and maintenance documentation completed. All functionality tested in simulated and operational scenarios. Verification and Validation (V&V) completed.	
	TRL 7	TRL 7 System prototyping demonstration in an operational environment System prototyping demonstration in operational environment. System is at or near scale of the operational system, with most functions available for demonstration and test. Well integrated with collateral and ancillary systems. Limited documentation available.	
Technology Demonstration	TRL 6	TRL 6 System/subsystem model or prototyping demonstration in a relevant end-to-end environment Prototyping implementations on full-scale realistic problems. Partially integrated with existing systems. Limited documentation available. Engineering feasibility fully demonstrated in actual system application.	
	TRL 5	TRL 5 System/subsystem/component validation in relevant environment Thorough testing of prototyping in representative environment. Basic technology elements integrated with reasonably realistic supporting elements. Prototyping implementations conform to target environment and interfaces.	
Technology Development	TRL 4	TRL 4 Component/subsystem validation in laboratory environment Standalone prototyping implementation and test. Integration of technology elements. Experiments with full-scale problems or data sets.	
Research to Prove Feasibility	TRL 3	TRL 3 Analytical and experimental critical function and/or characteristic proof-of-concept Proof of concept validation. Active Research and Development (R&D) is initiated with analytical and laboratory studies. Basic demonstration of technical feasibility using representative data.	
Basic Technology Research	TRL 2	TRL 2 Technology concept and/or application formulated Applied research. Theory and scientific principles are focused on specific application area to define the concept. Characteristics of the application are described. Analytical tools are developed for simulation or analysis of the application.	
	TRL 1	TRL 1 Basic principles observed and reported Transition from scientific research to applied research. Essential characteristics and behaviors of systems and architectures. Descriptive tools are mathematical formulations or algorithms.	

System Control Process Flow.

## 8.2 Plan to provide Alternative Solutions to Consumers (1250 words)

8.2.1 Provide an indication of likely numbers of domestic and non-domestic consumers who will require an alternative solution and your approach for where non-hydrogen solutions need to be implemented (including the main technology option, how it will be funded and any additional arrangements required to make it a viable solution for the consumer, such as the need for insulation).

**Additional guidance:**  
The alternative offer can be a high value electric alternative (heat pumps), or a cheaper

alternative, but you will need to demonstrate value for money in either case. We would also expect to see:

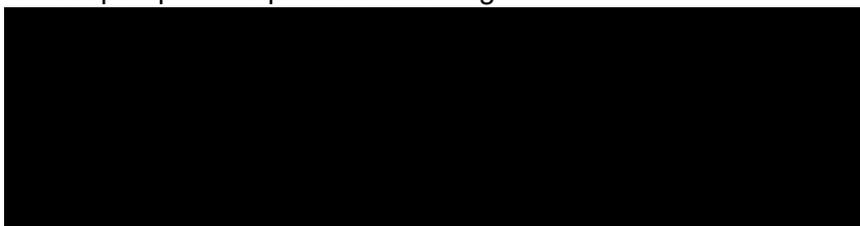
- A full breakdown of installation and ongoing running costs, outlining what is being provided for free and what, if anything, the consumer will have to contribute. This should include the support package for billing and retrofit
- The extent that the technology is suitable for properties in the trial area and the approach to properties that are not suitable for the default offer or where consumers would like a different technology
- The approach for commercial properties
- A justification for the benefits of using the proposed technology
- Plans for the installation process and ongoing maintenance
- Exit plans for consumers on the alternative offer.

In addition, provide detailed plans for bespoke solutions for properties unable to take either hydrogen or electric solutions e.g. LPG for AGA.

**Answer:**

**Alternative offer**

For domestic consumers, electric boilers and heat pumps will be offered as hydrogen alternatives. An eligibility assessment to qualify for a heat pump will require the following:



Consumers choosing a heat pump must accept that they will not have the option to return to natural gas after the trial because it is a long-term net zero solution that should reduce their energy costs. They will be supported with ongoing touchpoints to ensure its appropriate use and maximum efficiency.

Regardless of choice, consumers will be offered £2,000 in energy efficiency measures, potentially covering improvements required for heat pump eligibility.

**Suitable technology**

We have identified single and 3-phase electric boiler solutions to provide viable options for all properties and are working with [REDACTED] to assess the DNO network's capacity to accommodate these.

We developed heat pump criteria with SMEs to ensure that they are only offered where they will realise the intended benefit.

**Document reference (relevant page/section):**

Hydrogen Village Trial – Appliance Procurement Strategy.

Hydrogen Village Trial – Hydrogen Alternatives Report.

Attachment L – Completed Cost Template.

The project will give industrial and commercial consumers a choice of hydrogen or electrical. For details on the status of commercial alternatives see Hydrogen Village Trial – Hydrogen Alternatives report, Sections 8 and 9.

Appliances will be under a standard warranty from the supplier and any issues for the trial period resolved by the installer.

The project seeks to offer commercial consumers a hydrogen, electric or hybrid solution. However, in the extreme circumstance where no other option is available the project may consider bottled gas, which will be evaluated and risk assessed on an individual basis.

### **Costs**

Any alternative offer will be funded by the project without cost to the consumer, from initial installation to installation and retrofit of appliances at exit. Cost detail is provided in the Hydrogen Village Trial – Appliance Procurement Strategy, Section 6 for Domestic, and Hydrogen Village Trial – Hydrogen Alternatives report, Sections 8 and 9 for Commercial. Detailed costs are provided in Attachment L.

### **Billing**

Consumers will receive advance energy account credit to offset costs compared to equivalent usage of natural gas. Pre-payment meter consumers will be provided with vouchers to top up their account. Credit value will be based on prior month usage adjusted for seasonal consumption, or on a historic local baseline adjusted for seasonal consumption and weather forecast.

### **Benefits of technology**

We have developed alternative options with consumer focus and are confident that technologies offered will allow consumers to efficiently heat their homes.

Heat pumps are significantly more efficient than traditional boilers and provide a long-term solution that should reduce energy consumption. Many consumers in the trial would otherwise be unable to afford one, even with funding.

While electric boilers lack comparable advantages, they are in line with net zero ambition and are safer than other alternatives.

### **Exit**

<p>At exit, the default position is that all consumers (hydrogen and alternative) will return to natural gas. Consumers with an electric boiler may choose to keep it and replaced appliances or return to natural gas with a new boiler and appliances. Consumers who opted for a heat pump will retain it. All bill subsidies will cease at trial end.</p> <p>If hydrogen is approved by Government as a long-term solution, and an agreed solution ensures hydrogen consumers can continue to pay no more than for natural gas, the trial area could remain on hydrogen. In this scenario, consumers with electric boilers would have the option of a new hydrogen boiler and appliances, benefitting from the natural gas cap on bills, or keep their electric boiler and appliances. The subsidy for electricity bills would cease at trial exit.</p> <p>Maintenance post-trial will be undertaken by the consumer in line with manufacturers' guidance.</p>	
---	--

8.2.2 Summarise key findings from your evaluation of the impact of your proposed alternative solutions, for example the impacts on the electricity network capacity and any reinforcement work required, or in the case of bottled gas, how it would be supplied.

<p><b>Answer:</b></p> <p>The Redcar Hydrogen Community Trial project area is currently supplied by [REDACTED] a dual-transformer configuration. In accordance with [REDACTED] record, each of the transformers is rated at [REDACTED] whilst the firm capacity of the Redcar Primary Substation is [REDACTED]. The current maximum load is [REDACTED], resulting in a firm capacity headroom of [REDACTED].</p> <p>The [REDACTED] is fed by the [REDACTED] ([REDACTED]), further supplied from the [REDACTED] ([REDACTED]). Although the [REDACTED] may have a limited firm capacity headroom of [REDACTED], both the [REDACTED] have a firm capacity headroom in excess of [REDACTED]. This means the local electrical infrastructure (particularly the extra high voltage network) should support the possible electrification required by the hydrogen village trial.</p> <p>The impact of electrifying residential properties can likely be limited to the local low and high voltage network, considering the firm capacity headroom of the [REDACTED]. However, electrification of commercial properties will require capacity to be made available at the [REDACTED], potentially by adding a third circuit between [REDACTED] and [REDACTED], or a new primary substation with two new circuits from [REDACTED].</p> <p>The RHC project seeks to offer I&amp;C consumers a hydrogen, electric or hybrid solution. The project does not aim to supply bottled gas to</p>	<p><b>Document reference (relevant page/section):</b></p>
---	---

consumers. However, where no other option is available, this may be evaluated and risk assessed on an individual basis.

8.2.3 Provide a summary of evidence of engagement or agreements with relevant third parties who will act as partners for this element.

Where the commercial approach involves procurement, your response should demonstrate readiness to procure including evidence of market engagement (including quotations where relevant), confirmation of internal approvals, and preparation of invitation to tender materials.

<p><b>Answer:</b></p> <p>Through participation in the cross-GDN Appliance Working Group (AWG) and with regard to Redcar specific requirements, NGN has engaged with multiple suppliers for alternatives to hydrogen-fuelled solutions.</p> <p>As stated in our Appliance Procurement Strategy, NGN intends to contract with our preferred supplier to provide a full “in-home” solution, incorporating provision and installation of alternatives. This includes business premises where a domestic-type solution exists. Heads of Terms are in development to enable efficient transition to a contractual arrangement. In accordance with the Utilities Contract Regulations 2016, NGN will issue a VEAT notice on the Government’s Find a Tender Portal citing Regulation 50 of UCR2016 which permits such a contract award, following which a 10-day standstill period will be observed prior to entering into any formal contract.</p> <p>Industrial and commercial solutions will be procured by NGN. NGN’s aim, subject to market availability, will be to supply and fit contracts for such appliances and equipment. Where not possible, NGN will source the equipment/appliance directly and utilise pre-qualified organisations for installation works. NGN will operate its supplier prequalification process, which is tailorable according to specific project requirements.</p> <p>NGN is bound by the Utilities Contract Regulations 2016 and has existing policies and auditable procedures to ensure its compliance and ability to demonstrate internal approvals for each procurement undertaken, with contracts awarded based on the principle of Most Economically Advantageous Tender (MEAT).</p> <p>Attached letters of interest demonstrate market readiness to support NGN in delivering this solution. Also attached are copies of NGN’s standard pre-qualification procurement documentation which will be tailored to requirements.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Hydrogen Village Trials – Appliance Procurement Strategy.</p> <p>Pre-qualification procurement documentation.</p> <p>Letters of interest.</p>
---	--

8.2.4 Provide a concise summary of the contingency plan in case new consumers (domestic consumers or businesses) choose to opt-in to hydrogen at a later date during the trial, including those with potentially complex safety cases.

<b>Answer:</b> [Redacted]	<b>Document reference (relevant page/section):</b>
------------------------------	--

### 8.3 Design and Plan for Grid Conversion (1000 words)

8.3.1 Provide a concise summary of the detailed design and plan for grid conversion across the trial zone, setting out the reasons for the chosen approach (overall disruption, time off gas for consumers, cost, environmental impact); the timeline (for procurement, conversion); measures in place to ensure isolation from natural gas infrastructures.

As well as plans and designs for new infrastructure and modifications of existing infrastructure, this should include proposals for ongoing operation (including operating parameters such as pressures and velocities, and approach to maintenance).

Where the commercial approach involves procurement, demonstration of readiness to procure including evidence of market engagement (including quotations where relevant), confirmation of internal approvals, and preparation of invitation to tender materials.

<b>Additional guidance:</b> Your answer should describe long lead items identified on the timeline for grid conversion (e.g. critical bespoke equipment), and include considerations of any key dependencies such as planning permission and land acquisitions.	
<b>Answer:</b>  For network conversion, the project has determined the following is required: <ul style="list-style-type: none"> <li>• New Medium Pressure (MP) mains and associated valves.</li> <li>• Four new and one repurposed district governor.</li> <li>• New Low Pressure (LP) pipework for reinforcement and metallic mains replacement.</li> <li>• Isolation from the existing natural gas network.</li> </ul>	<b>Document reference (relevant page/section):</b>  Redcar Hydrogen Community - Network Design Plan

- Replacement of metallic services.
- Sectorisation into 21 sectors for conversion.

Further details are provided below and within the Network Design Plan and Sectorisation Plan.

**Medium Pressure Mains**

A new MP main will be connected to the new pressure reduction station, laid to the trial site area and connected to new district governors.

The medium pressure main will be constructed using new 250mm diameter, SDR21 PE 100 HDPE pipe, which is commonly used in the gas industry and suitable for hydrogen, as evidenced by SGN and reviewed by the HSE. The new MP main will be constructed under standard New Roads and Street Works opening notices in agreement with [REDACTED]. The new MP main will split to the North side of Redcar to feed Coatham, and to the south to feed the Kirkleatham area.

The new MP main will be connected to four new district governors and one repurposed existing district governor in Kirkleatham.

Strategic isolation valves will be installed every 800 m, in accordance with IGEM/TD/3, to allow efficient isolation of the MP main in the event of third-party interference or escape. All valves will be double block and bleed and will be installed with pressure points and purge/bypass points installed either side of the main.

**Isolation from Natural Gas Network**

In total there are five locations with extremity to the natural gas network, requiring four extremity valves and one VIA cap end. The extremity valves are needed to provide positive isolation to separate the hydrogen network from the natural gas network.

**Governors**

The project will require four new district governors and one repurposed existing governor. [REDACTED] have been contacted by the project and a Technical Proposal provided including selection of suitable products, initial P&ID drawings and estimated procurement period of 12–14 weeks. The new district governors will also require an enclosure and will be installed on a concrete plinth.

At the network extremities the minimum operating pressure will be at least 23 mbar and average pressures with remote profiling will be kept to circa 27 mbar.

**Reinforcement**

Redcar Hydrogen  
Community -  
Sectorisation Plan

Redcar Hydrogen  
Community - Network  
Analysis Plan  
February 2023

[REDACTED]  
Technical Proposal.

In order to sectorise the trial area, additional reinforcement is required on the local network to allow hydrogen conversion in sectors. This includes pipes to allow hydrogen to be brought into the trial area sector by sector and also to allow sectors to continue to be fed with natural gas until conversion.

There is also additional reinforcement needed on the existing natural gas network to maintain minimum pressure on the network of customers outside the trial area, during and post conversion of the trial area.

### **Replacement**

[REDACTED]

### **Services**

NGN propose to replace all the metallic services with a diameter  $\leq 2$ " with PE pipe. Initial assessment shows that 72.5% of services are PE and 27.5% are metallic.

The allowable pressure drop across services with diameters less than 63 mm were assessed and it identified that 17 of the existing PE services will need to be replaced with a larger diameter pipe.

An assessment of the suitability of <63 mm PE services has been carried out and the preliminary review shows that potentially 31% of the services will require individual assessment. The condition and suitability of all services will be assessed in detail in Stage 3.

### **Sectorisation**

An RHC gas network model has been developed using the updated [REDACTED] software for hydrogen, to allow the project to assess the network when operated on 100% hydrogen. Using the model, the trial area has been engineered into a total of 21 conversion sectors.

### **Conversion Timeline**

It is expected that conversion of a sector will take one week, with domestic properties being without heating and hot water for only one day, with the supply interruption expected to commence at 8am on the day of conversion and be complete by 5pm. The remainder of the week will be installing hydrogen appliances such as cookers and fires.

Commercial customers' conversion will vary in duration, and timings are dependent on the type of gas apparatus upgrades required.

### **Long Lead Items**

The project has determined the following items are long lead items:

<b>Equipment</b>	<b>Lead in time</b>
MP to LP Governors	12–14 weeks
Valves, including sectorisation valves	20 weeks
250 mm PE Pipe	Bulk order needed, circa 6 weeks' notice

### **Considerations of any key dependencies**

The project is in initial discussions with landowners for the locations of the district governors, currently sited on local council-owned land.

The majority of the project pipelines/mains and valves will be installed under the New Roads and Streetworks Act. An easement crossing for Coatham Green is currently in discussions with the landowner. The district governors and associated kiosks will require local authority planning permission.

### **Costs**

This design has been managed around striving to achieve the best options for sectorisation, conversion and consumer impact.

## **8.4 Detailed Procedures for End Users-Conversion (2000 words)**

8.4.1 Provide a description of procedures required for end-user conversion.

You should include:

- List of building/premises likely to participate, including details of gas consumption and usage, with reference to surveys undertaken
- Process by which engineers/installers will confirm suitability for conversion, undertake risk assessments and confirm safety mitigations to be applied – with reference to relevant standards

- Assessment (based on surveys and other safety evidence) of the safety mitigations and any other adaptations likely to be necessary in participating premises, including to pipework, building fabric (e.g. new vents), meter location, and electrics for the alternative offer
- Identification of premises which will require an individual risk assessment/management plan, the reasons why a bespoke approach is required (e.g. presence of boosters, risers etc.), and a detailed outline of the approach to be taken
- Full details of the types and quantities of all hydrogen appliances required, and assessment of confidence in availability, supported by evidence
- Detailed procurement strategy (including commercial assumptions made, risks and mitigations) for all conversion work, including appliances, ancillary devices and all necessary components. This should include agreements already reached with manufacturers to supply these elements and approach to ensuring adequate reliability
- Detailed costs and impact assessment of all end user conversion work, including the estimated duration and disruption to end users of all conversion activities
- Evidence of draft agreements with downstream gas safe registered engineering companies (and appropriately qualified companies for non-hydrogen options) for work to be carried out in consumers' houses.

**Additional guidance:**

For domestic properties, we expect appliances to be available at the level necessary to guarantee consumer choice or to meet a minimum threshold – whichever is higher. Further information can be found in the Hydrogen Heating Village Trial Stages 3 to 5 Funding Application Guidance.

You should include or refer to cost of materials for (i) hydrogen appliances and (ii) electrification appliances (total costs, unit costs), and appliance procurement and contracting strategies, including any letters of intent from appliance manufacturers.

**Answer:**

The RHC project area contains 2,677 properties shown on the Land Register. Of these properties, 2,157 have a Meter Point Reference Number (MPRN) implying they have an ‘in-use’ gas supply. The 2,157 properties can be further categorised into 1,949 domestic properties and 208 commercial properties.

The majority of the 1,949 domestic properties within the RHC area are terraced, have two floors (with no cellar) and are of brick construction. There are smaller numbers of semi-detached and detached properties within the trial area, and all property types include both privately owned and tenanted properties.

The 208 commercial properties include various small businesses, a leisure centre, college, two schools, hotels and a large business park which contains large scale factories.

From end user/stakeholder conducted surveys, it is envisaged that 89% of domestic properties will participate in the trial. The survey also had good interaction from multiple industrial and commercial properties wishing to participate in the trial as they themselves work towards net zero.

████████████████████ The commercial gas annual usage ranges from small consumption as per domestic up to the largest user with ██████████, again, taken from ██████████. Although NGN have access to ██████████, to comply with GDPR, it cannot be shared.

NGN engaged with ██████████ to carry out detailed engineering surveys. These were to assess findings within properties in the trial area to enable a safe conversion to hydrogen. Domestic surveys were undertaken by ██████████ whilst industrial & commercial surveys were undertaken by ██████████

**Document reference (relevant page/section):**

Hydrogen Village Trial – Appliance Procurement Strategy.

Hydrogen Village Trial – Hydrogen Alternative Report.

██████████ – Analysis & Recommendations for Redcar Hydrogen Village Metering Installations.

Redcar Hydrogen Community – Domestic Survey Updates.

Redcar Hydrogen Community – Electrical Alternatives Report.

Attachment E: Network and End User QRA 10369984-2.

Attachment C – Survey Data.

<p>To date, ██████████ have completed 668 domestic surveys, ██████████ have completed 50 gas &amp; DSEAR, and 51 electrical detailed commercial surveys.</p> <p>It is presently deemed that all properties surveyed are suitable for conversion to hydrogen; however, the current lack of formally published hydrogen standards and procedures makes this only an assumption based on engineering judgement. The surveys were based on the current published standards for natural gas i.e., BS-6891, IGEM UP/1/B, IGEM/G/11 etc.</p> <p>NGN are collaborating with GDNs and IGEM to finalise the Hydrogen Enabling Standards, which are stated to be IGEM/H/2 for Domestic and IGEM/H/3 for Commercial. At present these standards are still in draft format so are not attached for reference. Once published, a detailed survey of every property will be required to confirm suitability for conversion and if a noncompliance is found, mitigations and further work will be required to bring the installation up to hydrogen standard to allow for conversion.</p> <p>The draft standards only include installations with primary meters which have a badge capacity not exceeding <math>65\text{m}^3\text{h}^{-1}</math>. Therefore, any installation with a meter above this capacity will require a specific risk assessment.</p> <p>NGN are working with ██████████ producing a QRA to assist with conversion mitigations both prior to and during the trial period. Work on the network in readiness for the trial will include mains and service replacements and moving meters outdoors where possible. Due to the makeup of the housing stock, a split of 30% external, to 70% internal meters is to be expected.</p> <p>All domestic gas meters in the trial area will be replaced with a hydrogen-ready meter prior to conversion to ease disruption as the go-live date nears. All hydrogen-ready meters will contain an Excess Flow Valve (EFV). The valve will allow the delivery of <math>20\text{scmh}</math> of hydrogen. During the meter installation, an additional EFV will be installed between the Emergency Control Valve (ECV) and meter inlet. EFV, Automatic Isolation Valves (AIV) are still being researched for commercial properties, but it is proposed that further developments will be made in order to incorporate this technology into commercial installations. Hydrogen sensors will be installed into every domestic property and, upon detection, will trigger an alarm. Approximately 50% of properties surveyed incorporated a CO detector; therefore, replacing these with hydrogen detectors should be acceptable for end users. All gas appliances will be renewed, which will provide further safety mitigations, as the new appliances will include the latest safety devices for flame supervision.</p> <p>Of the 208 industrial and commercial properties within the trial area, it was deemed that some will fall into a niche bracket mainly due to</p>	<p>Purge and Relight Framework Agreement.</p>
---	---

the type of appliance used and amount of gas consumption required. Most I&C properties incorporate appliances which require a simple like-for-like hydrogen replacement such as commercial boilers as opposed to some appliances which require further research and development to confirm if a conversion to hydrogen is suitable.

NGN have worked with [REDACTED] and completed further surveys on niche appliances to confirm if a hydrogen conversion would be suitable and the current research suggests most appliances are eligible for conversion. The conversion of these appliances will have to be completed and certified in situ and an individual risk assessment and management plan will be produced.

CHP units at the leisure centre have been inspected by [REDACTED] who confirmed the conversion to hydrogen was possible but would need further risk assessments into the building logistics before conversion. The possibility of installing a CHP unit at [REDACTED] has been discussed as an initial proposal, but further risk assessment would be required.

NGN, in its participation in the Gas Distribution Network (GDN) Appliance Working Group (AWG) and with regard to Redcar-specific requirements, has gained significant insight into the emerging market for hydrogen fuelled appliances. The information below should be read in conjunction with the AWG document "Hydrogen Village Trials: Appliance Supply Chain, Procurement Strategy" and the other referenced documents in this question response. The document includes the following details:

- Expected costs and quantity of hydrogen appliances and electrification alternatives.
- Numbers of appliances.
- Letters of intent.

NGN is bound by the Utilities Contract Regulations (UCR) 2016 and has policies and procedures in place to ensure compliance with the regulations and to demonstrate internal approvals for each procurement undertaken, with contracts awarded based on the principle of Most Economically Advantageous Tender (MEAT). The procurement "threshold" at time of writing for the applicability of this legislation for contracts for supplies and services is £355,796 excluding VAT.

NGN is in the process of developing Hydrogen Village Trial (HVT) pre-qualification documents to be used in such procurement processes to ensure the suitability of suppliers used with particular regard to health & safety, reliability of service and capability to deliver.

All procurements undertaken as part of this trial will be conducted in accordance with these policies, procedures and UCR legislation.

NGN has a Framework agreement in place (Framework Agreement for the Provision of Purge and Relight Response Engineers) which enables the provision of Gas Safe Engineers in consumers' homes to ensure safe gas supply following service interruptions as well as for necessary interventions for boilers and other such equipment which requires that specialist skill set. The Framework agreement is attached for reference.

NGN also has Framework Agreements in place with accredited contractors covering various trades across its network to ensure where required NGN can provide these services to residents. The services include: General Building Work, Plumbing, Glazing, Electrical, Joinery, Plastering, Carpet Fitting, Cleaning, Tree Surgery, Specialist drive-ways, and Locksmiths. All of which form part of NGN's "Labour Services Framework" with ■■■ suppliers of such services covering the Tees area.

To mitigate supply chain risk NGN will:

Procure contracts based on its bespoke terms and conditions of purchase for Goods and Goods and Services or where appropriate NEC form contracts with all presented contract challenges undertaking internal legal review prior to further negotiation or acceptance.

Support the principle as stated in the AWG report regarding product allocation and the use of multiple suppliers for each component, service type or specific equipment where possible. This provides greater supply chain resilience for the trial and drive the participation of multiple suppliers. This will in turn create a competitive market-place for subsequent initiatives in the further use and roll out of the hydrogen solution as an alternative to natural gas.

It must be stressed that the market in which these purchases will be made is very much a developing one with some technologies and/or alternatives not fully developed or market ready. This procurement strategy has been put together using the information currently available. It is possible therefore (and in some cases necessary) for these market dynamics to change in terms of participants and product availability. This procurement strategy therefore is subject to change; however, the principles which underpin it are not.

### **Disruption to End User**

Domestic:

Once confirmation of the conversion to hydrogen has been approved, further detailed analysis and assessment of all properties will be conducted. Each property will be different in characteristics, and therefore a specific risk assessment will be created for each property prior to conversion. The estimated durations and disruption to each property can then be established.

The trial area is to be split into sectors in order for the conversion to be controlled and rolled out in a logical switch over. On the current survey data, it is estimated that the conversion of a domestic property will take approximately 8 hours. However, this is based on a like-for-like boiler swap, a like-for-like hob switch over and a fire replacement.

If end users opt for an electrical alternative, this work can be conducted prior to a hydrogen conversion to ease disruption and volume of works in the trial area at the time of conversion. Boiler manufacturers have suggested boilers will be fit for use on natural gas and will simply need a hydrogen switch over (internal parts) and can therefore be installed prior to a go-live date.

**Industrial & Commercial:**

The wider impact for commercial properties will be a major factor on determining how much disruption is allowable during conversion. The conversion of hydrogen appliances will take considerably more time than domestic, due to the complexity of some installations. However, detailed planning and site-specific management plans are ongoing utilising recent survey information.

<b>Conversion Activity Timeline Domestic</b>	
<b>Activity</b>	<b>Estimated Duration</b>
Pre-conversion Survey	2hrs
Gas Meter Replacement	2hrs
Update installation for Hydrogen/Electric (as/if required)	Up to 4days/32hrs
Hydrogen Ready Boiler Install (site specific)	8hrs
Conversion Day	8hrs
Additional Appliance Installs (site specific)	Up to 4 days/32hrs

Snagging work/making good (site specific)	8-16hrs
<b>Commercial Properties</b>	
Site specific bespoke solution	N/A

## 8.5 Regulatory Model (2000 words)

8.5.1 Provide a summary of the regulatory and commercial arrangements expected to be implemented for the trial. This should include the following evidence:

- Documented proposal on the UNC modifications required to support your trial
- Documented proposal on technical billing modifications to be undertaken
- Commercial Assurance Framework
- Commercial Change Framework for hydrogen.

<p><b>Answer:</b></p> <p>To assess the requirements of the regulatory framework and associated supporting arrangements for the Hydrogen Village Trial (HVT) a collaborative workstream was established with representatives from all of the Gas Distribution Networks (GDNs), [REDACTED], and with periodic representation from both Ofgem and Department of Energy Security and Net Zero (DESNZ). [REDACTED] were contracted by the GDNs to support thought leadership / development, provide PMO support, and were tasked with a set of interim and final deliverables.</p> <p>In the work group interim report delivered Dec 2022, [REDACTED] framed the question of the appropriate arrangements for the HVT by considering how the market in which hydrogen is delivered to homes and businesses might develop. For example, they highlighted the need for contractual and regulatory simplicity to facilitate trials and the roll-out process, followed by a period of evolution during which hydrogen is separated (commercially) from natural gas.</p> <p>The final report (attached) documents the work group’s findings and incorporates the deliverables outlined in 8.5 above. Table 1 (page 6/7) within the report provides the reader with an overview of the approach and relevant chapter/s.</p> <p>The respective sections / appendices within the report that incorporate these deliverables are outlined below:</p> <ul style="list-style-type: none"> <li>• Documented proposal on the UNC Modifications required to support the trial (Chapter 8)</li> </ul>	<p><b>Document reference (relevant page/section):</b></p> <p>Hydrogen Village Trial Stage 2 Regulatory Framework.</p>
---	---

- Documented proposal on technical billing modifications (Chapter 6)
- Development of Commercial Assurance Framework (CAF) (Chapter 9)
- Development of a Commercial Change Framework (CCF) (Chapter 10)

The report makes a number of key recommendations for the regulatory framework for the HVT, as outlined below:

- A minimal change approach is recommended, using the existing market frameworks, i.e., Uniform Network Code (UNC) and requiring all supplier participation. (*Commercial framework recommended approach can be found in Chapter 4 (Section 4.4)*).
- Use of a 'passive' entry shipper is proposed in order to fulfil necessary functions under the UNC (e.g., posting of nominations), whilst recognizing that the GDN will require the ability to direct flows of hydrogen into the distribution network. (*Production-side arrangements can be found in Chapter 5 (Section 5.3)*).
- Deferral of any decision in respect of billing solution is recommended at this time, pending further investigatory analysis. Currently, two options are being explored to determine the most appropriate proposal for a billing solution to ensure that shippers and consumers are charged accurately.
  - The first is the Multiplication Factor (MF) solution which is currently favoured by the Neighbourhood trial.
  - The second is the Correction Factor (CF).

A detailed overview of billing options can be found within Chapter 6 (Section 6.9) of the report (for the avoidance of doubt proposed billing solutions relate to energy settlement managed via CDSP central systems and not end-consumer billing managed via supplier systems). An approach to support a final decision has been outlined in the Commercial Change Framework document (Chapters 9 & 10 respectively).

- The concept of a set of rules or Code of Practice for suppliers (and shippers) is proposed, in support of the recommendation of all supplier participation within the trial and in recognition of the fact that GDNs do not have a direct contractual relationship with suppliers.
- A dedicated meter conversion programme is recommended, again in support of the recommendation for all supplier participation. This is seen as the most practical approach with a dedicated workforce carrying out the conversion and providing metering services to suppliers during the trial. (Details of the recommended approach can be found in Chapter 7 (Section 7.3)).

Details of the approaches considered, impacts on codes & license and analysis of billing options, along with a set of business rules for metering and supplier participation are all included within the final report. These are supported by the Commercial Assurance Framework and Commercial Change Framework which set out the assurance activities and high-level plans for the proposed changes required to facilitate these recommendations.	
---	--

8.5.2 In addition to the above, summarise any regulatory barriers identified and provide a description of the proposed solution(s) with relevant parties to resolve these, such as licences granted and exemptions sought. Where an issue has not yet been fully resolved, a viable solution should be proposed, with a clear indicator of what the network considers should constitute evidence of resolution and estimated date of resolution. Your response should include, but is not limited to, regulatory issues associated with:

- Production / storage / distribution of hydrogen or at any other point during the supply chain.
- Alternative options given to consumers
- The approach to metering, for all meter types (including PPM customers) and supply-point types (1-4) in the trial area
- The approach to billing
- Retail competition - consumers in the trial areas switching between energy suppliers.
- How property prices, mortgage and insurance policies will be affected in the trial areas, including implications on energy performance certificates (EPCs)
- Planning and permitting, including at a property level, spatial planning and wider implications (roadworks etc.), as well as any other permissions needed at a local authority level.
- Building Regulations
- Different tenure types, including the rights and responsibilities of different groups, such as domestic and non-domestic landlords, tenants, sub-tenants and owner-occupiers, as well as leaseholders and freeholders
- Interaction with any relevant government renewable, energy efficiency and fuel poverty schemes and policies
- Any further regulatory frameworks that may require amendment or derogation to facilitate the trial which were not identified in Stage 1, including industry codes and licences, and primary and secondary legislation.

**Additional guidance:**

Your response should refer to the collaborative regulatory and commercial model developed by GDNs in Stage 2 and explain how this model will work for your specific proposal.

Where relevant, you should also reference how specific Ofgem RIIO mechanisms, such as the Guaranteed Standards of Performance Regulations (GSOPs) will operate.

Note that a solution to the charging of VAT at a different rate to natural gas has been developed, and therefore does not need to be covered in this response.

**Answer:**

The workstream has considered a wide range of topics and processes in developing its thinking, ensuring engagement with Ofgem and DESNZ along the way to ensure a no-surprise approach. (For example, there has been ongoing discussion in respect of GSOPs with GDNs providing assurance of a BAU approach being both appropriate and proportionate for the HVT.)

Areas considered include but are not limited to:

- Market / Commercial Framework (Chapters 2 / 3)
- Production-side arrangements (Chapter 5 / Appendix II)
- Storage (Chapter 5)
- Settlement and billing (including impacts on central systems administered by the CDSP and supplier billing) (Chapter 6)
- Metering Conversion (Chapter 7 / Appendix IV)
- Supplier participation (Chapter 4 / Appendix V)
- Legal considerations including licence, industry codes and regulations (Chapter 8 / Appendix VI)
- Interactions with other government policies and programmes (Appendix VII)

The report clearly outlines its recommendations as have been summarised in 8.5.1 above.

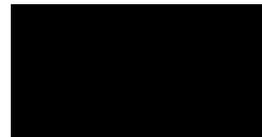
It flags the deferral of decision in respect of billing methodology and clearly articulates a plan for final decision in the CCF and CAF.

It highlights the limited influence of GDNs on supplier behaviours and recommends the development of a Code of Practice for suppliers and calls out the need for a Letter of Direction from Ofgem to support this (ref Chapter 4 (Section 4.5). Draft supplier participation rules are included in Appendix V.

The collaborative research done by [REDACTED] concluded that:

- Overall, the trial is not expected to significantly impact local property prices or the availability and cost of mortgages, subject to public support for the technology being positive and the cost of running being no more expensive during or after the trial.
- We will follow the recommendation to engage with members of the Building Societies Association and UK Finance to develop narratives for liaising with consumers within the trial area to alleviate any concerns regarding mortgages.
- In terms of cost of insurance, there are varied views from insurance providers. Most agreed that an HSE Certificate of Safety would provide them with the confidence that the risk of using hydrogen for the trial is comparable to that of natural gas. [REDACTED]

**Document reference (relevant page/section):**



- [REDACTED]
- EPC ratings are the most recognisable metric to the general public regarding energy efficiency and can influence purchasing decisions. The SAP methodology is what forms these ratings. The proposed RdSAP convention means that hydrogen boilers will be viewed the same as natural gas boilers in the trial. Some stakeholders believe the RdSAP convention makes sense for the trial due to the price of hydrogen being capped at the price of natural gas; however, some stakeholders highlighted how this will not reflect the carbon reduction benefit of heating technology and therefore would reduce the positive effect the trial could potentially have. There is a need to ensure that the introduction of hydrogen does not negatively impact property EPC ratings, so further reforms to SAP may be needed to replace the convention later.

NGN construct above ground apparatus under GDPO (General Permitted Development Order) legislation and the same legislation applies to planning use classes, with NGN most commonly requiring B2 and/or B8 planning for larger gas storage sites. The legislation is not specific to the gas but rather the infrastructure and/ or property. In this regard the existing approach used by NGN will be applicable for the RHC Project. The New Roads and Street Works Act applies to access to streets/ passages/ places and rights granted, not to the infrastructure that is being placed in them by a Gas Transporter. Therefore, NGN's BAU processes will be applicable. NGN assumes that residential planning and permitting, similar to above, are not dependent on the gas that is being utilised and therefore the existing practices will be continued. Additional work will be carried out in conjunction with local authorities in Stage 3 and appropriate actions implemented where required.

As per the Gas Safety (Installation and Use) Regulations 1998, installation of certified appliances will be carried out by a suitably qualified installer. Any additional requirements under the building regulations will be adhered to. The RHC project is working with training providers to ensure that engineers will be upskilled to ensure they are competent to install hydrogen appliances. The RHC project is also working with OEMs to ensure that the appliances that are supplied for the trial have achieved suitable certification.

We are working on the assumption that the property owner, occupier-owner or landlord, is the decision maker in relation to everything they own in the property. The tenant is the decision maker

<p>for the final replacements for anything owned by them; however, landlord permission will likely be required before we can carry out works at the rented property. Depending on the terms of the lease, this could mean that the tenant is unable to have their preferred choice between hydrogen and electric as the landlord will have final say. In Stage 2.5, we will review a sample of leases in the trial area to identify the likely support required and put plans in place before Stage 3. One or more of the consumer legal agreements will be tailored to the scenario in which a property is rented by a tenant.</p>	
---	--

# 9. Public and Local Engagement

## 9.1 Comms and Stakeholder Engagement (2500 words)

9.1.1 Provide outputs and outcomes of all public and consumer engagement activities conducted in Stage 2, including surveys of consumers and visits to premises. This should include information and evidence of meaningful engagement and substantial local support for the project, with validation from external / independent sources e.g. a local council. This should also include evidence that indicates likely trial uptake and an assessment of any key risks/issues associated with consumer participation for what has/ has not worked based on engagement so far.

<p><b>Additional guidance:</b> You should show:</p> <ul style="list-style-type: none"> <li>• The number and type of engagement activities and the approach followed by all consumers</li> <li>• The content of different engagement (e.g. details of the trial, what it means for consumers)</li> <li>• Consumer support for the trial overall, as well as their likelihood to take hydrogen.</li> </ul>	
<p><b>Answer:</b></p> <p>Throughout Stage 2, NGN’s RHC project has engaged a breadth of stakeholders as outlined in our Public Engagement plan, produced June 2022. To maximise the inclusivity and response, we have used varied mechanisms and channels, supported by an independent research provider.</p> <p>The types, purpose and outcomes from this engagement include:</p> <ul style="list-style-type: none"> <li>• <b>Consumer survey</b> via email, post, telephone, in-person, and online from Oct 22–Jan 23 to understand sentiment regarding trial participation and preference for hydrogen vs. electric. Overall, 89% of respondents (from a total of 699) said they would opt for a hydrogen boiler over an electric alternative. This is an encouraging sign for hydrogen uptake, but we are not drawing definitive conclusions, given the understandable risk of bias in the sample.</li> <li>• <b>7 x in-person Citizens’ Panel discussions</b> with a representative group of c.20 eligible individuals from the trial area delivered between September 2022 and March 2023. Discussion topics included community engagement, attitudes towards hydrogen, expectations and acceptability of the customer offer and journey.</li> <li>• <b>10 x in-depth, in-home interviews with small business owners</b> in the trial area in Feb 23 to enhance our understanding of business owners’ expectations and perceptions, with insights gathered informing the commercial offer and LOB process.</li> <li>• <b>10 x in-depth, in-home interviews with landlords</b> in the trial area in March 2023 to supplement our understanding of the relationship between landlords and tenants, and</li> </ul>	<p><b>Document reference (relevant page/section):</b></p> <p>Comms and Stakeholder Engagement, Section 15.1, Outcomes of Consumer Engagement pg. 35-49 and pg.47-56.</p>

expectations of the project. Insights gathered informed landlord and tenant engagement methods, and participation incentives.

- **4 x letters sent to properties within the trial area** from May 22–Feb 23. These letters were to provide information, encourage survey booking, invite participation in questionnaires and promote community events.
- **Door knocking at 1123 properties** in March 2023 by Customer Care Officers and Community Development Officers from the Local Council to capture sentiment, promote survey booking and enhance engagement. Sentiment captured showed 52% felt positively about the trial, 35% neutral and 13% negatively. A card was posted if a door was unanswered, directing consumers to available resources.
- **11 x drop-in sessions** at accessible community locations such as, a local hotel, golf club and the Civic Centre.
- **3 x market days** with an RHC project stall attended by Customer Care Officers to engage passing footfall.
- **Customer enquiries and bookings** received, comprising 11 calls to our consumer Care line, 117 general enquiries via our online form and email inbox, 324 hub enquiries, 489 engineering survey enquiries, and two complaints.
- **A Hydrogen Hub** opened on the High Street in Nov 22 to give consumers a space to speak to our experts, attend events (with NEA reps) and book surveys. Of the 324 consumer visits to date, 69% felt positively, 27% neutral and 4% negatively, with safety being a main concern. This insight has informed our participation risks and mitigations outlined in Deliverable 15.
- **9 x consumer enquiries** to our NEA partnership established to provide free independent advice about the project through NEA's trained advisors – including guidance on energy efficiency, tariff review and options, benefit entitlement checks, Priority Services Registration, as well as complex billing or technical advice.
- **Community support & events** we have contributed to the local community through sponsoring two local football teams, provided £20,000 to the community partner fund and participated in 10 community events including volunteer days, intergenerational and charity events.
- **Further engagement** through the website (c.11k visitors), posters, leaflets (including NEA specific), advertising, media and social media can be found in Deliverable 15.

Overall, engagement has demonstrated strong social acceptance for the RHC project from consumers. This is reflected in positive sentiment towards the project, strong acceptability of the consumer offer, and positive sentiment towards the possibility of switching to hydrogen.

<p>Key insights we have factored into the offer, journey design and future engagement design:</p> <ul style="list-style-type: none"> <li>• <b>Cost is the main concern of respondents across all research activities, followed by safety</b>, largely attributable to a need for more information. This is addressed through planned engagement activities.</li> <li>• <b>Environmental benefits and job creation in Redcar were the two most important benefits</b> of the project for respondents, and will be further promoted in comms and engagement.</li> <li>• <b>Range of appliance choice is a priority</b>. We have extended the range of consumer appliances offered to ensure they have a choice of aesthetic and brand.</li> <li>• <b>Respondents expect protections to be extended at project exit</b>. Regardless of the chosen exit option, our offer includes warranties on all boilers and appliances at trial exit.</li> </ul> <p><b>Consumers valued independent advice</b>. To facilitate, we have factored a one-off compensation payment for impartial advice and a legal review of their consumer contract.</p>	
---	--

9.1.2 Provide outputs and outcomes of your engagement with local partners, local representatives, consumer groups and other interested parties, including stakeholders that support consumers with additional needs and consumers in vulnerable situations.

<p><b>Answer:</b></p> <p>Since May 2022, we have engaged with 62 representatives from local partners, local representatives, and other interested parties. Engagement and outcomes include:</p> <ul style="list-style-type: none"> <li>• <b>Schools/Colleges</b> <ul style="list-style-type: none"> <li>○ Conducted assembly talks, financially supported pupil competitions, and invited students to our Hydrogen Home.</li> <li>○ Introduced the project and explored ways to support [REDACTED], including potentially building a sensory garden in 2023.</li> <li>○ Maintained close relations with [REDACTED] to review downstream training, discuss adaptations required to provide certifications in hydrogen and attended the Clean Energy Employers Forum hosted by the [REDACTED].</li> <li>○ Collaborated on Caretakers Lodge; a facility for college students to learn about hydrogen innovation and an alternative location to Low Thornley for consumers to get a hydrogen home experience.</li> </ul> </li> </ul>	<p><b>Document reference (relevant page/section):</b></p> <p>Comms &amp; Stakeholder Engagement, Section 15.2, Outcomes of Broader Engagement pg. 40-43 and pg.57-65.</p>
--	---

- **Local Authority** (Tees Valley LEP, [REDACTED], Tees Valley Combined Authority (TVCA), Redcar Council (RCC)) engaged in 1-1 briefings, group briefings and ad-hoc committee meetings with the following outcomes:
  - **Redcar & Cleveland Council** – engaged with extensively across various departments with great success, including establishing a partnership approach with [REDACTED]
  - **Housing Standards** – identified a need to work more closely to ensure a flow of information to manage grants for heating homes/affordable warmth.
  - **Trading Standards** – provided briefings on the project to effectively signpost should they receive calls from consumers in the trial area. We will further engage to gain iterative feedback on the consumer journey.
  - **Development Team** – established relationships with Customer Development Officers (CDOs) for the wards to help identify and engage hard-to-reach consumers. CDOs have accompanied NGN door knocking with CIVS, and distributed comms through council events and noticeboards.
  - **Highway and Planning** – identified areas with planning applications that require adapted pipework routes. We continue to plan together to align works and minimise community disruption.
  - **Estates Team** – involved in initial project briefings about council-owned buildings within the trial area to ensure these were fully considered.
  - **Emergency and Response Planning** – part of an initial project briefing as a resilience forum member, and attended our regular blue light meetings.
  - [REDACTED] – we continue to provide 1-1 briefings on an ad-hoc basis. [REDACTED] has demonstrated [REDACTED] support through speeches, attending key events (e.g. Hub opening), providing media quotes and social media posts.
- **Blue light services** including Cleveland Police, Cleveland Fire Brigade, North East Ambulance Service and Primary Care:
  - Main queries from meetings were around safety and flammability of hydrogen in comparison to natural gas.
  - We will continue to work closely with Blue Light Services to ensure we have processes in place to identify and mitigate public risks.
- **Community / faith interest groups** ([REDACTED]):
  - Established relationships with key stakeholders in the faith community. We've received strong support from [REDACTED] for the environmental benefits and the cost savings to consumers (particularly CIVs) with free gas checks and replacement appliances from the project.
- **Charities and community interest groups** via tailored group briefings and round table discussions including [REDACTED]

<p>[REDACTED] [REDACTED] [REDACTED] [REDACTED]. Outcomes from this engagement:</p> <ul style="list-style-type: none"> <li>○ Key considerations relating to financial protection in relation to bill parity, support SLAs and ongoing reviews of the consumer experience have been factored into our offer, journey and research approach.</li> </ul> <p>Support and feedback on the project from local partners and interested parties has been consistently positive, further evidenced by letters of support from NGN's Customer Engagement Group, [REDACTED] [REDACTED] [REDACTED]</p> <p>Key findings from this engagement that have informed detailed design:</p> <ul style="list-style-type: none"> <li>● <b>Consumers in Vulnerable Situations (CIVs) may require additional support</b> – stakeholder engagement has been pivotal to our vulnerability strategy and approaches to engaging hard-to-reach consumers. The needs of vulnerable consumers will be considered throughout the consumer journey providing choice of channels and additional support.</li> <li>● <b>Trusted partner and third-party advice is valued</b> – where appropriate, consumers will be engaged through trusted third parties to instil confidence and trust.</li> <li>● <b>Engagement needs to be tailored and targeted</b> – all consumers will receive personalised communications which are addressed by name and wherever possible, and through their preferred channel.</li> <li>● <b>Consumers have safety concerns</b> – we know that some consumers are concerned about hydrogen safety and so we have set out a commitment in our strategy to educate and support consumers so that they feel safe in their homes.</li> </ul>	
---	--

9.1.3 Provide detailed communications and consumer engagement plans (covering pre, during, and post-trial).

This should include:

- Detail of proposed communications and engagement activities, with consideration of the engagement needs of different consumer groups, including vulnerable consumers, tenure types (including freeholders and leaseholders) and demographic groups. This should outline the aim of the engagement and the rationale for the approach / methods / activities proposed. Appointments with installation / maintenance engineers and consideration of the role of landlords / tenants should also be incorporated. This should also cover who would need to give final permissions e.g. for what appliances are installed and how conflicts between different groups (e.g. tenant and landlord or freeholder/ leaseholder) will be managed

- Detail of the customer journey and what will be required from consumers at each point, and the approach taken for consumers who are reluctant to engage in the trial
- Details of how the consumer offer, and any risks and opportunities (including potential disruption in people’s homes) of the trial are communicated clearly to consumers, so they can form specific, fully formed and timebound consent
- Detail on proposed governance structures for seeking views from key stakeholders
- A detailed media and communications plan.

<b>Answer:</b>	<b>Document reference (relevant page/section):</b>
<p>Since our interim report in September 2022, we have worked with independent third parties to evolve our communication and engagement strategy, detailed in Deliverable 15. This now incorporates:</p>	
<p><b>Our overarching purpose</b> to make those directly and indirectly affected by the trial feel recognised, confident, and empowered through communication and engagement.</p>	<p>Comms &amp; Stakeholder Engagement, Section 15.3, Outcomes, Audiences &amp; Principles, pg. 5-8.</p>
<p><b>Key consumer outcomes</b> we need to drive pre-, during and post-trial to deliver on our strategy.</p>	
<p><b>The different consumer groups</b> (primary, secondary, and public) we need to engage.</p>	
<p><b>The design principles</b> we apply to our engagement activities:</p>	
<ul style="list-style-type: none"> <li>o <b>Inclusive:</b> we will ensure our engagement fully meets the needs of different groups including vulnerable customers to reach the whole community.</li> </ul>	
<ul style="list-style-type: none"> <li>o <b>Meaningful:</b> we will consult and engage on the issues stakeholders tell us are important to them and where there is real opportunity to influence.</li> </ul>	
<ul style="list-style-type: none"> <li>o <b>Iterative:</b> we will make sure that every contact counts, making the most of insight gathered from day-to-day feedback, third-party insight and specialist engagement.</li> </ul>	<p>Comms &amp; Stakeholder Engagement, Section 15.3, Comms &amp; Engagement Activities, pg. 9-17.</p>
<ul style="list-style-type: none"> <li>o <b>Considered:</b> we will make sure we take account of the complex and varied consumer views throughout.</li> </ul>	
<p>The activities planned for beyond Stage 2 will be delivered through a multi-method, multi-channel approach including:</p>	
<ul style="list-style-type: none"> <li>o Face-to-face: community hot spots, at the Hydrogen Hub, Caretaker’s Lodge and in homes to build visibility and trust.</li> </ul>	<p>Comms &amp; Stakeholder Engagement, Section 15.3, Engaging Different Consumer Groups, pg. 21-28.</p>
<ul style="list-style-type: none"> <li>o Web: via our website and portal, maximising self-service of key requirements for consumers with a digital preference.</li> </ul>	<p>Redcar Hydrogen Community – Consumer Offer, Section 16.2, pg. 41-43.</p>
<ul style="list-style-type: none"> <li>o Telephony: expressed by consumers as a key channel to make available for the duration of the project, particularly for inbound support and guidance.</li> </ul>	<p>Comms &amp; Stakeholder Engagement, Section</p>

<ul style="list-style-type: none"> <li>o Postal: to reach every property in the area with letter drops, newsletters etc., with the opportunity to have this tailored to suit accessibility needs e.g., braille, alternative languages.</li> <li>o SMS: to ensure those without internet access, but with a mobile phone, are kept informed.</li> <li>o Social media: to garner support, publicly recognise and celebrate the project and contribution of Redcar consumers.</li> <li>o In the media: using press releases to maximise awareness inside and outside the trial area, garnering broader public support and awareness of the trial purpose and benefits. To support this, we have created a detailed media plan in Deliverable 15.</li> <li>o Through our partners: continuing to build our network of support to provide an extension to our direct communication and engagement through trusted third parties, community groups and charities.</li> </ul> <p>Content produced for comms and engagement will be multi-media and tailored to different consumer groups to maximise engagement including animation, videos, images, posters, newsletters, and infographics.</p> <p>We have paid particular attention to consumer groups that may have additional support needs, including vulnerable consumers, landlords and tenants and small businesses. We have separately detailed our approach to engaging these groups in Deliverable 15.</p> <p>To provide clarity to the journey consumers will experience, we have developed consumer journey maps detailing the steps a domestic or commercial consumer will go through at each stage. These maps highlight the requirements from both the consumer and NGN across the end-to-end journey.</p> <p>For every consumer to make an informed decision during the trial it is essential they fully understand the scope of the trial, options available and the potential consequences of each. Therefore, each consumer will be provided with a personalised offer breakdown via a channel of their choosing, based on the specification of their property, including a catalogue of appliances to choose from, as well as the protections and upgrades they can receive. Details are found in Deliverable 16.</p> <p>To ensure our engagement strategy is effectively executed, and that the needs of different stakeholders are met, we have developed a governance structure supported by an insight framework leveraging internal and external parties. This framework covers collecting sentiment, experience and engagement insight that is reported monthly across the project and fed into a monthly continuous improvement forum to drive action from what we learn.</p> <p>To ensure we adhere to the transparency principle, we will seek independent review, periodically by a third party, who will assess our plans and outputs and provide recommendations for improvement. We will share the output of these with DESNZ to demonstrate our ongoing progress.</p>	<p>15.3, Engaging Different Consumer Groups, pg. 23.</p>
---	--



## 9.2 Consumer Offer (1500 words)

9.2.1 Provide a concise summary of the overarching consumer strategy for both domestic and non-domestic consumers (including those who are vulnerable), informed by consumer engagement. This should include details of the proposed contractual arrangement with participating consumers.

The response should cover the following:

- The finalised consumer 'offer', including proposed options for consumers/businesses who do not wish to or cannot participate and how this can be funded. This should also include how the offer will be presented to different stakeholders who are affected (such as leaseholders, freeholders, occupiers and landlords)
- Detail on what costs will be included in the consumer offer and what, if anything, is expected to be covered by consumers, including ancillary works, and how you will support consumers to manage unforeseeable costs
- Evidence that an equality impact assessment was carried out when developing the consumer offer
- Proposed billing strategy for hydrogen supply, including billing rates and charges and an assessment of the impacts to consumers, including consumers on the alternative offer
- Terms and conditions with respect to consumers being able to change their mind and their rights to do so, including timelines and any other stipulations. These should be agreed by working with other GDNs
- Customer service arrangements
- Provisional contractual arrangements between consumers and the GDN with respect to installation and maintenance of equipment (and ancillary work), including a clear strategy for managing changes of ownership during the trial period
- Provisional contractual arrangements between different stakeholders (including occupiers, landlords and freeholders/leaseholders) in compensation for disruption
- Post-trial arrangements, including the exit plan, and options provided to consumers then, and an assessment of the impacts to consumers, e.g. choice, costs, and disruption
- Provision of plans to manage any issues regarding heating quality or cost. For example, in the event of high cost of energy, appropriate measures to ensure consumers are not financially worse off and, in the case of poor-quality heating for non-hydrogen users (e.g. due to lack of insulation), appropriate measures so that quality of heating is maintained.

### **Additional guidance:**

You should demonstrate how your consumer offer complies with BEIS consumer protection policy and ensures that no one in the trial area is financially disadvantaged.

We expect that the offer for domestic consumers plans should include or reference:

- An overarching financial incentives and support package for minor or common costs experienced by many consumers (e.g. having to stay home for surveys, increase in insurance premiums or impacts on house prices). It should also include incentives to encourage participation
- Specific plans to address larger or less common costs (e.g. needing to stay somewhere else during the conversion process, other unexpected costs to consumers). This should include a process for assessing and appropriately compensating consumers who have been financially disadvantaged in these cases
- A mechanism for ensuring that consumer bills for both hydrogen and any alternative heating solution are no higher than they would be for natural gas.

<p>The offer for non-domestic consumers should include or reference:</p> <ul style="list-style-type: none"> <li>• How compensation for loss of revenue will be provided for businesses of different types, size, trading hours etc.</li> <li>• Plans for managing disruption/closure of businesses during conversion, particularly if workers cannot work from home</li> <li>• Plans for managing disruption/closure of other non-domestic buildings, such as schools or nursing homes</li> <li>• How your engagement with non-domestic properties has informed your understanding of any challenges and the plan for financial support.</li> </ul>	
<p>The consumer offer has been iteratively developed with input from consumers and third-party stakeholders, with some features directly attributable to feedback received (e.g., warranty at exit).</p> <p><b>Natural gas boiler and appliance replacement</b></p> <ul style="list-style-type: none"> <li>• Consumers will be offered a new hydrogen boiler and appliances (hobs, cookers, fires) free of charge.</li> <li>• With a hydrogen boiler, consumers can also choose new electric appliances instead of hydrogen ones.</li> <li>• Consumers who do not want hydrogen have a choice between heat pump (if suitable) and electric boiler and new electric appliances.</li> </ul> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>• Consumers can have up to £2,000 in energy efficiency upgrades carried out by the Project.</li> <li>• Appliances, installation, servicing and maintenance during the trial, and any repairs following installation, will be carried out and funded by the Project.</li> <li>• Consumers will pay no more for the hydrogen or electricity used by their new boiler and appliances than they would have on natural gas.</li> <li>• Consumers can receive £250 towards lawyer fees to ensure they are comfortable with their legal agreement.</li> <li>• At exit, consumers receive brand new appliances, or if they keep trial appliances, will get an extended warranty.</li> <li>• Consumers are eligible for participation payments, regardless of choice. These will be paid in vouchers in recognition of consumer inconvenience to support evidence gathering. We hope this will encourage hydrogen uptake and overall engagement whilst ensuring appropriate consumer redress.</li> <li>• Consumers will enter into a legal agreement with NGN whereby the Project owns and is responsible for new boilers and appliances installed for the duration of the trial.</li> </ul> <p><b>Costs</b></p>	<p><b>Document reference (relevant page/section):</b></p> <p>Consumer Offer, Domestic Core Offer Proposition.</p> <p>Consumer Offer, Commercial Offer Core Proposition.</p>



<p>stay on hydrogen can choose an electric boiler and appliances free of charge; however, the cost of electricity will not continue to be subsidised.</p> <ul style="list-style-type: none"> <li>• Consumers will own any appliances they keep or are given at exit.</li> </ul> <p><b>Plan to manage any issues regarding heating quality or cost</b></p> <ul style="list-style-type: none"> <li>• Domestic consumers will be offered funded fabric upgrades up to the value of £2,000 per property to mitigate against poor quality heating.</li> <li>• We will monitor usage data and work with local partners to identify and support potentially vulnerable consumers.</li> </ul> <p><b>Loss of business (LoB)</b></p> <ul style="list-style-type: none"> <li>• Commercial consumers with an annual turnover of [REDACTED] will be eligible for compensation for loss of revenue for each day that the business is unable to operate due to trial disruption.</li> <li>• This is more generous than NGN's current LoB process to reflect the forced disruption.</li> </ul> <p><b>Equality impact assessment</b></p> <p>We have conducted an equality impact assessment and any required mitigations have been incorporated into the consumer offer and vulnerability strategy.</p>	<p>Redcar Hydrogen Community - Consumer Offer, Compensation.</p>
--	--

9.2.2 Provide details of intended messaging around the consumer offer.

The response should cover the following:

- Details of how key consumer benefits from the trial will be communicated with consumers and considered within the trial design
- Details of how options for alternatives will be presented, including how the option of hydrogen will be encouraged whilst maintaining choice and aligning with the consumer protection principle that consumers should not be financially disadvantaged
- Details of how evidence, including social research has informed this planned messaging.

**Additional guidance:**

The response should include how you plan to reach all consumers in the trial area and ensure that the communication is understood by all, including using different methods for vulnerable consumers and people with specific needs.

Any planned communication with consumers should include:

- Details of the incentives, compensation and/or remediation available
- The boilers and appliances on offer
- The user experience of different options, including how different heating or other appliances work (and may work differently to what consumers are used to), and any changes to how they experience billing and household costs.

<p><b>Answer:</b></p> <p><b>Benefits</b></p> <p>Trial benefits will be communicated in different ways depending on whether they relate to:</p> <ul style="list-style-type: none"> <li>• Environmental benefit and critical evidence gathering for the government to decide on the viability of hydrogen as a long-term heat solution.</li> <li>• Consumer benefit as a result of the trial offer and built into the consumer package e.g. insulation upgrades.</li> </ul> <p>The big picture benefits will be an underpinning theme through all consumer engagement and our aim is to make the entire community feel proud to be part of the trial. We will have different approaches for different consumer groups. As well as targeted engagement, we will have a monthly newsletter, available in different formats and languages across multiple channels, presenting trial benefits, updates and some form of game or competition to engage consumers.</p> <p>The direct consumer benefits e.g. insulation upgrades will be communicated as part of the campaign when the trial is awarded and in presentation of the offer. Multi-media benefit overview across all channels will highlight benefits to the consumer, focusing on the issues they are addressing e.g. “Are you losing heat in your home?”. We will equip our Community Project Ambassadors with full understanding of the benefits so they can raise awareness in the community. This is critical as engagement with peers is more likely to be believed, trusted and resonate with consumers.</p> <p><b>Presenting the offer</b></p> <p>Each consumer will be provided with a personalised offer based on the specification of their home. This will include a catalogue of appliances from which to choose, as well as protections and upgrades they can receive. We will develop decision making considerations for consumers to encourage them to appreciate and properly consider some of the potential risks. This will include highlighting support available so that for each risk, we show the consumer how the project can help mitigate it.</p> <p>Expert advice will be available for consumers who would like to discuss options in more detail. We will work with local support groups and charities to engage harder to reach consumers, working with them as already known and trusted figures to develop a relationship with the consumer and take them through their options. We hope that</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Redcar Hydrogen Community - Consumer Offer, Communication &amp; Presentation of the Offer.</p>
--	---

<p>personalising final options will reduce confusion and demonstrate project commitment to reducing complexity.</p> <p><b>Encouraging hydrogen</b></p> <p>We want to encourage consumers to select hydrogen while remaining conscious that we must maintain overall fairness and not be seen as buying consumers.</p> <p>Through consumer engagement, [REDACTED] and other third-party research, we are aware of the concerns consumers have about hydrogen, including cost and safety; therefore, our first step is to tackle this through education, information materials and events.</p> <p>We will also encourage consumers by highlighting their critical role in the trial but also in the broader net zero ambition – appealing to their desire to be involved in a greater social good.</p> <p>All activity to encourage hydrogen will be done through various stakeholders as well as the project, as research suggests consumers are more likely to trust experts and their peers.</p>	
---	--

9.2.3 Provide an example of consumer draft agreements with indicative sign-up figures.

<p><b>Answer:</b></p> <p>Consumer engagement to date has indicated the following in relation to hydrogen for heat uptake:</p> <ul style="list-style-type: none"> <li>• 89% of respondents reported that they would opt for a hydrogen boiler in a trial situation. The main reason cited was the concern about the cost of electricity, which led us to consider whether despite it being stated, some consumers did not appreciate that that they would not pay any more for electricity during the trial. It is possible that, if they had, some consumers would have responded differently.</li> <li>• If the consumers who said they picked hydrogen because of cost concerns had chosen differently (selecting the electric alternative), the percentage of consumers responding in favour of a hydrogen boiler would be 71%.</li> <li>• On this basis, we believe a sensible expected uptake range for hydrogen boilers is 71%-89%.</li> </ul> <p>We are mindful that due to self-selection, it is difficult to ensure the sample is unbiased; therefore, we will undertake additional research in Stage 2.5 to get a more accurate view of likely uptake.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Comms &amp; Engagement Strategy, p29.</p> <p>Redcar Hydrogen Community - Consumer Offer, Terms &amp; Conditions Section.</p>
--	---

### 9.3 Consumer Protection Plan (2000 words)

Provide a concise summary of how you will deliver against the consumer protection framework set out in the BEIS consultation 'Hydrogen for heat: facilitating a 'grid conversion' hydrogen heating trial' published in April 2022 (pg. 16-17).

Where appropriate, this should include identifying areas for further improvement, options, and contingencies as necessary, and how you will continue to monitor these issues.

Ofgem expects to include consumer protection conditions in their NZASP funding direction. These conditions will be based on the Consumer Protection Plan and will be consulted on.

#### 9.3.1 Ensuring transparency

<b>Answer:</b>	<b>Document reference (relevant page/section):</b>
<p>It is critical that consumers have full understanding of the trial, its aims, and its impacts. Our Stakeholder Comms &amp; Engagement plan has been developed to maximise consumer reach with various engagement methods for different consumers, recognising potential vulnerabilities and consumer situations. To ensure full accessibility, we will work with third-party organisations to reach consumers and ensure the required support. For example, all consumers are entitled to £250 towards legal expertise to review their legal agreement with full confidence before signing it.</p>	<p>Consumer Protection Plan, Consumer Protection.</p>
<p>To ensure transparency, we are taking a personalised approach to consumer offers and, following property survey, consumers will be presented with options available to them. To help consumers gain a full understanding of the technology available, we are opening Caretaker's Lodge at [REDACTED] where consumers will be able to interact with the options available, supporting informed decision.</p>	<p>Redcar Hydrogen Community – Consumer Offer, Appendix A for Offer rationale.</p>
<p>All communication will cater to accessibility requirements of our consumers and stakeholders.</p>	
<p>To ensure we adhere to the transparency principle, we will seek independent review, periodically, by a third party who will assess our ongoing plans and outputs and provide recommendations for improvement. We will share this with DESNZ to demonstrate ongoing progress.</p>	
<p>Throughout the trial, we will continue to test the efficacy of the communication and engagement approach by capturing consumer feedback before reflecting this in appropriate changes to the communications approach. We are also considering how to make data rights, data capture, and data use more accessible to consumers, to ensure any decisions made by consumers are fully informed.</p>	

### 9.3.2 Appropriate oversight and redress

<p><b>Additional guidance:</b> Your response should include or make reference to:</p> <ul style="list-style-type: none"> <li>• An overview of the internal GDN complaints procedure</li> <li>• An overview of the type of complaints that fall in and out of scope of the existing Ombudsman Services agreement</li> <li>• The proposed approach and timescale to securing an agreement with Ombudsman Services to deal with any escalated complaints from consumers regarding the trial.</li> </ul>	
<p><b>Answer:</b></p> <p>Our existing complaints procedure will serve to manage complaints arising from the trial. Complaints are taken through a three-tier escalation process, then referred to the Ombudsman in case deadlock is reached. Through ongoing engagement with the Ombudsman Service, we have provisionally agreed how trial-specific scenarios will be treated to ensure they can serve an effective, defined role for complaint resolution throughout the trial.</p> <p>For out of scope scenarios, we will assess the complaint to determine the most appropriate route. This may include OFGEM, particularly where the complaint relates to the general policy of the trial, which is a government decision. We will explore other suitable agencies for complaint referral and reach a decision in Stage 2.5.</p> <p>Irrespective of the trial, as per existing obligations, we will continue to measure and track complaint volume against Ofgem’s complaints metrics and internal targets. We will regularly review all trial complaints and where themes emerge, take appropriate action to target the source for the ongoing complaint type.</p> <p>We will ensure full transparency in all complaints and compensation cases, providing consumers with a breakdown of decision-making criteria and redress provided.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Redcar Hydrogen Community - Consumer Offer, Complaints and Dispute Management Approach.</p> <p>Consumer Protection Plan, Consumer Protection.</p>

### 9.3.3 Fair treatment for all

<p><b>Additional guidance:</b> Your response should set out or refer to your proposed definition for vulnerable and fuel poor consumers. Your approach to vulnerable consumers should consider:</p> <ul style="list-style-type: none"> <li>• The potential temporary nature of someone’s vulnerability.</li> <li>• Customers who may be considered vulnerable but who may not be or want to be registered on the Priority Services Register (PSR)</li> <li>• How you will engage with vulnerable consumers who may be disengaged</li> <li>• How you will ensure any existing obligations on other parties can be met e.g. Supplier Licence Conditions regarding winter disconnection of vulnerable consumers; gas supplier voluntary commitments</li> <li>• Interdependencies with the wider Consumer Protection framework and Consumer Offer (e.g., financial compensation; time off gas/ unplanned interruptions; consumer offer).</li> </ul>
---

Please include the latest data on vulnerable consumers under your proposed definition within your trial location.	
<p><b>Answer:</b></p> <p>We have conducted extensive engagement with consumers, including additional research to understand vulnerability in the trial area.</p> <p>We are using the Ofgem definition for vulnerability, which is intentionally broad to capture all consumers who need additional support. We have developed potential circumstances and characteristics that may make a consumer vulnerable, many of which are included on the PSR.</p> <p>More work is required to understand the number of vulnerable consumers in the trial. As a minimum there are [REDACTED] from the PSR, but this does not cover the full extent of vulnerable trial consumers. The number of vulnerable consumers will change throughout the trial as circumstances change, so our vulnerability strategy will evolve and adapt alongside consumer needs.</p> <p>To help us engage and support other vulnerable consumers we will work with local organisations (charities, local authority bodies, etc.) who are already trusted by the consumers and can advise on how best to engage and face into challenges.</p> <p>During planning for the trial, we do not foresee any unusual or trial-specific challenges which may impact our ability to ensure compliance with existing obligations on other parties.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Consumer Protection Plan, Consumer Protection.</p>

9.3.4 Financial fair treatment

Please refer to the additional guidance under 9.2.1

<p><b>Answer:</b></p> <p>We have designed our offer to ensure that no consumer is financially disadvantaged throughout the trial. We are committed to covering all costs incurred in switchover, such as ancillary works, servicing, and repair of appliances.</p> <p>If unforeseeable costs arise, consumers will inform the project and we will assess urgency and decide next steps. This may involve project intervention to pay costs where the consumer is unable e.g., if they need alternative accommodation. In less urgent scenarios, we will determine what is reasonable and fair to support consumers. If consumers have</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Consumer Protection Plan, Consumer Protection Principles.</p> <p>Redcar Hydrogen Community - Consumer Offer.</p>
---	---



<p>periods. Our CCOs will work with their sector to identify where alternative measures or accommodation need to be provided to ensure access to heat and cooking during conversion. This will be planned in advance to minimise disruption.</p>	
--	--

9.3.5 Quality of service

<p><b>Answer:</b></p> <p>We have put processes and procedures in place to ensure best practice for hydrogen and electric installations will be followed throughout the trial, including the principles outlined in GSOPs. All engineers utilised on this trial will be will fully qualified and Gas Safe registered. Depending on requirements at individual participating properties, we may also use secondary trades such as electricians or speciality builders. These will usually be sub-contractors and will be suitably qualified. We recognise that we will always be responsible for work they undertake at any property as part of the trial.</p> <p>As part of our preparations, we are considering how our existing processes and procedures for construction and in-home visits may be adapted to ensure we absolutely minimise disruption to properties in the trial area (both those directly affected, and those indirectly through any construction work).</p> <p>We are working with the HSE to ensure that the trial is carried out in full accordance with their guidance. We will maintain a relationship with them throughout the trial to ensure we continually improve our processes and increasing consumer safety.</p> <p>We will also engage with the Hydrogen Skills and Standards for Heat Programme and the HSE before and during the trial, This ensures we identify changes to skills requirements and updates for standards so we can roll these out to the deployed engineering workforce at the earliest opportunity.</p> <p>We will obtain external validation from an independent third party periodically throughout the trial to monitor the quality of service, keeping a log of ratings provided and actions taken to correct shortfalls identified.</p> <p>Quality of service includes our support services. Having established our vulnerability strategy, we are working towards establishing a support network with local and national organisations to ensure that we have appropriate expertise within the project to provide tailored consumer support.</p>	<p><b>Document reference (relevant page/section):</b></p> <p>Consumer Protection Plan.</p>
--	--

--	--

9.3.6 In addition to the consumer protection framework outlined above, please outline a response to the following considerations (or if appropriate, clearly specify where else in your application this information is provided):

- Detail on demographics of consumers within the trial area, including the number of consumers on the Priority Services Register
- Finalised strategies for different consumer groups, including vulnerable consumers, informed by consumer engagement. The offer should ensure that all engagement and materials are inclusive. For materials, this may include using accessibility guidelines and standards where they are available and cognitive testing to inform the design
- An outline and assessment of other consumer issues, such as impact of the trial on the property market (e.g. property transactions, mortgages and insurance), and strategies to address these to minimise impact on consumers
- Contingency plans for changes to a consumers' situation during the trial such as change of ownership/tenancy of properties or business closures
- Outline of roles and responsibilities of different organisations involved in the consumer protections regime, including local authority, local support groups etc.
- Assessment of any safety, cost or housing quality risks, with appropriate mitigation plans. For example, in the event of loss of property value due to any perceived safety risk, plans for compensating consumers.

<p><b>Additional guidance:</b>          You should provide a holistic consumer protection plan. Your plan for consumer protection should include an evaluation of what protections are already in place today and determine what additional measures may be required for the trial. The plan needs to articulate how the gap between the existing measures and new requirements are bridged (e.g. through regulations). This will require collaboration across the consumer protection and regulatory workstreams.</p>	
<p><b>Answer:</b></p> <p>We have identified a population of 5,866 within the trial area, comprising 2,677 domestic and 280 commercial properties. C.73% of homes are rated EPC D or less; c.20% of domestic properties in the trial area do not currently have a live gas supply. Approximately [REDACTED] of domestic properties in the trial area are eligible to be registered on the PSR; NGN's pre-trial engagement has identified [REDACTED] consumers who previously hadn't been listed on the PSR, taking total PSR consumers in the trial area to [REDACTED]. Of those, [REDACTED] have one code attributed to them, [REDACTED] more than one (suggesting their vulnerability is more complex).</p> <p>In preparation for the trial, we have also considered other risks that may affect consumers because of the trial, such as market value for sale or rental income and the ease of mortgaging and insuring properties within the trial area. We have described a comprehensive suite of mitigation measures which seeks to minimise any potential impact through education, engagement, monitoring and transparency of roles of bodies involved in the trial. We have also considered risks to property safety, property value or housing quality arising from the</p>	<p><b>Document reference (relevant page/section):</b>          Consumer Protection Plan.</p>

trial, and provided a comprehensive mitigation approach for these to ensure they are unlikely to materialise. In the event that any risks materialise, we remain committed to the principle of no financial disadvantage, and have described provisions which will ensure we can act in a way to make right any wrongs.

Finally, as part of our trial preparations, we have identified and engaged with a local stakeholders across local charities, support groups and authorities to discuss their roles in the support ecosystem established as part of the trial to protect vulnerable consumers wherever possible.

We have developed a vulnerability strategy that remains current and able to respond to the specific needs of vulnerable customers in the trial area. The strategy considers who in the trial area will be defined as “vulnerable”, how we proactively identify and provide relevant support throughout the trial period, whilst maintaining our commitment to the protection principles. We have defined some key enablers for our approach to vulnerability that we will iterate throughout the trial.

**1. Identify**

- Map key indicators for vulnerabilities (e.g., data points, behavioural indicators, in-home circumstances).
- Establish the routes to identify indicators at each stage of the trial (e.g. details captured through upfront engagement, hub interactions, surveys, home visits etc.).

**2. Collaborate**

- Establish a representative network of charities, building on those already engaged, to ensure coverage across vulnerability types /groups.
- Agree ways of working, escalation routes and engagement commitments (i.e. dedicated trial reps) for the duration of the project.

**3. Support**

- Create processes (between NGN, charities and the council) to enable targeted support for vulnerable consumers and test these against a series of scenarios relevant to the trial and vulnerability indicators.

**4. Assess**

- Agree a process of review and ways to securely retain records of support needs and project response.

# 10. Cost and Commercial



## 10.1 Cost and Funding Plans (3000 words)

10.1.1 Provide a comprehensive summary of costs and profile expenditure (CAPEX and OPEX) broken down by milestone, including commentary covering cost uncertainties (i.e. Scenario 1 and 2).

**Additional guidance:**

The milestones listed here should align with, but may be a subset of, the milestones listed in Table 4 (Section 7.1.2). In proposing these milestones, you should have regard to the guidance in Section 4.4 of the Hydrogen Heating Village Trial Stages 3 to 5 Funding Application Guidance.

For each milestone you should identify an appropriate set of Milestone Requirements, representing the evidence that will be provided to demonstrate the milestone has been met.

[Redacted]

[Redacted]							
[Redacted]							
[Redacted]							
[Redacted]							
[Redacted]							
[Redacted]							
[Redacted]							
[Redacted]							
[Redacted]							



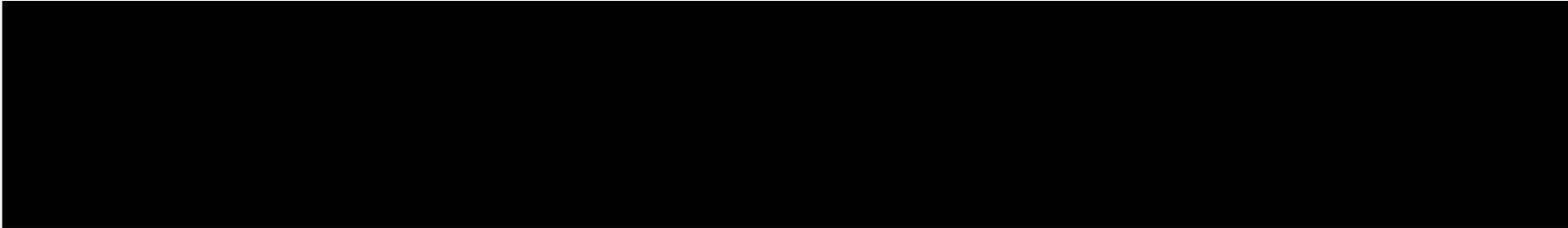
[REDACTED]								
[REDACTED]								
[REDACTED]								
[REDACTED]								
[REDACTED]								

**Assumptions and key dependencies leading to Scenario 1:**

For a detailed list of assumptions relating to each line of the Costing Template please see 'NGN's Costing Template Assumptions List'.



Milestones:



Cost summary – Scenario 2

| [REDACTED] |
|------------|------------|------------|------------|------------|------------|------------|------------|
| [REDACTED] |
| [REDACTED] |
| [REDACTED] |
| [REDACTED] |
| [REDACTED] |
| [REDACTED] |

[REDACTED]

[REDACTED]							
[REDACTED]							
[REDACTED]							
[REDACTED]							
[REDACTED]							
[REDACTED]							
[REDACTED]							
[REDACTED]							
[REDACTED]							

[REDACTED]

			[REDACTED]				
[REDACTED]			[REDACTED]	[REDACTED]			
		[REDACTED]	[REDACTED]				
[REDACTED]			[REDACTED]	[REDACTED]			
		[REDACTED]	[REDACTED]				
[REDACTED]			[REDACTED]	[REDACTED]			

**Assumptions and key dependencies leading to Scenario 2:**

Assumptions and Key Dependencies are the same as Scenario 1 with the addition of contingency based on quantitative risk analysis using Palisade @Risk software based on a Latin Hypercube modelling methodology.

10.1.2 Provide a funding plan for the whole project, clearly identifying proposed contributions from network shareholders, third parties, BEIS Grant Funding and Ofgem NZASP Funding.

**Additional guidance:**  
 Where it is proposed to seek cash contributions from third parties, this section should clearly identify the activities that these contributions will go towards. Where it is proposed to seek benefits-in-kind from third parties, this section should detail how these contributions have been valued. In both cases, this section should justify that these contributions would not have been provided in the absence of the village trial.

<p><b>Answer:</b></p> <div style="background-color: black; height: 15px; width: 100%; margin-bottom: 5px;"></div> <div style="background-color: black; height: 15px; width: 20%; margin-bottom: 5px;"></div> <div style="background-color: black; height: 15px; width: 100%; margin-bottom: 5px;"></div> <div style="background-color: black; height: 15px; width: 100%; margin-bottom: 5px;"></div> <div style="background-color: black; height: 15px; width: 100%; margin-bottom: 5px;"></div> <div style="background-color: black; height: 15px; width: 10%; margin-bottom: 5px;"></div>	<p><b>Document reference (relevant page/section):</b></p>
---	---

Match Funding – Scenario 1


[REDACTED]						
[REDACTED]						
[REDACTED]						
[REDACTED]						
[REDACTED]						
[REDACTED]						
[REDACTED]						

[REDACTED]

[REDACTED]						
[REDACTED]						
[REDACTED]						
[REDACTED]						
[REDACTED]						
[REDACTED]						

[REDACTED]

[REDACTED]						
[REDACTED]						
[REDACTED]						
[REDACTED]						



[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]					
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	

[REDACTED]

			[REDACTED]			
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]		
		[REDACTED]	[REDACTED]			
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]		
			[REDACTED]			
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]		

10.1.3 Provide evidence of how you arrived at cost estimates for Stages 3 and 4. In particular, this section should detail the basis on which costs have been estimated (e.g. degree of supply chain engagement undertaken) and the corresponding certainty in cost estimates.

<p><b>Answer:</b></p> <p>Overview of how main cost items were estimated (full supporting information is available upon request).</p> <p><b>Project management</b> – cost classification: 1–2</p> <ul style="list-style-type: none"> <li>A resource plan developed for the project was used to determine the type of roles, number of resources required, and number of days required to work on the project. [REDACTED]</li> </ul> <ul style="list-style-type: none"> <li>Reference document – Resourcing and Recruitment Plan</li> </ul> <p><b>Consumer, stakeholder &amp; compensation</b> – cost classification: 1–3</p> <ul style="list-style-type: none"> <li>All staff costs for the Consumer Engagement team are covered within the Project Management section above. Other public relations &amp; stakeholder costs have been estimated from supplier proposals, quotations and historic running costs. [REDACTED]</li> <li>[REDACTED] Compensation payments have been based on assumed consumer numbers and NGN standard compensation payments.</li> </ul> <p><b>Safety &amp; training</b> – cost classification: 2–3</p> <ul style="list-style-type: none"> <li>Costs have been included for further QRA and Safety Case work and has been estimated using historic annual run rates from work with DNV and PIE during Phase 2. HSE’s requirements for Phase 3 and 4 were calculated using an annual estimate and applied the duration assessed for the work in these phases.</li> </ul> <p>Training costs were estimated using a training resource plan developed by the project team which includes courses such as fuel switchover, new NGN emergency operations and maintenance procedures. Trainee numbers were estimated by the project team and costed using internal rates.</p> <ul style="list-style-type: none"> <li>Reference document – Training Plan</li> </ul> <p><b>Regulatory, billing &amp; legal</b> – cost classification: 1–4</p> <ul style="list-style-type: none"> <li>Electricity bill subsidies have been calculated using DESNZ assumed rate for natural gas and average market rates for electricity. Usage figures have been based on Ofgem’s published Typical Domestic Consumption Values for the North East and extra over costs calculated for the duration of the trial. Legal costs have been</li> </ul>	<p><b>Reference document (relevant page/section):</b></p> <p>Redcar Hydrogen Community – Workforce and Recruitment Plan.</p> <p>Redcar Hydrogen Community – Training Plan</p>
---	---

estimated using actual historic cost information and forecasted support requirements.

**Hydrogen production – cost classification: 4**

- NGN developed a three-point estimate (low, medium, high) for the pence per kWh price of green hydrogen. To derive this range NGN researched published data from existing hydrogen markets around the world (e.g. [REDACTED]) and included an uplift for the high scenario to reflect higher energy prices across all vectors as most of this data was prior to the energy crisis. For Scenario 1, NGN used the midpoint hydrogen rate and deducted the DESNZ provided base rate for natural gas to provide the extra over cost as required to be included within the Costing Template. NGN multiplied the rate by the average annual property usage (domestic and I&C) per year to arrive at a cost. Our annual usage figures are based on Ofgem’s published Typical Domestic Consumption Values. The slightly higher than national figures for the North East were used to reflect the state of the housing stock and trial location. For small-to medium-sized businesses, a [REDACTED] was applied per business to the Typical Domestic Consumption Values and remaining industrial demand was calculated as the balance of the known demand of the trial location based on our own network consumption data.

For Scenario 2 NGN used the mid-point estimate again for the base costs, however we have included a risk item to allow for fluctuations from our midpoint estimate. The risk item has been modelled on a high medium low assessment of [REDACTED] at a probability of [REDACTED].

**High Pressure Pipelines – cost classification: 2–3**

- [REDACTED] provided a pipeline design which NGN used to price the base costs. NGN sought competitive prices from our supply chain for materials and from our framework contractors for installation works. NGN revised these quotations to account for a change in the preferred route due to construction constraints with the original design. [REDACTED]  
[REDACTED]  
[REDACTED]

For Scenario 2 the base cost is the same; however, risk items have been included for programme delays and direct cost impacts relating to an alternative longer pipe route that would be required if reasonable lease terms cannot be reached.

[REDACTED] – cost classification: 2

- Indicative lease costs have been provided by [REDACTED] for the duration of the project.

[REDACTED] – cost classification: 5

<ul style="list-style-type: none"> <li> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> </li> </ul> <p>For Scenario 2 the risk was modelled on a low, medium and high rate at a probability of 90% to produce a contingency.</p> <p>[REDACTED]</p> <ul style="list-style-type: none"> <li> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> </li> </ul> <p><b>Network Reinforcement</b> – cost classification: 1–4</p> <ul style="list-style-type: none"> <li> <p>In converting Redcar’s gas demand model to hydrogen, network reinforcements are required to ensure minimum pressures in a 1:20 are above 23mbar. These reinforcement schemes were designed by NGN’s Network Analysis team and used in the cost estimate. The Operational Manager for the Redcar area produced a Standard Pricing Model (SPM) from a desktop survey which provides detail on the enabling works, pipe &amp; fittings, traffic management, Direct Service Provider (DSP) teams, special operations and volumes of reinstatement required to undertake the work. NGN Commercial Team used this SPM to cost of the project using an internal costing model.</p> </li> </ul> <p>Reinforcement of the electrical distribution network has been estimated however does not form part of the project cost as we understand that these costs will be funded through the RIIO-GD2 regulatory price control.</p> <ul style="list-style-type: none"> <li> <p>Reference documents – Network Design Plan and Network Analysis Plan</p> </li> </ul> <p><b>Network conversion</b> – cost classification: 1–3</p> <ul style="list-style-type: none"> <li> <p>NGN have excluded any costs associated with mains replacement works (including non-mandated) as these costs relate to our regulatory programme over the term of the project. NGN produced a sectorisation plan, calculations and drawings to determine the most efficient method to roll out the conversion of the hydrogen network. From this plan, the number of isolation valves required to undertake the roll out is identified and used in the cost estimate. NGN used a mixture of historic rates and supplier quotes for the various valve sizes required and an assumption of one team for two days per valve</p> </li> </ul>	<p>Redcar Hydrogen Community – Network Design Plan.</p> <p>Redcar Hydrogen Community – Network Analysis Plan.</p> <p>Redcar Hydrogen Community – Sectorisation Plan.</p> <p>Redcar Hydrogen Community –</p>
---	---



<p>and fitting costs. Nitrogen costs based on volume determined by NGN's operations team and supplier rates.</p> <p><b>Switchover of hydrogen-ready boilers and procurement and installation of hydrogen appliances</b> – Appliance Procurement Strategy was used to estimate the cost for the supply of hydrogen appliances. Our preferred supplier for the in-home solution provided switchover and hydrogen appliance install costs, at cost, by developing a labour resource plan to deliver the project's Sectorisation Plan.</p> <p>I&amp;C – All hydrogen appliances are assumed to be ready for the start of the trial except for bain maries and rotisserie ovens which are priced for an electrical alternative. The report was used for the supply cost of the boilers and appliances, with exception of the Combined Heat &amp; Power plants for which a supplier quotation was used. Installation works were quoted for by our preferred supplier.</p> <ul style="list-style-type: none"> <li>• Reference doc – HVT Appliance Procurement Strategy.</li> </ul> <p><b>Trial period</b> – cost classification: 1–2</p> <ul style="list-style-type: none"> <li>• NGN's inspections and maintenance costs were calculated using historical costs. Preferred supplier for the in-home solution provided market rates for boiler servicing based on their [REDACTED]</li> </ul>	<p>Hydrogen Village Trials – Appliance Procurement Strategy.</p>
--	--

10.1.4 Provide evidence of how you arrived at cost estimates for Stage 5. In particular, this section should detail the basis on which costs have been estimated (e.g. degree of supply chain engagement undertaken) and the corresponding certainty in cost estimates.

<p><b>Answer:</b></p> <p><b>Re-conversion</b> – cost classification: 1–3</p> <ul style="list-style-type: none"> <li>• Re-conversion assumptions – assumed all domestic and I&amp;C properties on natural gas at project start revert to this at exit; this includes the CHP sites and those who opted for an electrical alternative. For customers who opted for a heat pump, no further costs for reconversion have been included. For meters, it is assumed domestic meters are dual-fuelled and therefore can remain in situ whereas I&amp;C meters will be replaced on recommendation by [REDACTED].</li> </ul> <p>Our preferred supplier for the in-home solution has provided a cost for the re-conversion works based on labour resource model and market rates for boilers and appliances.</p> <p>Market rates were used for the natural gas I&amp;C appliances and a supplier quotation was used for the installation works.</p>	<p><b>Reference document (relevant page/section):</b></p>
---	---

<p>NGN have estimated the costs associated with the reconnection of isolated mains to the wider gas network using network design and historic unit cost information.</p> <ul style="list-style-type: none"> <li>Reference doc – HVT Appliance Procurement Strategy</li> </ul> <p><b>Decommissioning</b> – cost classification: 2–3</p> <ul style="list-style-type: none"> <li>NGN used historic cost data to determine the costs associated with decommissioning the pipeline, PRS and District Governors. All reinforcement is assumed to remain in the network and is not decommissioned.</li> </ul>	<p>Hydrogen Village Trials – Appliance Procurement Strategy.</p>
--	--

10.1.5 Summarise key details of availability and costs of liability insurance for the complete project including both upstream and downstream components.

<p><b>Answer:</b></p> <p>At the time of writing, we understand that no specific cover is available in the market which relates to the supply of hydrogen in the context of a village trial. If we are successful, we will liaise with our brokers, [REDACTED] in conjunction with the [REDACTED] to identify the scope of any additional cover that may be required.</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <table border="1" data-bbox="183 1279 1171 1682"> <tr> <td>[REDACTED]</td> <td>[REDACTED]</td> </tr> <tr> <td>[REDACTED]</td> <td>[REDACTED]</td> </tr> <tr> <td>[REDACTED]</td> <td>[REDACTED]</td> </tr> </table> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	<p><b>Reference document (relevant page/section):</b></p>
[REDACTED]	[REDACTED]						
[REDACTED]	[REDACTED]						
[REDACTED]	[REDACTED]						





# 11. Grant Funding Agreement

## 11.1 Reporting (1000 words)

11.1.1 Outline your plans for monthly reporting, including proposed contents covered in the report.

<p><b>Answer:</b></p> <p>The monthly report will summarise project activities during a specific month in relation to the project deliverable relevant to each specific stage.</p> <p>The report will provide an overview of key activities carried out within each workstream and include:</p> <ul style="list-style-type: none"> <li>• Workstreams will provide a summary of activity carried out for the specific month reviewed against the project plan and will highlight any impact on the delivery timeframe.</li> <li>• Priorities and key activities for the upcoming month for visibility of next steps.</li> <li>• Risks within each workstream, including Type / Impact / Probability / Description and Mitigation Activity.</li> <li>• Monthly cost review</li> </ul> <p>Workstreams covered within the update will include:</p> <ul style="list-style-type: none"> <li>• Regulatory Framework</li> <li>• Stakeholder &amp; Consumer</li> <li>• Safety / QRA</li> <li>• Network Conversion</li> <li>• Upstream</li> <li>• Production and Storage</li> <li>• Commercial and Procurement</li> </ul>	<p><b>Reference document (relevant page/section):</b></p> <p>Project Communication Plan.</p>
--	--

11.1.2 Outline your plans for quarterly reporting, including proposed contents covered in the report.

<p><b>Answer:</b></p> <p>The quarterly reporting will provide a project status update for the Redcar Hydrogen Community. The format of this report will be centred around the Evidence Mapping &amp; Collection Against Evidence Framework for the relevant Stages 3-5 of the project, to reflect the stage in which the project is in flight.</p> <p>As we progress through the stages, the report will provide a comprehensive update on stage Evidence Collections for the following areas:</p> <ul style="list-style-type: none"> <li>• Consumer: including consumer attitudes &amp; perception; consumer behaviour; and impact and experience on premises-type and demographic</li> <li>• Safety: Sub section pre-trial safety outputs</li> </ul>	<p><b>Reference document (relevant page/section):</b></p> <p>Project Communication Plan.</p>
--	--

<ul style="list-style-type: none"> <li>• Delivery and learning for town/roll-out: Live trials and design, Maintenance and Repair</li> <li>• Commercial and Regulatory: Commercial; regulatory &amp; billing; training &amp; skills; and risks &amp; mitigations.</li> </ul> <p>The commercial team will provide a financial update based on costs vs. forecast. The report will give an overview of costs against award from both DESNZ and Ofgem.</p> <p>The P6 programme will be shared for visibility; this will incorporate all stages and reflect the changes made to programme as the project progresses.</p> <p>The risk register will form part of the reporting, and will be circulated for transparency. The risk, type, impact, and likelihood – as well as the scoring – will be included as part of the document.</p> <p>As the project moves through the different stages the reporting will reflect the changes in stage gates. This will be especially evident in Stage 4 as the project starts to measure performance.</p> <p>As a minimum, the following areas will be monitored and reported within this stage.</p> <ul style="list-style-type: none"> <li>• Resilience measure identified</li> <li>• Planned interruptions</li> <li>• Unplanned interruption (Non-Major Incident)</li> <li>• Unplanned interruption (Major Incident (&gt;250 homes))</li> <li>• Guaranteed Standards of Service</li> </ul> <p>Overall, the quarterly reporting will act as a form of communication between the project and stakeholders, and will provide them with visibility and clarity on how the trial is progressing.</p>	
---	--

## 11.2 Acceptance of Grant (1000 words)

11.2.1 By submitting this application, you accept that it is your intention to enter into the Grant Funding Agreement as shared alongside this form including any amendments agreed through the clarification period, that your application has been produced on the basis of this acceptance, and that you will not seek alterations to the agreed terms and conditions after submitting your application.

Should there be any conditions or caveats attached to the above acceptance, for example where further clarification or discussion of specific terms is required, please detail these below.

<p><b>Answer:</b></p> <p>We confirm that should our bid for the village trial be successful, then we intend to enter into a Grant Funding Agreement with DESNZ in a form which</p>	<p><b>Reference document</b></p>
--	----------------------------------

incorporates amendments agreed during the clarification period. However, such acceptance is subject to further discussion with DESNZ on the various points as set out in the attached list. This includes a point on which we recently received external legal advice and has yet to be discussed, which does have an effect on the terms of the current draft agreement as a whole.

**(relevant page/section):**

RHC\_GFA  
List.