Department for
Business, Energy
& Industrial Strategy

Hydrogen for heat

Facilitating a ‘grid conversion’ hydrogen heating trial

Closing date: 28 September 2021

August 2021

Any enquiries regarding this publication should be sent to us at:
hydrogenheatingtrials@beis.gov.uk

Foreword

The UK is playing a leading role in the global effort to tackle climate change. From 1990 to 2019 UK emissions fell by 41% - more than any other G7 nation – while the economy grew by 78% and the UK is continuing to demonstrate its global leadership by hosting the COP 26 conference in Glasgow in November. In the past 12 months we have announced we will further strengthen our binding climate change targets and published the Energy White Paper and the Hydrogen Strategy.

Much of our success has come from cutting emissions in our power sector: they fell by two thirds from 2008 to 2019. The progress of decarbonisation in the heating sector to date is much less. Heating in buildings still accounts for around 22% of national carbon emissions, with the vast majority of this fuelled by natural gas. It is important that we establish an ambitious programme of work to enable key strategic decisions on how to achieve the mass transition to low-carbon heat.

Hydrogen is one potential key option for decarbonising heating, alongside other solutions, including heat pumps and heat networks. Hydrogen could replace natural gas in the gas grid and therefore provide a like-for-like alternative for buildings currently heated by natural gas. However, 100% hydrogen for heating is not an established technology and so further work is required to understand the feasibility, costs and benefits ahead of Government making strategic decisions on the role of hydrogen in heat decarbonisation.

The Government is delivering a programme of work to assess the feasibility of 100% hydrogen heating. We are working closely with industry and regulators to support a range of research, development and testing projects. The Prime Minister's Ten Point Plan for a Green Industrial Revolution, published in November 2020, included a commitment to support industry to deliver a large village hydrogen heating trial by 2025. This will be a grid conversion trial, building on the 'neighbourhood trial' due to take place in Levenmouth, Fife in 2023, providing a greater diversity of evidence and filling evidence gaps on the feasibility of repurposing the existing gas grid for hydrogen, including costs, feasibility, and consumer experience.

Trialling hydrogen for heat on a large village scale will be a first-of-a-kind activity globally. Supported by government and regulators, it is a chance for the UK gas, hydrogen and heating industries to demonstrate their expertise and leadership to deliver an important milestone on our roadmap to net zero.

It is critical that these pioneering trials can proceed at pace so we can accurately assess the case for hydrogen heating. This will help us decarbonise heating in a way that is effective, affordable, fair and minimises disruption for consumers.

- Kwasi Kwarteng, Secretary of State for Business, Energy and Industrial Strategy

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General information

Why we are consulting

We are seeking views on our proposal that we need to legislate to enable the gas networks to successfully deliver the village trial. We are also seeking stakeholders' views on whether additional consumer protections are required, and how these should be implemented. This consultation will help us to understand the role that legislation should play in enabling the village trial and protecting consumers.

Consultation details

Issued: 17 August 2021

Respond by: 28 September 2021

Enquiries to:

Hydrogen Heat team, Clean Heat Directorate
Department for Business, Energy and Industrial Strategy
1 Victoria Street
London
SW1H 0ET

Email: hydrogenheatingtrial@beis.gov.uk

Consultation reference: Hydrogen heating trials

Audiences:

Gas distribution network operators and other organisations in the gas value chain (e.g. gas suppliers, appliance manufacturers); consumer rights organisations; regulators; local authorities; housing rights organisations.

Territorial extent:

England, Scotland and Wales. We will continue to work with the devolved administrations as we develop and finalise the proposals.

How to respond

Respond online at: https://beisgovuk.citizenspace.com/heat/hydrogen-heating-trials

or

Email to: hydrogenheatingtrial@beis.gov.uk

Write to:

Hydrogen Heat team, Clean Heat Directorate
Department for Business, Energy and Industrial Strategy
1 Victoria Street
London
SW1H 0ET

When responding, please state whether you are responding as an individual or representing the views of an organisation.

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018 and the Environmental Information Regulations 2004).

If you want the information that you provide to be treated as confidential please tell us, but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable data protection laws. See our privacy policy.

We will summarise all responses and publish this summary on GOV.UK. The summary will include a list of names or organisations that responded, but not people’s personal names, addresses or other contact details.

Quality assurance

This consultation has been carried out in accordance with the government’s consultation principles.

If you have any complaints about the way this consultation has been conducted, please email: beis.bru@beis.gov.uk.

The proposals

Definitions

BEIS: Department for Business, Energy and Industrial Strategy.

GDN: Gas Distribution Network operator. The regulated entities responsible for maintaining the gas distribution network and for setting up, running and concluding the village trial.

Hydrogen: an alternative heating fuel to natural gas which can be produced with a smaller carbon footprint.

Natural gas: the mixture of gases currently in use in the gas network, primarily composed of methane. Natural gas is used to heat the majority of homes and businesses in the UK.

Neighbourhood trial: the ‘H100 Phase 1’ trial being delivered by SGN (the GDN in Scotland) in Levenmouth, Fife to approximately 300 premises, due to start in 2023.The neighbourhood trial will be a dual pipe trial.

Ofgem: The Office of Gas and Electricity Markets. The independent regulator for gas and electricity markets in Great Britain.

Village trial: the hydrogen heating trial committed to in the Ten Point Plan for a Green Industrial Revolution. Government will support industry to begin this trial by 2025 and envisages it being run as a grid conversion trial.

What is the purpose of hydrogen heating trials?

Replacing natural gas with hydrogen in parts or all of the gas grid is one of the few options that could make a major contribution to fully decarbonising heat, alongside heat pumps and heat networks.

However, further work is required to fully assess the feasibility, costs and benefits of transitioning to a hydrogen system. Therefore, Government is supporting an extensive programme of research, development, testing and trialling projects to provide the evidence required. As part of this, the Government’s Ten Point Plan for a Green Industrial Revolution set out the goal of supporting industry to deliver a hydrogen neighbourhood trial by 2023 and a village trial by 2025. Trials will deliver essential evidence on the feasibility, costs, convenience and consumer acceptability of transporting 100% hydrogen safely and securely in the gas grid and using it in occupied buildings for heating and cooking.

The knowledge and experience gained in delivering trials in communities, together with the results of our wider R&D and testing programme, will enable a strategic decision in the mid-2020s over the long-term role of hydrogen for heating.

What will hydrogen heating trials involve and how are they being delivered?

Hydrogen heating trials will involve replacing natural gas supplies with hydrogen in consumers’ premises in the areas involved. Existing in-home appliances and devices such as boilers and meters will need to be replaced with hydrogen-compatible equivalents. Pipework may need to be replaced if it is not already suitable for hydrogen. Additional internal work may also be required to make the property ‘hydrogen-ready’. The existing gas network infrastructure will need to be adapted to transport hydrogen, or new infrastructure built.

The trials will be led by the Gas Distribution Network Operators (GDNs), working in partnership with local authorities, energy companies, organisations and communities. The GDNs own the majority of the gas distribution networks and have the right expertise and knowledge to deliver safe and successful trials.

In any trial of hydrogen heating, safety will be of paramount importance. BEIS and GDNs are working closely with the Health and Safety Executive (HSE), to understand the measures which will be needed to ensure that hydrogen is stored, distributed and used in a safe way. No community trials will happen unless and until all necessary safety assessments have been carried out.

It is vital that the consumers involved are properly informed and supported as trials are developed and implemented. This is discussed further in the section below.

The neighbourhood trial (H100)

In 2020, Ofgem and the Scottish Government provided funding for the neighbourhood trial to a consortium led by SGN (the GDN in Scotland) for the H100 Fife project. It will supply hydrogen to approximately 300 properties and is being run as a dual pipe trial. It is expected to ‘go live’ by 2023.

To run a *dual pipe* trial a SGN will lay new pipes alongside the existing natural gas grid and supply hydrogen to consumers through them. Consumers in the neighbourhood trial area will be given the choice of whether they wish to connect to the new hydrogen supply or remain on the existing natural gas supply. It will generate valuable evidence about the in-home experience of using hydrogen, but less relevant evidence on the process of rolling out hydrogen on a larger scale and converting the existing gas grid.

The village trial

In July this year, BEIS and Ofgem wrote to the GDNs inviting them to come forward with proposals to deliver the village trial. This Letter of Invitation is annexed to this consultation at Annex 1. In December GDNs will submit their initial proposals which BEIS and Ofgem will consider.

The village trial will need to convert a section of the existing gas network infrastructure in a local area to enable repurposing for hydrogen. This will require disconnecting a section of the local gas grid from the natural gas supply, ‘purging’ natural gas from it, and then supplying hydrogen through it to all consumers who want to take part in the village trial. In the village trial, those affected will be switched off from natural gas. However, this does not mean that consumers will be forced to use hydrogen for heat. The GDN will need to ensure fair treatment of all consumers within the trial area, including those who do not want to switch to hydrogen, who will be offered suitable alternatives for heating and cooking during the period of the trial.

The village trial will build on the learnings from H100, extending the scope and learning involved in a number of areas. Any rollout of hydrogen heating will involve converting the existing gas network, at least in part. The village trial will generate essential evidence about how feasible it is to do this, and how this can work best for consumers. It will provide evidence on a wider range of residential and commercial property types, and a larger population of gas consumers.

As hydrogen heating trials, and in particular grid conversion trials, involve novel activity, we have considered whether the existing legal framework needs changing to make sure that trials can generate the evidence needed.

Legal framework for a grid conversion trial

To convert from natural gas to hydrogen for a trial, the GDN and its delivery partners will need to carry out works within homes and businesses. This will include making sure that properties are ready to use hydrogen and moving consumer connections over to hydrogen from the current natural gas supply.

We have analysed whether the existing legal framework adequately provides the necessary powers for these activities. There are currently limited grounds on which GDNs have the right to enter private property, and we have summarised the main ones at Annex 2. We have identified two areas where existing powers under relevant gas legislation does not allow GDNs to conduct necessary activities to set up a trial. However, we expect that GDNs will always aim to reach agreement with occupiers before entering premises unless it is an emergency (as they do currently with homes heated with natural gas). Nevertheless:

- To make premises suitable for heating with hydrogen it is possible that GDNs will need to carry out some additional alterations which are not needed for natural gas. If it turns out that these changes are necessary - for example, ensuring that homes have better ventilation - this would not be covered by the GDNs' existing statutory remit.[1]
- For any consumers who do not wish to participate in the trial, it will be necessary to move their connection away from natural gas supplies safely. We expect that the majority of consumers in the trial area will participate in the grid conversion trial. To secure public funding, the GDN delivering the trial will be required to develop and implement a consumer engagement strategy that includes an attractive consumer offer for participants, as well as viable alternative options for consumers and businesses who do not wish to or cannot participate in the trial. Evidence of community participation and support will also be important in selecting the trial area. However, it is possible that there may be a small number of consumers who will not accept either hydrogen or the alternative offer. In that scenario it is not clear that a GDN would be able to rely on existing powers of entry to disconnect such consumers safely from natural gas.[2] Introducing such powers is necessary to make sure that the trial could be delivered safely and would be provided only as a last resort for the GDN to use. If these consumers were not disconnected, hydrogen would be supplied to their premises through the newly converted pipes without the property being ready for hydrogen, and this would not be safe.

We are therefore proposing that we legislate to give powers to GDNs so that they can confidently and safely set up, run, and conclude a grid conversion trial.

1. **Please list the major activities necessary to set up, run, and conclude a grid conversion trial, to ensure that premises and the gas distribution network are ready to use hydrogen for heating.**

2. **Do you agree with our view that changing existing legislation would help ensure that GDNs can deliver grid conversion trials? Please explain your answer.**

3. **Please list any other amendments to existing legislation which you consider would be necessary to ensure that GDNs could effectively set up, run, and conclude a grid conversion trial.**

[1] Para 16, Schedule 2B, Gas Act 1986.
[2] Para 24, Schedule 2B, Gas Act 1986.

Protecting consumers

It will be vital that consumers in a grid conversion trial area are fairly treated and continue to be protected before, during, and after the trial. Protections for gas consumers are already built into several parts of the regulatory system:

- Consumer protections are incorporated into the licences that Ofgem grants to regulated entities within the gas value chain, such as gas suppliers, shippers, and transporters. For example, requirements are imposed on GDNs under their gas transporter licences when exercising rights of entry in addition to those set out in statute.
- Regulated entities are bound by industry codes such as the Retail Energy Code, Uniform Network Code, Smart Energy Code, Supply Point Administration Agreement, Master Registration Agreement and relevant metering codes of practice, which regulate how consumers are treated.
- Gas transporters are also required to adhere to protections set out in primary and secondary legislation. For example, the Gas (Standards of Performance) Regulations 2005 require GDNs meet a set of minimum standards relating to the service they provide to gas shippers and consumers, or GDNs must otherwise pay compensation. This includes, for example, reinstating gas supply within 24 hours in the event of an unplanned interruption.

However, consumers in a grid conversion trial area will no longer have the option of using natural gas during the period of the trial. Those consumers will need to either switch to hydrogen supplied through the gas distribution network or to an alternative heating solution offered by the GDN. In these circumstances, additional rights and protections may be required to ensure that consumers have a clear choice and are treated fairly. We want to fully explore whether the existing suite of protections is adequate, particularly for any vulnerable consumers and those experiencing fuel poverty.

The GDNs have significant experience of working closely in communities and with consumers to deliver gas projects. They will engage with consumers in the trial area to encourage them to participate in the trial and make provision for those who do not wish to or cannot participate. As part of our selection process for the village trial location, we are requiring all project proposals to include a consumer strategy setting out how they will ensure the fair treatment of all consumers, including those who do not want to switch to hydrogen.

However, we are considering whether to underpin this with legislation that sets out explicit minimum consumer protection requirements for grid conversion trials, going further than existing rules in energy or consumer legislation. This could help give consumers confidence to participate in trials, knowing that their interests are protected in law.

A framework of **consumer protections** for those in the trial area could include ensuring that:

- there is comprehensive and accessible information and guidance on how a grid conversion trial will affect consumers in the trial area, and options for participation, to enable them to make informed decisions;
- no consumers in the trial area are financially disadvantaged as a result of a grid conversion trial taking place;
- participants in the trial are not expected to pay more to use hydrogen than they would for natural gas;
- consumers in the trial area are not expected to pay for the installation and maintenance of hydrogen-capable appliances, or an alternative heating solution (and faulty or inoperative appliances and equipment are promptly repaired or replaced at no cost to the consumer);
- consumers are treated fairly when the trial concludes and transitioned back to using natural gas;
- there is a means of 'consumer redress' if consumers are unhappy about the way that aspects of a grid conversion trial are being conducted, potentially linking to existing Alternative Dispute Resolution provisions or even including the development of a bespoke dispute resolution mechanism;
- there is some form of independent oversight or scrutiny of the lead GDN's conduct during a grid conversion trial (e.g. through Ofgem);
- additional protections and support are provided to consumers during the build phase of grid conversion trial, particularly relating to the length of time consumers may be disconnected from the gas grid;
- the 'alternative offer' to consumers who do not wish to take part in a grid conversion trial should include clear language and information;
- customer information packs will be made available for those who participate, including details of billing arrangements, length of trial and relevant contact information;
- specific additional protections are implemented for vulnerable consumers and those experiencing fuel poverty;
- the principles of the quality of service in the Gas (Standards of Performance) Regulations 2005 will be adhered to.

  We may therefore need to make amendments to the existing regulatory framework, including introducing new legislation to protect consumers.

4. **Which aspects of a grid conversion trial could lead to consumers being treated unfairly or not being protected?**

5. **Which of the consumer protections listed on p.14 are necessary to ensure that energy consumers are protected in a grid conversion trial? Please explain why they are necessary.**

6. **Are there other consumer protections not set out on p.14 which would be necessary to implement? If so, please explain why they are important.**

7. **How should each of the consumer protections you have listed in response to questions 5 and 6 be implemented?**

Legislative proposals

The Government intends to legislate to allow GDNs to effectively carry out the activities needed to deliver a grid conversion hydrogen trial, and potentially to bring in new consumer protections related to the trial.

Our legislative approach will be informed by the responses we receive to this consultation. We are considering options such as taking new legal powers in primary legislation or amending existing primary legislation. Depending on the approach taken, this may be followed by secondary legislation containing a more detailed regulatory framework. If this is the case, we would expect to consult again prior to the introduction of the regulations to engage stakeholders on the details of the policy.

Consultation questions

1. Please list the major activities necessary to set up, run, and conclude a grid conversion trial, to ensure that premises and the gas distribution network are ready to use hydrogen for heating.

2. Do you agree with our view that changing existing legislation would help ensure that GDNs can deliver grid conversion trials? Please explain your answer.

3. Please list any other amendments to existing legislation which you consider would be necessary to ensure that GDNs could effectively set up, run, and conclude a grid conversion trial.

4. Which aspects of a grid conversion trial could lead to consumers being treated unfairly or not being protected?

5. Which of the consumer protections listed on p.14 are necessary to ensure that energy consumers are protected in a grid conversion trial? Please explain why they are necessary.

6. Are there other consumer protections not set out on p.14 which it would be necessary to implement? If so, please explain why they are important.

7. How should each of the consumer protections you have listed in response to questions 5 and 6 be implemented?

Next steps

Responses to this consultation will inform our decision-making on how to draft or amend legislation to facilitate hydrogen heating trials.

We will then publish a Consultation Response and a full impact assessment prior to making any detailed provision in law about trials.

Annex 1: Letter of invitation for proposals

Department for Business, Energy & Industrial Strategy

ofgem
Making a positive difference for energy consumers

Steve Fraser, Cadent
Mark Horsley, NGN
John Morea, SGN
Graham Edwards, WWU

David Capper, BEIS
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21 July 2021

Letter of Invitation for proposals

Decarbonising heat in buildings and industry is essential to delivering net zero. Heating in buildings accounts for around 23% of national carbon emissions[1], with the vast majority of this fuelled by natural gas. As set out in last year's Energy White Paper, the Government believes that low carbon hydrogen may have the potential to offer a strategic option for decarbonising heat in buildings.

Further work is required to ensure the case for hydrogen heating is properly assessed. This includes developing evidence to understand the feasibility, costs and convenience of transporting 100% hydrogen safely in the grid and using hydrogen in occupied buildings for heating and cooking. The Government's recent Ten Point Plan for a Green Industrial Revolution sets out its ambition to support industry to deliver a 100% hydrogen Neighbourhood Trial, and a Village Trial by 2025. In 2020, Ofgem and Scottish Government provided funding for the Neighbourhood Trial to a consortium led by SGN for the H100 Fife project which will convert around 300 properties to hydrogen[2]. The Village Trial will build on the learnings from H100, extending the scope and learning involved in a range of key areas. For example, the Village Trial will need to trial the conversion of existing gas network infrastructure in the local area, repurposing it for 100% hydrogen. It will also need to include a substantially larger number and wider range of consumers and building types.

Both trials will support the building of the evidence base needed for Government to decide whether to promote hydrogen transported through the existing gas network infrastructure to decarbonise heat and buildings.

BEIS and Ofgem are working together to provide a framework to support the development and delivery of the Village Trial. The purpose of this letter is to invite Gas Distribution Network companies (GDNs) to prepare 'Outline Designs' for the Village Trial. The letter and annexes provide guidance to inform the development of

[1] Internal BEIS analysis for the Heat and Buildings Strategy (2021).
[2] https://www.ofgem.gov.uk/publications/amended-project-direction-h100-fife-sgn

GDN applications, expected in December 2021, for funding to support the subsequent 'Detailed Design' phase. The guidance and annexes below describe the objectives and benefits we are seeking to achieve through supporting such a trial, and the anticipated funding arrangements and processes for the early stages of this work.

The GDNs will need to take responsibility for designing and developing trial project proposals and forming successful partnerships with local authorities, energy companies, organisations and communities which will be essential to enable any project to go ahead. In their Outline Designs, GDNs will need to include clear evidence of their early engagement with stakeholders in the relevant local areas, how they are responding to initial feedback, and their plans for consultation and engagement in developing the proposals.

Government, regulators and industry all have key roles to play in delivering the information and analysis required to enable the Government to make policy decisions on the strategic role of hydrogen. We think that the Village Trial is an exciting opportunity to lead the world in investigating a major potential option for combatting climate change and we look forward to working closely with you as you develop your proposals.

We are copying this letter for information to John Trounson at the Independent Network Association.

David Capper
Director - Clean Heat
Department for Business, Energy & Industrial Strategy (BEIS)

Akshay Kaul
Director - Networks
Office of Gas and Electricity Markets (Ofgem)

HYDROGEN HEATING VILLAGE TRIAL: OUTLINE AND DETAILED DESIGNS – GUIDANCE FOR GDNs

1. This document provides guidance to GDNs seeking to submit Outline Designs for a village-scale trial of hydrogen heating. BEIS and Ofgem expect to support the development of the Village Trial through a series of stages, with staged decisions on whether to provide funding for further work. These are summarised in Table 1.

Table 1: Village Trial stages

Stages	**Description**
1. Outline Design	Initial outline designs, feasibility studies and planning.
2. Detailed Design	Development of detailed plans to enable a go/no-go decision on whether to proceed with the procurement and engineering work required for a particular trial location and design, and investment decisions associated with this.
3. Prepare and Build	By the end of stage 3, project developers will need to demonstrate that they are ready to begin installation in consumer properties and the conversion to hydrogen.
4. Go-live and Operate	Activities will include installation in consumer properties, conversion, system implementation (eg settlement/billing), operation of the trial, evidence collection and benefits realisation.
5. Trial exit	Activities will include either planning for the continuation of the project or decommissioning all necessary system engineering work and property installations, and data gathering and evidence analysis.

2. This document sets out the objectives and principles across all stages, and funding arrangements for stages 1 and 2.
    - Annex A sets out the completion requirements expected from Outline Design stage 1 which will need to be met to apply for stage 2 funding.
    - Annex B describes indicative requirements to apply for stage 3 and 4 funding. Funding arrangements for stages 3 – 5 will be set out at a later date.

3. Outline Design submissions at the end of stage 1 will be used as applications for funding to carry out more Detailed Design work in stage 2. The deadline for receiving applications for funding to support stage 2 is 17 December 2021.

4. The final timetable for Detailed Design and subsequent project development stages will be confirmed at a later date and be informed by the plans proposed by the GDNs in their Outline Design applications for stage 2. However, as an indication, our current expectation is that applications for stage 3 will be required by Q2 2023. The trial must be operational no later than mid-2025, however we encourage GDNs to consider all opportunities for commencing trialling earlier than this.

<u>Overall Objectives and Purpose</u>

5. The Village Trial is intended to provide a range of evidence which will support Government to assess the feasibility, costs and benefits of a possible transition to hydrogen for heat, enabling a policy decision on whether or not gas networks will

be converted, at scale, for use of hydrogen in occupied buildings. The Village Trial will also have key demonstration benefits to the wider public and decision makers.

7. The Village Trial is expected to build on the lessons learned and evidence obtained from the Neighbourhood Trial, H100, led by SGN. It will provide new evidence due to its larger scale, a more diverse and representative population of gas consumers, and because it will adapt and use existing gas network infrastructure to transport hydrogen.

6. We have not specified the number of properties needed for the trial. However, our expectation is that between 1,000 and 2,000 meter points may be appropriate to generate evidence of rollout methods and conversion processes, and to produce representative findings from a diverse range of participants and building types. However, we are open to proposals for smaller or larger numbers of properties if GDNs can demonstrate this is a robust and cost-effective sample size. It is also anticipated that the trial should be operational for a minimum of 12 months.

7. Trials in local communities on this scale will be complex projects and the precise range of benefits available may depend to some extent on the specific characteristics of the local area and consumer base. We therefore recognise that the overall value of project proposals will need to be assessed in the round and that different projects may deliver different benefits and be stronger in certain areas relative to others.

8. However, to achieve the overall objectives of the Village Trial, it must produce evidence and learnings in the following areas:
    - the extent to which the existing gas network across Great Britain can be repurposed for and operated with 100% hydrogen[3];
    - the extent and practicability of any additional network design and installation requirements, and corresponding maintenance and repair regimes;
    - representative findings on the experiences, attitudes and behaviours of a diverse range of trial participants and building types during the conversion process, and of using hydrogen for heating and cooking when the trial is operational;
    - consumer acceptability of hydrogen and ways to improve consumer experience, including minimising disruption and inconvenience;
    - costs and practical requirements involved in preparatory activities, conversion and rollout methods and processes, in relation to a diverse and widely representative range of end users[4] and property types, including the costs and practicability of any safety mitigations in a real-world setting;
    - how different seasons and weather might impact the conversion process, operation of a hydrogen network, and impact a range of applications using hydrogen for cooking and heating buildings.

[3] NI is not part of the GB-wide gas grid, which is shared by England, Wales and mainland Scotland. NI gas distribution operates under a separate legal framework with different energy market considerations and is and is out of scope for this programme of work.
[4] While the Village Trial should primarily focus on trialling conversion of gas networks supplying occupied buildings with hydrogen, there may be benefits of integrating or coordinating it with projects funded by other sources that demonstrate use of hydrogen to decarbonise transport or industrial end-uses.

General eligibility principles

9. To qualify for support, all projects will need:
    - a plan for a grid-conversion hydrogen heating trial within England, Scotland or Wales;
    - a licensed GDN to lead the project, taking overall responsibility for its planning and delivery and for achievement of the overall outcomes;
    - a consumer strategy to ensure that all occupiers in the trial locality will be treated fairly. Because the existing gas network in the chosen trial area will be converted to transport hydrogen, all consumers in the chosen village will be switched off from natural gas, but this does not mean that they should be forced to use hydrogen for heat. The consumer strategy should set out how the GDN will ensure the fair treatment of all consumers, including those who do not want to switch to hydrogen, including by offering suitable alternatives for heating and cooking during the period of the trial.

10. To enhance value for money, we expect the GDNs to work together to avoid unnecessary duplication of work across separate projects, and collaborate where possible on areas of common interest, such as on risk assessments. This should help to minimise costs, manage overall delivery risks, and facilitate a diverse and robust evidence base.

11. We expect part of the trial to be funded through private sector investment. GDNs should consider what funding contributions they and /or their project partners can make as part of their applications for funding.

Stage 1: Outline Design

12. Outline Designs should be prepared in line with BEIS and Ofgem's purpose and overall objectives in seeking to support the design, development and delivery of village-scale hydrogen heating trials.

13. GDNs can begin Outline Design stage 1 work now and prepare applications for stage 2 funding. We anticipate that most of the work will be funded through the RIIO-2 Net Zero and Re-opener Development Allowance[5]. Elements of the work that are unique and novel could also be taken forward under the Network Innovation Allowance (NIA)[6]. The use of both allowances is subject to the requirements set out in the licence and governance documents directed by Ofgem. These mechanisms are both use-it-or-lose-it allowances and are designed to quickly support net zero project development, small scale innovation projects and early-stage R&D. Under both mechanisms, we expect GDNs to share knowledge created during the Outline Design stage 1 widely.

14. During stage 1, we would like GDNs to develop initial Outline Designs so that the case for funding for stage 2 can be considered. GDNs may produce Outline Design proposals for different potential trial locations, in which case we expect GDNs to

[5] The NZARD Use-it-or-lose-it allowance (UIOLI) Guidance document sets out the detailed arrangements for this allowance. Network Licensees are required to comply with this governance document in accordance with Special Condition 3.5 in the Gas Transporter Licence.
[6] The Network Innovation Allowance (NIA) Governance document sets out the regulation, governance and administration for this allowance. Network Licensees are required to comply with this governance document in accordance with Special Condition 5.2 of the Gas Transporter Licence.

ensure these proposals are diverse in terms of risk profile and / or with respect to the evidence the different trial locations would produce.

15. Regular engagement between GDNs, BEIS and Ofgem during stage 1 will be established to help ensure that:
    - stage 1 work is progressing to plan and to highlight any key learnings or future challenges;
    - potential applications for stage 2 funding are shaped in a way to deliver value for money and to best meet the overall objectives of the Village Trial set out here and in the Trials Evidence Framework v3 June 2021[7];
    - any regulatory and legislative structures can be put in place to enable the trial;
    - the funding mechanism(s), and associated processes, for future trial stages are clear.

Stage 2: Detailed Design

16. Stage 2 will investigate the feasibility for the Village Trial in detail and result in the development of detailed plans for potential implementation. More than one project may be supported with funding for stage 2 if the benefits of doing so are evident.

Funding

17. We anticipate that funding for stage 2 will primarily be provided by Ofgem under the RIIO-2 Net Zero Pre-construction Work and Small Net Zero Projects Re-opener (NZASP).[8] Ofgem will, during stage 1, seek to confirm the appropriate RIIO-2 mechanism and trigger the re-opener in advance of accepting stage 2 funding applications in December 2021.

18. RIIO-2 could fund elements of detailed design work beyond the gas network where these are ancillary, and where there are clear network benefits to be obtained from the work. It is not expected that RIIO funding will be used for significant design feasibility work associated with hydrogen production. Moreover, we anticipate the requirements for capital expenditure for the procurement of new physical assets will be determined in assessments of applications for stage 3 funding. If GDNs' project planning indicates specific expenditure commitments of this type may be required in advance of this point, or that spending is required beyond the scope of RIIO-2, GDNs should identify these requirements and discuss with BEIS and Ofgem as early as practicable, to enable consideration of options and timing issues.

Decision Making

19. The applications for stage 2 funding must include the information outlined in Annex A. Once applications are submitted, BEIS and Ofgem will review project proposals and may propose amendments as appropriate to enhance the overall value for money the projects expect to achieve.

[7] The Trials Evidence Framework v3 June 2021 was shared with the GDNs on Wednesday, 7 July 2021.
[8] The NZASP Governance Document sets out the sets out the arrangements for gas transmission and gas distribution network companies to use this re-opener. Network Licensees are required to comply with this governance document in accordance with Special Condition 3.9 of the Gas Transporter Licence.

20. The organisation responsible for administering the relevant funding mechanisms will take the relevant funding decision(s). Conditions may also be attached to the funding which will be discussed with project developers and relevant stakeholders.

21. Considerations relevant to assessing the overall value for money may include (but will not be limited to):
    - costs to consumers and / or taxpayers (including the funding contributions GDN shareholders and third-party partners are proposing to make);
    - the range and quality of relevant evidence and other benefits which the proposal could deliver;
    - delivery risks in relation to achievement of the objectives of the project and the latest date required for the start of operations for the trial, including the strength of the plan and risk management strategies;
    - evidence of appropriate engagement with local stakeholders in developing the outline design, and plans for future engagement;
    - the offer for trial participants/local communities;
    - and environmental impacts of the trial project.

ANNEX A: OUTLINE DESIGN - REQUIREMENTS FOR STAGE 2 FUNDING APPLICATIONS

At the end of stage 1, project developers should submit evidence which includes the following information (unless exceptions or amendments have been made by prior agreement with BEIS and Ofgem). Subject to Ofgem triggering the NZASP re-opener, Ofgem will assess the outline design submissions as applications for the NZASP re-opener and this evidence must be compliant with the NZASP governance[9] directed by Ofgem.

i. Trial project summary, including:
   - the population and geographical coverage of the potential trial location;
   - the number and range of gas consumers in the trial area, and coverage of consumers and building types within the trial;
   - the broad strategy for hydrogen supply, new infrastructure and network conversion.

ii. Plan, timetable and scope of work for subsequent stages, including:
   - a full plan for the Detailed Design stage;
   - a high-level plan and schedule for all other stages of the trial as set out in Annex B, identifying the scope of work, deliverables and milestones for each stage.

iii. Outline evidence/benefits plan, including:
   - a description of the different types of evidence expected to be generated by the proposed trial, with reference to the Trials Evidence Framework being developed by BEIS;
   - an assessment of the quality and comprehensiveness of evidence the trial project would provide against each evidence type, including an assessment of the nature of any substantial evidence gaps expected to remain after the completion of the trial (eg materially different building types);
   - an explanation of how the scope and design of the trial will enable these benefits;
   - when the benefits would be realised, eg identifying benefits at each subsequent stage of design, preparation and operation.

iv. Cost estimates, for the full lifetime and the full costs of the trial project, including:
   - the expected costs and profile of expenditure over the full lifetime of the project broken down by appropriate expenditure items/headings, identifying material estimating risks, uncertainties and ranges;
   - funding contributions that the GDN and project partners expect to provide; and
   - firm cost estimates and a statement of the GDN's funding requirements for the Detailed Design stage.

v. Organisation of responsibilities and liabilities, including:
   - a description of the proposed organisational, funding and legal arrangements with project delivery partners, and suppliers, describing their respective responsibilities and liabilities, including for procurement,

[9] NZASP Governance Document

ownership and delivery of assets and services and associated liabilities.

vi. Safety Case Development Strategy, including a description of:
- the planned technical approach to modelling/quantifying/assessing risks and mitigations;
- the scope of activities which the GDN plans to include in its assessment of risks;
- the main potential hazards which the GDN anticipates its risk assessment will need to encompass;
- the GDN's approach to building on existing safety projects and working with others to build our collective understanding of hydrogen safety;
- the GDN's plan for delivering the necessary risk assessment work including securing the necessary technical expertise and resources; and
- set out the GDN's plans to meet the requirements of the relevant health and safety regulatory framework.

vii. Regulatory plan, including:
- a summary of regulatory frameworks potentially impacting on the design, feasibility or timeline of the project (eg. GDN licence conditions, planning regulations, environmental requirements);
- an outline timetable of regulatory compliance activities and milestones anticipated by the GDN;
- a description of any regulatory barriers in relation to which the GDN is planning to seek some form of exemption/derogation/easement/special permission etc.

viii. A statement of the options identified for meeting requirements for hydrogen supply and resilience, including:
- identification of reliable and resilient hydrogen supply solution(s) for the proposed trial site. This should also include an assessment of the viability and cost of using a low carbon hydrogen supply; and
- evidence of support from any third parties who would be partners on the project and responsible for delivering hydrogen production.

ix. A statement of infrastructure requirements, including:
- a description of any new infrastructure construction or existing infrastructure adaptation required to deliver the project;
- an outline strategy and timeline for the design, procurement, construction and/or adaptation of infrastructure required.

x. Public engagement evidence:
- evidence of positive engagement with local partners, local representative authorities and/or consumer groups, including stakeholders that support consumers with additional needs and consumers in vulnerable situations, and a summary of feedback received.

xi. Public engagement strategy, including:
- the plan for extending engagement and consultation with communities, local authorities, and representative organisations in the Detailed Design stage. This should include the objectives and success criteria for each stage of the strategy/plan, as well as planned methods of communication/engagement.

xii. Proposals for a consumer strategy, ensuring fair treatment for all gas consumers in the trial locality, including:
- a strategy for establishing all consumers' requirements;
- the consumer "offer", including proposed options for consumers/businesses who do not wish to or cannot participate, and how these could be funded;
- an assessment of risks and planned approaches in relation to consumers in vulnerable situations;
- outline billing solutions: the approach to billing arrangements for the duration of the trial.

xiii. Supply chain strategy, including:
- an assessment of the required range and volume of appliances, ancillary devices (eg meters), and any other necessary installations;
- evidence of support from third parties who would be partners on the project to supply these elements; and
- analysis of any further new technology/product development work required, and associated risks.

xiv. Workforce capability, skills and training plan:
- identification of the workforce and training requirements needed to successfully deliver the proposed trial, and a plan to show how these needs would be met (eg recruitment, certifications, competency assessments).

xv. Exit plan:
- outline plans for two possible scenarios:
    1. the continuation of the project;
    2. ending the project within 1-3 years of trial commencement and the reinstatement of natural gas supplies.
- This should include the necessary infrastructure works, an outline strategy for treatment/status of consumer appliances and installations, and associated costs.

xvi. Risk Register:
- the project risk register with associated mitigation measures to manage risk.

ANNEX B: INDICATIVE REQUIREMENTS FOR FUNDING APPLICATIONS FOR FUTURE TRIAL STAGES

Future Trial Stages		Indicative Outline Completion Requirements
Stage 2	Detailed Design	Work in this stage will develop funding applications for stage 3: Build & Prepare. These applications will enable a go/no-go decision on whether to proceed with the procurement and engineering work required for a particular trial location and design, and investment decisions associated with this. To that end, completion requirements will include a full evidence/benefits plan, a robust spending profile and a detailed implementation timetable for delivery of a live trial (including identification of further stage gates and a detailed exit or continuation plan). Applications will need to evidence a readiness to begin the building and preparation work required in stage 3, with network solutions defined, partnerships with third parties agreed, commercial contracts and regulatory approvals ready to be finalised, and workforce training programmes provided for. At this stage, applications will need to summarise the conclusions of the safety and risk assessment work so far and the key risk reduction measures to be deployed in the trial. They should also outline the full scope of site-specific safety documentation to be developed, as agreed with the Health and Safety Executive. Applications should also demonstrate how the outcomes of all public and consumer engagement, including a survey of individual consumers and visits to premises/properties, have been taken into account and used to inform all aspects of the trial which will impact home owners, residents and other occupiers within the trial region. Consumer solutions and corresponding agreements should be ready to be put in place, including a detailed billing strategy (that covers also balancing and settlement).
Stage 3	Build & Prepare	By the end of stage 3, project developers will need to demonstrate that they are ready to begin installation in consumer properties and the conversion to hydrogen. Evidence of this will include: • Completed procurement processes and the necessary assets and supply chains in place • Consumer agreements in place • Operational readiness gateways passed • System construction • System commissioning ready for/ahead of go-live
Stage 4	Go-live/ Operate	Activities in the go-live stage will include installation in consumer properties, conversion, system implementation (eg settlement/ billing), operation of the trial, evidence collection and benefits realisation.
Stage 5	Exit	Stage 5 will include data gathering and evidence analysis and either preparing for the continuation of the project or decommissioning all necessary system engineering work and property installations.

Annex 2

Existing rights of entry

1. **Entry during continuance of supply (Paragraph 23 of Schedule 2B to the Gas Act 1986)**

   An officer authorised by a GDN may enter a consumer's premises for specified purposes including:

   inspecting gas fittings;

   ascertaining the quantity of gas conveyed to the relevant premises;

   keeping meters in proper order (including removing, inspecting, re-installing or fixing substitute meters);

   to maintain, repair or renew service pipes; to alter, adjust or replace the burners in appliances;

   disconnecting, removing, testing and replacing appliances used for compressing gases to less than atmospheric pressure;

   inspecting premises to ascertain whether compressed gas or compressors are being used on a premises.

1. **Entry on discontinuance of supply (Paragraph 24** of **Schedule 2B** to **the Gas Act 1986)**

   Circumstances where a GDN may disconnect, cut off or discontinue supply of gas to any premises and remove any meter or gas fitting include where**:**

   the person occupying premises supplied by gas ceases to require a supply of gas; or

   a person entering into occupation of a property previously supplied with gas does not take a supply of gas.

2. **Entry following discontinuation of supply (Paragraph 25** of **Schedule 2B** to **the Gas Act 1986)**

   Where a consumer's premises have been disconnected by a GDN, the GDN may enter the premises to ascertain whether the connection has been restored or reconnected without relevant consents.

3. **Entry for removing fittings and matters (Paragraph 26 of Schedule 2B to the Gas Act 1986)**

Where a person occupying premises supplied with gas through a meter or other gas fitting owned by a gas transporter or gas supplier ceases to take a supply through that meter or

fitting, any officer authorised by the gas transporter may enter the premises for the purpose of removing the meter or other gas fitting.

4. **Entry for replacing, repairing or altering pipes (Paragraph 27 of Schedule 2B to the Gas Act 1986**

Any officer authorised by a GDN may enter premises for the purposes of replacing, repairing or altering pipes.

5. **Escapes of Gas (Paragraph 4 of the Gas Safety (Rights of Entry) Regulations 1996)**

Where a GDN has reasonable cause to suspect that gas is escaping or may escape in any premises or that gas which has escaped has entered or may enter premises, an authorised officer may enter the premises to carry out work necessary to prevent the escape or any other steps necessary to avert danger to life or property.

6. **Inspection, testing, disconnection, etc. of service pipes/gas fittings (Paragraph 5 of the Gas Safety (Rights of Entry) Regulations 1996)**

An officer authorised by a GDN may:

enter any premises where a service pipe is connected with a gas main to inspect any gas fitting, any flue or means of ventilation used in connection with any such gas fitting, or any part of the gas system which is on the premises and is used for the conveyance or supply of gas or is connected with a gas main; and

where the officer so enters any such premises, examine or apply any test to any such object as is mentioned above (and where the object is a gas fitting) verify what supply of air is available for it; and

where the officer believes it is necessary to do so to avert danger to life or property and notwithstanding any contract previously existing disconnect and seal off any gas fitting or any part of the gas system on the premises or disconnect the premises or refuse gas to be conveyed to the premises.

This consultation is available from: www.gov.uk/government/consultations/hydrogen-for-heat-facilitating-a-grid-conversion-hydrogen-heating-trial

If you need a version of this document in a more accessible format, please email enquiries@beis.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.