



**GAS GOES
GREEN**

Our Zero Carbon
Commitment

DELIVERING THE
PATHWAY TO
NET ZERO

Our Zero Carbon Commitment

“Let’s decarbonise our homes and businesses in a way that **works with people’s needs**, not against them. Only a zero carbon gas grid can do that.”

Our Zero Carbon Commitment sets out the £900m of investment that Britain’s gas network companies propose delivering between 2021 and 2026, to lay the foundations for the world’s first zero carbon gas grid. It also sets out how we will reduce emissions from day to day business operations and gas shrinkage.

Britain’s gas network allows us all to reliably access our energy quickly and easily, often when we need it the most. It guarantees our comfort in our homes whilst providing the lifeblood that our businesses need to grow.

Tackling climate change means we need to decarbonise the gas that plays a critical role in our everyday lives.

We need to take action that is based on pragmatic and realistic solutions. Creating the world’s first zero carbon gas grid means creating a platform that is based on a system that is tried, tested and trusted, on which a whole range of different technologies can be delivered.

Our Zero Carbon Commitment

“Time is running out – we need to take **action this day**. Let’s make the decisions necessary to build on the foundations of our world-leading energy system.”

Reducing carbon emissions from heat and transport is a highly complex area. Not only is there a direct impact on people’s lives, but most of the technologies that are needed are new and how they fit in with the wider energy system needs to be tested.

The price control that is responsible for regulating Britain’s gas energy network investment between 2021 and 2026, RII0-2, has an important, strategic role to play because it will determine how much network companies will be able to invest in trialing and integrating the technology options needed for decarbonisation.

The decisions the energy regulator, Ofgem, makes on RII0-2 and for the period beyond will have a major impact on the progress the UK makes in this area.

Britain’s gas network companies are committed to making progress even where there is uncertainty over future policy or technology developments. This is our Zero Carbon Commitment to that progress, for the period from 2021 to 2026, setting out the investment we want to deliver and the role that we want to play.

Our Zero Carbon Commitment

“The solutions to tackling climate change are **as much local as they are national**. We have to take the opportunity to help rebalance our economy. Let’s take that opportunity.”

Through the decarbonisation of our heat and transportation, we have to take the opportunity to help rebalance our economy.

The challenges of that decarbonisation are deeply interconnected and interdependent. That is why an approach that is based on the different parts of our energy system working more closely together in a more integrated fashion, will mean the potential economic benefits of those solutions can be spread far and wide.

A decarbonised gas grid will allow households, businesses, communities to choose those technologies best suited to their needs, keeping disruption and costs as low as possible

If supported with policy and investment, the reach of Britain’s extensive gas networks will mean that creating the world’s first zero carbon gas grid will help drive the rebalancing of the UK economy, leveraging regional industrial infrastructures, skills and networks to deliver economic benefits in towns, villages and communities across the country.

Our Zero Carbon Commitment

“Regulatory mechanisms need to evolve to reflect the pace of delivery required. This includes ensuring that key strategic projects can be delivered **if policy direction is given.**”

Our Commitment summarises the planned and proposed network innovation projects that will provide the evidence and learning required to deliver emissions reductions and an accelerated decarbonisation to create a world leading net zero gas network.

Activity is necessary across four areas. These are:

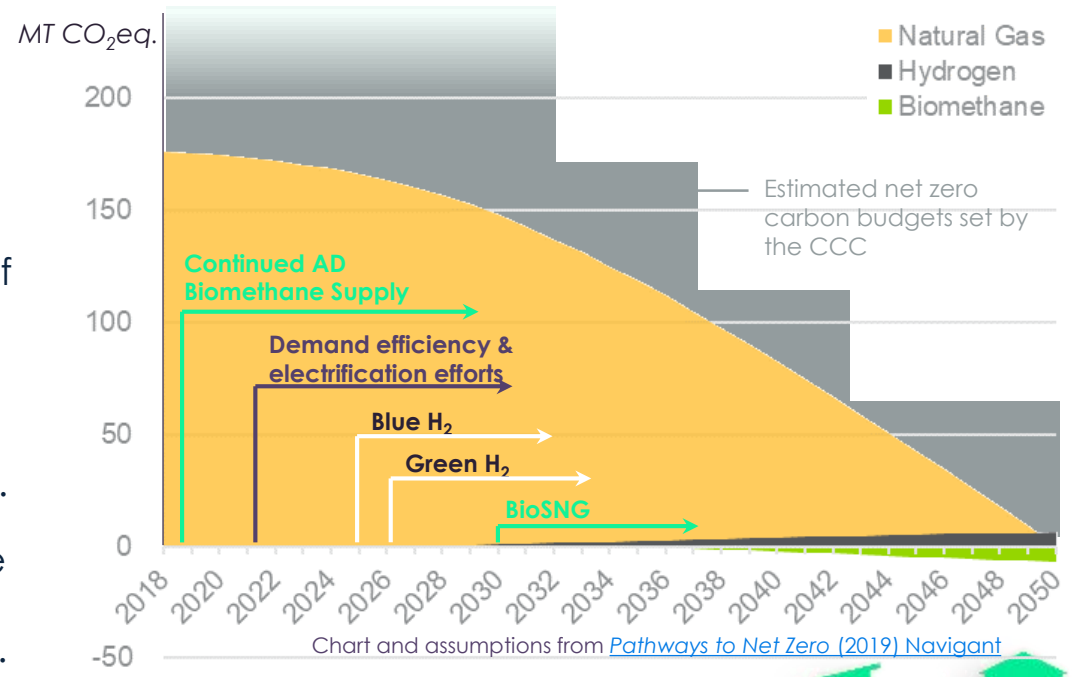
1. **New hydrogen networks** - developing the infrastructure needed for the industrial use of hydrogen, as well as the world's first 100% hydrogen domestic consumer pilot.
2. **Hydrogen blends** – to blend an increasing amount of hydrogen with the natural gas currently used in our gas networks, to gradually replace it.
3. **Repurposing the network for hydrogen** – ensuring that both the existing gas network and appliances are ready for the use of hydrogen.
4. **Cross-cutting projects** – projects where investment will deliver the wider changes needed for decarbonising our gas system.



Our pathway to net zero

- Natural gas plays a central role in the UK energy system today, but it is also a significant source of greenhouse gas emissions
- During the coming years, emissions will reduce, with gas network companies driving the transportation and distribution of hydrogen and biomethane.
- According to the scenario set out in the Pathways to Net Zero report, emissions will reduce by 9 MtCO₂eq by the end of RIIO-2.
- This saving is primarily delivered through the Iron Mains Risk Reduction Programme and from increased biomethane in the network.

Gas-related CO₂ emissions along the pathway to net zero (for buildings, industry, transport and power)





Investing to innovate

“Innovation projects allow us to understand **how to integrate new technologies and practices** into our energy networks.”

Since 2008, through key funding mechanisms such the Network Innovation Competition and Network Innovation Allowance, gas network companies have invested £265 million in innovation activities.

We want to increase this investment and accelerate our climate change ambition.

These are our plans to do so, across the four areas outlined.

RIO-2 Funding Proposals	NIA (£m)	NIC (£m)	Reopener (£m)	Total (£m)
New hydrogen networks	9	14	423	446
Hydrogen blending	2.75	15.5	25	44
Repurposing the network for hydrogen	27.9	62	60	150
Cross-cutting projects	35	16	213	264
Total	75	108	721	904



Structuring our investment

“This investment will help create a **platform based on a system that is tried, tested and trusted**, on which a whole range of different decarbonised technologies can be delivered.”

The £904m of investment that gas network companies are seeking approval for from the regulator is split into three types. These are:

1. **Reopener** investment that is agreed in principle with the regulator at the beginning of the price control and then confirmed once certain agreed pre-conditions have been met, in-line with the timeframes as set out.
2. **Network Innovation Competition (NIC)** funding is that allocated to an annual competition run by Ofgem where gas network companies to compete for higher-levels of funding for the development and demonstration of new technologies, operating and commercial arrangements.
3. **Network Innovation Allowance (NIA)** funding is that allocated to smaller projects directly related to gas networks.

Investing to innovate

“The investment we seek will allow for **an accelerated decarbonisation** across the UK economy.”

Our proposed investment will make significant progress towards meeting Ofgem's Decarbonisation Action Plan and achieving government policy.

The investment should be seen in the context of delivering net zero. Our asks here form part of the pathway set out in 'Pathways to Net Zero' report, where from the current annual system cost of c. £18bn (0.6% of GDP, 2019/20) net zero is achieved across buildings, transport, industry and power at a cost of c. 1.3% of GDP in 2050.

This is well within the Committee on Climate Change's estimate of a 2% GDP cost to deliver net zero across the whole economy.

The balanced energy system scenario set out in the Pathways to Net Zero report, which combines hydrogen and biomethane with electrification, energy efficiency and CCUS, could save around £13bn a year compared to a pathway that relies on electricity alone.

Developing our Commitment

“Gas networks undertook extensive engagement to develop the detail of our Commitment. **These projects are shaped by that input.**”

In 2018-19, the independent market research group Accent undertook surveys and a workshop to help us understand national stakeholder priorities.

Our stakeholders “emphasised the need for urgency in putting the stepping stones in place to reach decarbonisation targets” and “wanted to see more collaboration between networks... in relation to innovation”. Accent also concluded that participants “called for a continuation of options testing to provide the evidence on which subsequent network decisions will be taken.”

These plans reflect those priorities, alongside extensive engagement from gas network company engagement with their customers and in their own regions, including through their independent User and Customer Engagement Groups.

You can find out more:

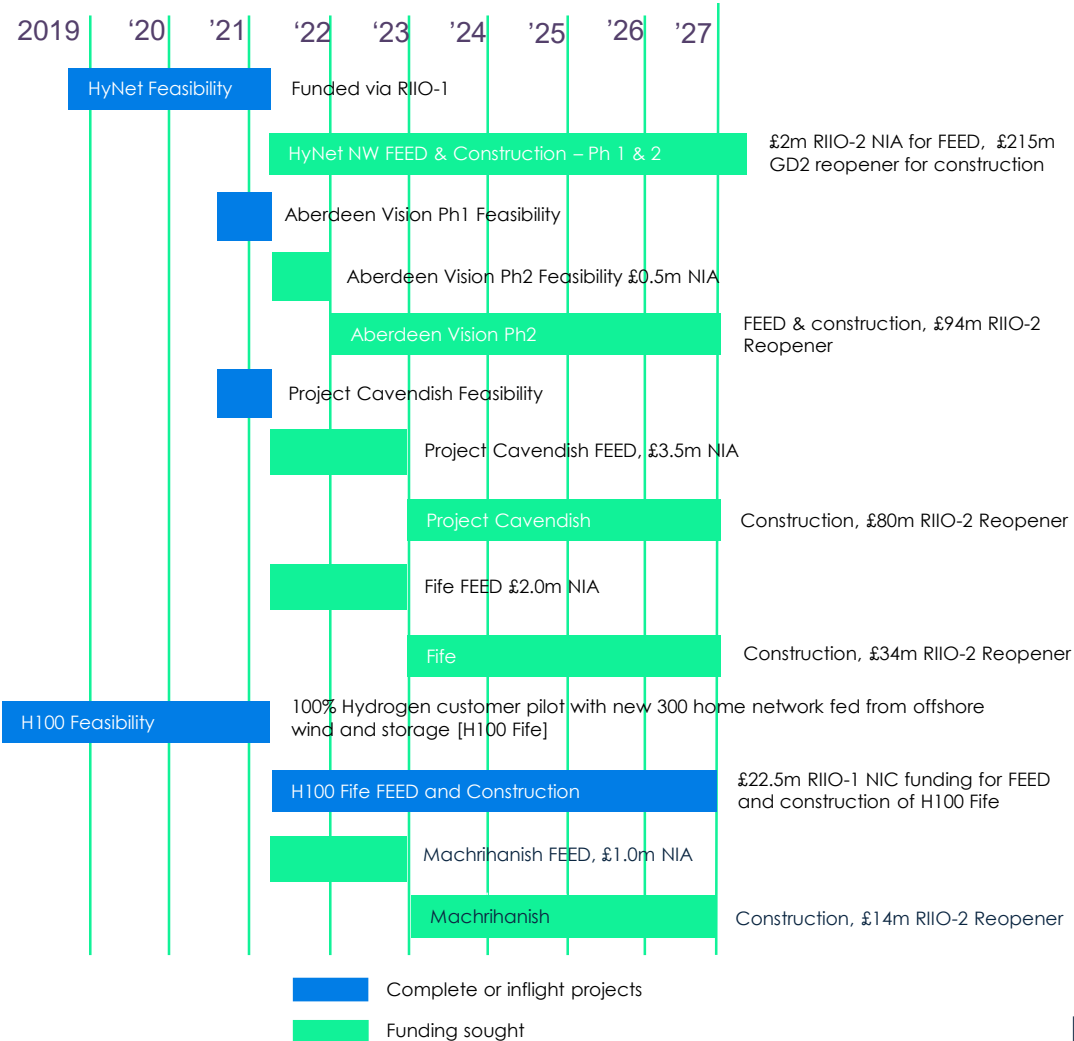
<https://www.energynetworks.org/gas/futures/gas-networks-joint-stakeholder-engagement.html>

Our plans for investment





New networks for hydrogen



New hydrogen infrastructure associated with industrial clusters

- RIIO-2 investment is driven by regional industrial and carbon capture & utilisation (CCUS) clusters
- BEIS funding has supported pre front-end engineering and design (FEED) and FEED for production and storage.
- Funding required for the design and construction of new bulk hydrogen pipelines.
- Investment to connect production and sources of demand, providing hydrogen to industry, power, transport and into the existing network Initially as a blend and then allowing transitioning to 100% hydrogen.
- BEIS Industrial Decarbonisation Challenge match-funding leveraged for FEED reducing gas consumer contribution.
- GNO's have proposed to fund remaining FEED costs via NIA c £8m.
- Construction costs are subject to be a 'reopener' contingent on a regional cluster passing Final Investment Decision.

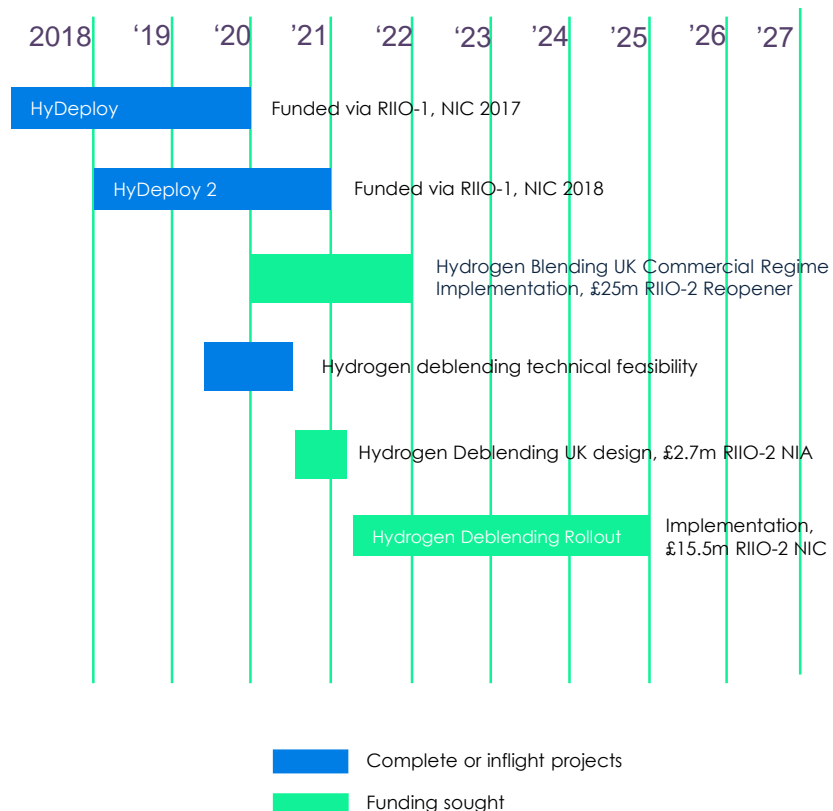
The first 100% hydrogen domestic consumer pilot

- The H100 project in Fife will be a new purpose built 100% hydrogen distribution network to 300 consumers.
- Utilising appliances developed by the BEIS Hy4Heat programme.
- Also integrates green hydrogen and storage.
- Scottish Government funding obtained £2.5m.
- Remainder will be funded via the 2020 RIIO-1 NIC allowance.

RIIO-2 Funding Proposal	Expenditure £m
NIA	9
NIC	14
Reopener	423
Total	446



Hydrogen blending



Roll out of Hydrogen Blending Commercial Regime

- Ofgem funding during RIIO-1 has delivered the technical evidence to enable blending across the UK.
- Either into the distribution or transmission networks.
- RIIO-2 funding is required to develop and implement a commercial regime for roll out.
- A market for blending in the network will stimulate and scale hydrogen production market.
- A regime is the first step in the necessary reforms to the gas market.
- Implementation costs are contingent on the timing of Government policy decisions and the type of revenue support mechanism underpinning this.
- Therefore have been included as a reopener in RIIO-2 submissions.

Deblending technical development and implementation

- Having hydrogen blended into the existing gas networks offers the opportunity via deblending to provide 100% hydrogen for various

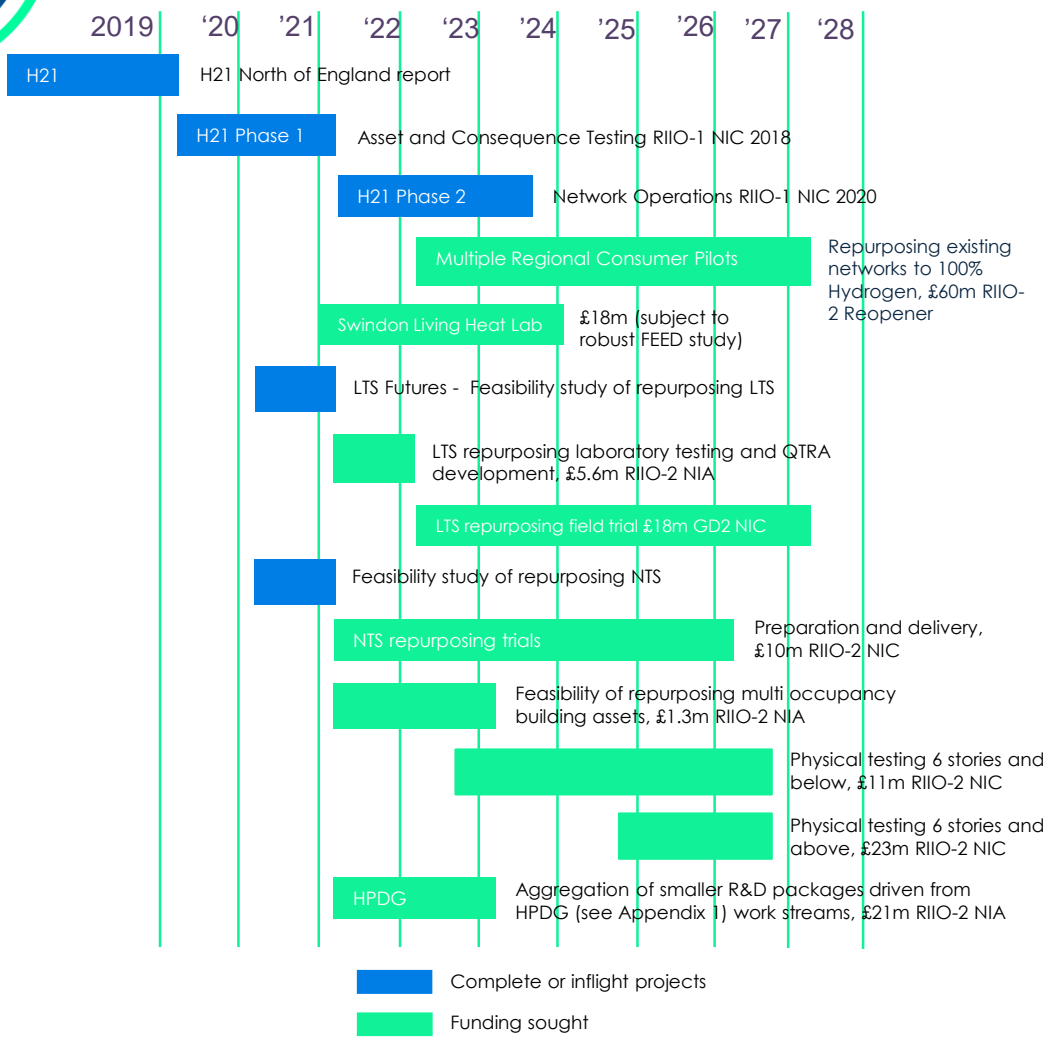
applications.

- The technical feasibility has successfully been investigated during RIIO-1.
- GNO's have included funding via NIA and NIC to first design a UK roll out and then construct a subsequent pilot project.

RIIO-2 Funding Proposal	Expenditure £m
NIA	2.75
NIC	15.5
Reopener	25
Total	43.25



Repurposing the network for hydrogen



Consumer pilots with repurposed networks

- Ofgem funding during RIIO-1 has delivered the technical evidence to enable repurposing of the below 7 bar network via the H21 projects.
- In parallel the BEIS Hy4Heat programme has established the safety case for the conveyance of hydrogen in domestic dwellings and developed 100% hydrogen appliances.
- During RIIO-2, BEIS has requested that the networks undertake a number of large scale customer pilots with 100% hydrogen.
- The first would be a new purpose built network with new hydrogen appliances followed by three further pilots all involving repurposing existing networks. The GNO's have proposed reopener to fund these pilots.

Repurposing transmission assets

- The GNO's have moved on in the last years of RIIO-1 to examine the feasibility and opportunity of repurposing the GB's local and national transmission system assets. They have proposed funding by NIA

and NIC in RIIO-2 to progress this from desk top studies into lab testing and field trials.

Hydrogen use in multi occupancy buildings

- The re-use of gas assets in high rise buildings has not yet been investigated. The GNO's have included funding first to assess the feasibility (via NIA) and if proven to be of value to consumers, further physical testing and assessment on real world assets.

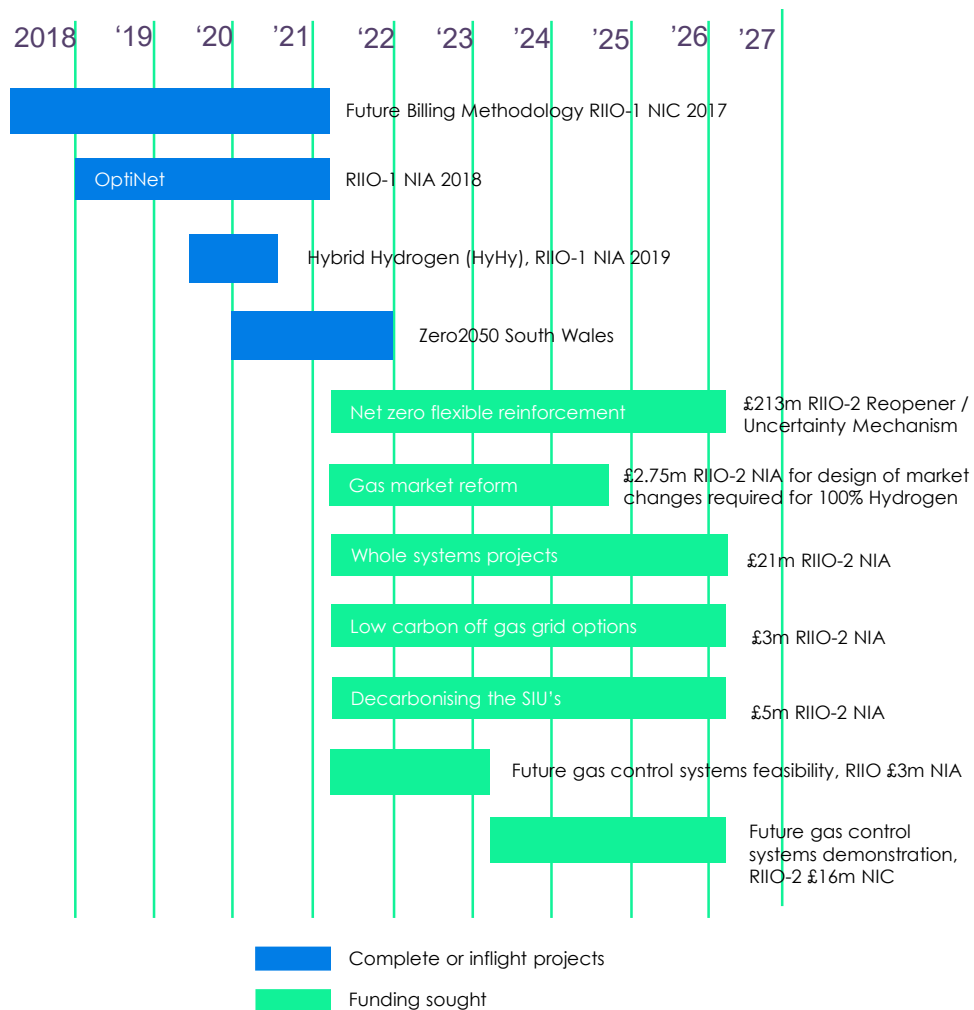
BEIS hydrogen grid R&D programme

- The HPDG workstreams have identified a portfolio of smaller packages of R&D which the GNO have made NIA funding provision in their submissions.

RIIO-2 Funding Proposal	Expenditure £m
NIA	27.9
NIC	62
Reopener	60
Total	149.9



Cross-cutting projects



Net zero flexible reinforcement

- Capacity investment is required in the networks to support cross sector decarbonisation, including flexible power generation and bio-CNG fuelling station connections for heavy duty vehicles.
- In particular there is currently no mechanism that supports capacity investment to enable more green gas connections both for biomethane now and hydrogen in the future.
- GNO's propose a reopener or new 'mechanism' to support this.

Gas market reform

- Reform of the current market operation arrangements are required if the UK is to transition to 100% hydrogen.
- Consideration is also required with regard to the role of blended hydrogen and the implications any regional roll out.
- The GNO's have requested NIA funding to design and develop this pathway identifying changes to UNC.

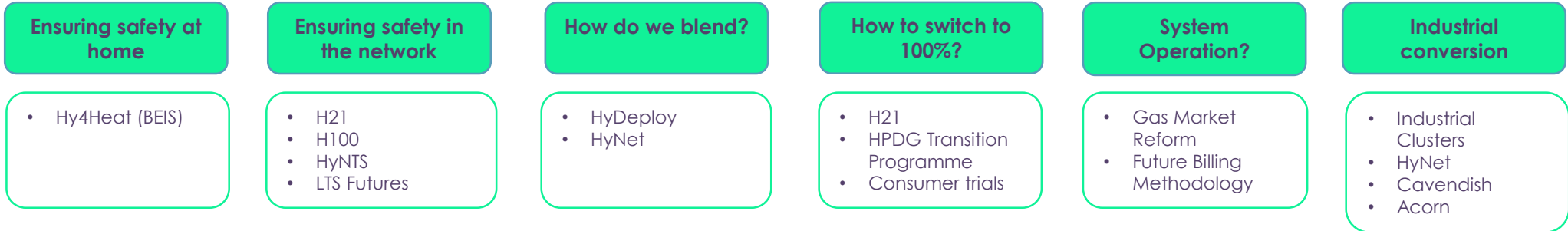
Future gas network control systems

- The future gas networks will need to be more actively controlled with the further expansion of distributed gas injection and the proliferation of peaking power generation supporting the decarbonisation of the electricity networks.
- GNO's have proposed first to carry out a feasibility study (funded by NIA) of how gas and electricity network data and comms can be utilised for whole system optimisation. Subsequent demonstration projects would be funded via NIC.

RIIO-2 Funding Proposal	Expenditure £m
NIA	35
NIC	16
Reopener	213
Total	264



Appendix: The role of existing projects



RIIO-1 Projects

- Existing RIIO-1 Projects (NIA/NIC funded, and supported by BEIS) have focused on safety and consumer acceptability first.

RIIO-2 Projects

- Proposed funding via NIA and NIC in RIIO-2 to progress many desk top studies into lab testing and field trials, filling the remaining evidence gaps to enable a government policy decision on heat.
- Further investment has been included as reopeners in RIIO-2 submissions to deliver policy direction either nationally or regionally. Both for the construction of hydrogen infrastructure associated with industrial clusters, the UK roll out of blending and capacity investment required to connect more biomethane.



Test rigs at HSE, Cumbria



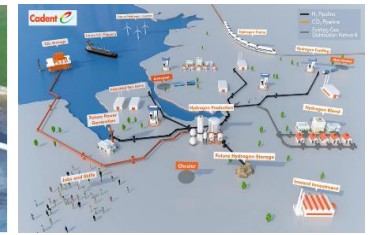
H21 test houses at DNV GL Spadeadam



Blending unit at Keele



HyNet schematic



How we will reduce business
carbon footprints & shrinkage

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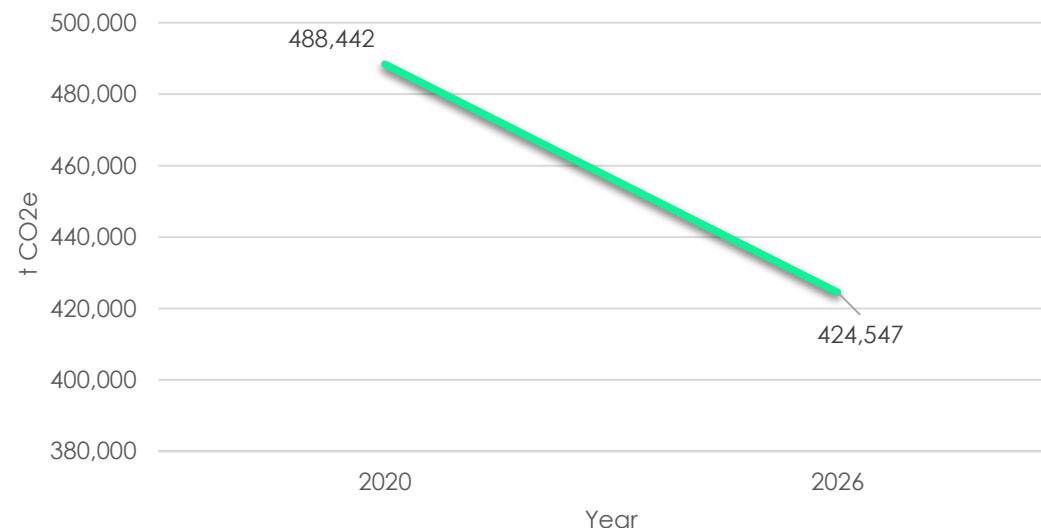
Reducing our operational footprint

Gas network companies are also committing to a 13% decrease in their business carbon footprint during the RIIO-2 regulatory period, a substantial reduction in their carbon emissions related to day to day business operations.

The reductions come from:

1. Low and Ultra Low Emission Vehicles replacing heavy polluting diesel equivalents
2. Making greater use of renewable energy within the businesses
3. Engaging more with our supply chain on environmental matters.

Total gas network business carbon footprint



Comprised of figures from GNO business plans (submitted to Ofgem in December 2019) with part of the data based upon 5-year averages to remove seasonal differences



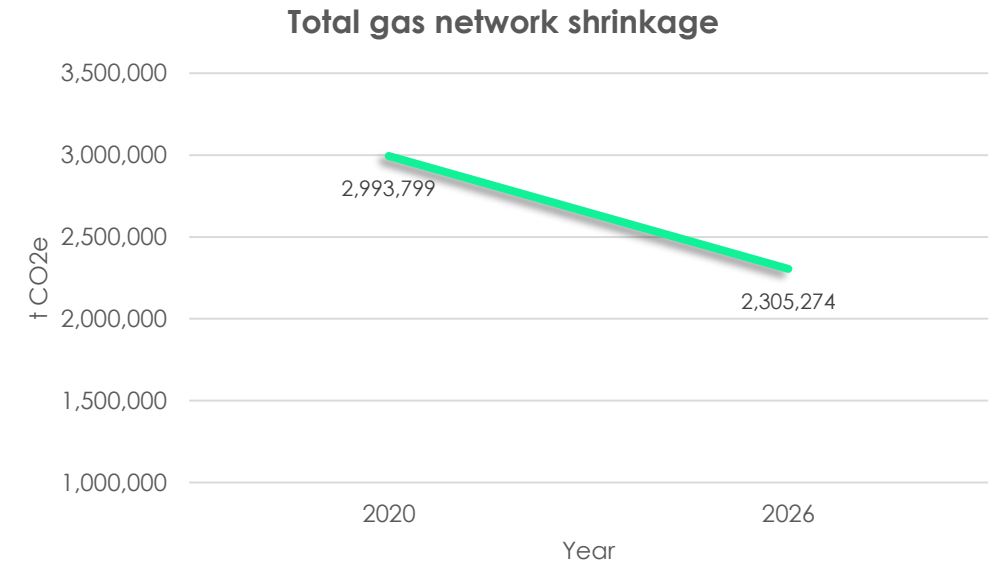
Reducing shrinkage

Gas network companies, also known as gas network operators (GNOs), are committing to reduce shrinkage during the RIIO-2 period by 23%

Examples of shrinkage are:

- Leakage (~95%)
- Gas theft
- Own gas consumption

Reductions come from replacement of cast iron pipes and addressing poorly sealed joints on aged assets - changes being delivered through the Iron Mains Risk Reduction Programme.



Comprised of figures from GNO Regulatory Reporting Packs (2018/19) and business plans (submitted to Ofgem in December 2019)





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