



Innovation  
Strategy 2025

Enter

# Executive summary



**“I am extremely proud of this strategy and believe it will forge the foundations for net zero work in the energy sector for years to come.”**

Corinna Jones  
Head of Innovation

**Innovation is about taking calculated risks that can drive change and deliver value to our customers. We ensure we manage these risks regardless of the funding mechanism, to deliver value in the end results. In shaping our strategy, we have considered the various funding mechanisms available for innovation and determined the optimum route to ensure real benefits are seen by the end consumer.**

**Our values** – ownership, simplicity and progress – build and protect our strong foundation as a business, while we look to the future and prepare ourselves for the energy transition. Our innovation strategy not only provides a focus for technology development but also ongoing market developments and broader business process improvements.

It is important that we continuously improve, to ensure our energy system is suitable for the future.

The innovation strategy for National Gas focuses on enabling the energy transition that we have focused on throughout the RIIO-2 period.

National Gas is in a unique position, as owners and operators of the National Transmission System (NTS), to take a leading role in whole system energy thinking. We will work closely with the UK electricity and gas networks to enable future interactions and network connections that support our transition to net zero. We’re aiming to deliver the most efficient and cost-effective solutions for the energy transition.

As we approach the end of the RIIO-2 price control period, the Innovation team has reflected on the projects undertaken, the stakeholder collaborations and the innovations implemented from RIIO-1. Our strategy has been updated to reflect our approach as we enter the RIIO-3 period, while enabling a transition across periods without causing a pause in activity.

The purpose of this document is to provide an insight into our strategy and innovation portfolio, to drive discussion and collaboration across the energy sector and wider complimentary industries. The following pages will cover our focus areas, current challenges and some of the key technologies we want to investigate further.

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# Strategic landscape

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**2030**

### Clean power 2030

**Maintain & grow natural gas network**  
Natural gas network remains at same scale as today, supplying gas to power, industry and domestic users. Cluster linked hydrogen and carbon projects supplying key power stations.

**2035**

### Decarbonised power 2035

**Power generation supported by net zero**  
Growth in renewable power generation in addition to the deployment of new low carbon dispatchable power from existing gas fired power stations using carbon capture and storage technologies and/or hydrogen as a fuel.

**2040**

### Decarbonised industry 2040

**Hydrogen core network growth**  
Focus on further reducing the industrial emissions and links to H<sub>2</sub> network alongside domestic heat electrification, some pockets of heat alternatives.

**2045**

### Net zero Scotland 2045

**Target date for net zero emissions in Scotland by 2045**  
Network emissions in Scotland eliminated, Hydrogen and CCUS pipelines expanded to support industry, power, heat and transport.

**2050**



### UK net zero 2050

**The UK has committed to achieving net zero greenhouse gas emissions by 2050**  
UK energy system meets net zero at minimal cost whilst enabling economic growth and stability. Home grown energy improves security of supply, energy resilience through variety.

# Clean energy

**As we progress from RIIO-2 towards RIIO-3, we are moving into a period where we begin to meet government deadlines for decarbonisation. The first to be considered is Clean Power 2030, which looks to reduce our electricity production reliance on fossil fuels and focuses on renewables.**

**This target still requires a maintained gas power system, but its use is limited to times when renewable sources are unavailable. This changes the usage scenario for our gas network and could require us to support winter level gas flows in the middle of the summer.**

We are currently assessing the impact of these changes on the natural gas network and considering innovation solutions to support the clean power ambitions. We are also looking at how we can decarbonise the natural gas network, through biomethane and blending, alongside deploying hydrogen and Carbon Capture, Utilisation and Storage CCUS.

As we move into RIIO-4, the targets become yet again more challenging: fully decarbonising power by 2035 and therefore converting all gas-powered plants to hydrogen, CCUS and/or the use of certification 100% of the time. We must start these projects now, ready for the future.

Our decarbonisation delivery programmes Project Union and SCO<sub>2</sub>T will be a core focus for innovation implementation and development in the RIIO-3 period, to enable us to meet those targets of 2035.

## Clean power

The government target for clean power by 2030 is an important step in achieving decarbonised power in the future. The enablement of low carbon gas and the start of hydrogen and carbon capture projects will enable power stations to decarbonise electricity production in the UK.



## Clean industry

Supporting the delivery of the industrial clusters across the UK with the core hydrogen network and our CCUS projects, will enable us to support the reduction of carbon emissions from our industry in the UK.



## Clean transport

Transport is a new market for molecules, as we progress away from fossil fuels. Heavy duty transport needs a green alternative, and this is where hydrogen and subsequent synthetic fuels can play an important role in decarbonising air, maritime, rail and road transport.



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# National Gas strategy

**National Gas**  
Innovation Strategy 2025

**Our Innovation activities must support the RIIO-3 price control business plan and align to the business strategy to ensure the outputs are relevant and can be implemented back into the business, providing value to consumers. We align our approach to the five National Gas priorities, and the three-molecule strategy developed for the future.**

**Business led innovation can be seen throughout our RIIO-3 business plan and our regulatory innovation will provide value for delivery of the network in RIIO-4 and beyond.**

## Our purpose

## Why we are here

## Our values

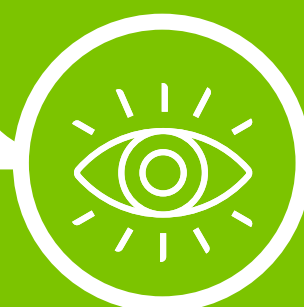
## How we work

## Our priorities

## Where will we focus our efforts

# Leading a clean energy future for everyone

# Progress



Shape the  
energy  
markets of  
the future

# Simplicity



Drive positive  
environmental  
and  
community  
impact

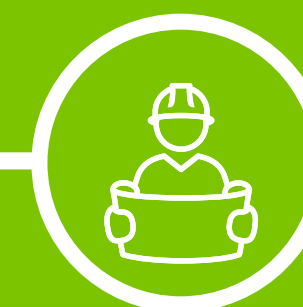
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Deliver sustainable value for customers and stakeholders

## Ownership



Invest in our  
people, grow  
our capability,  
and value  
everyone's  
contribution

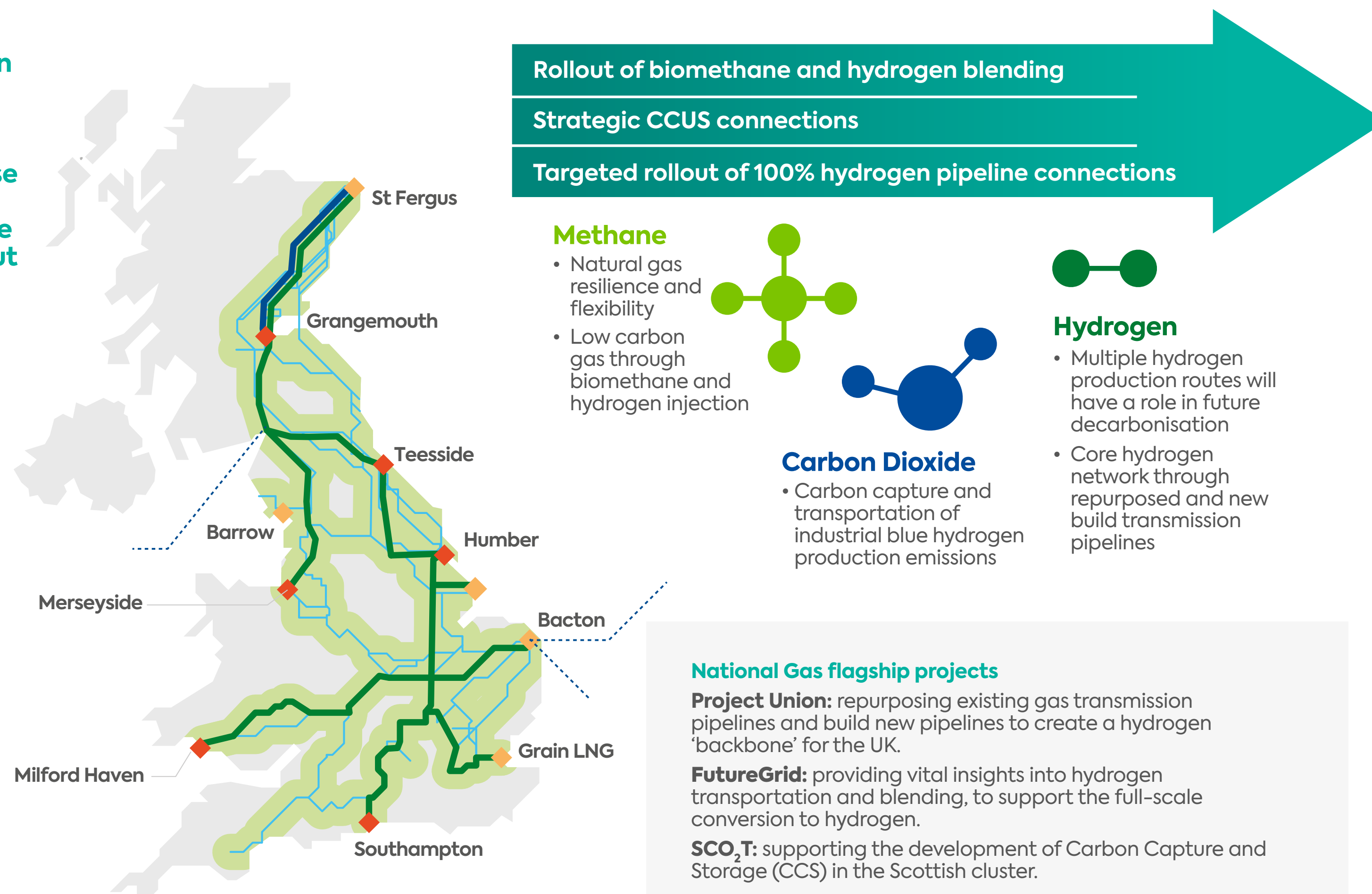


Operate  
safely, reliably  
and flexibly

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# The three molecule approach

The three-molecule approach encompasses the continuation of natural gas delivery, while reducing the carbon content through biomethane and hydrogen blending with the use of Carbon Capture, Utilisation and Storage (CCUS) to capture emissions; alongside the rollout of 100% hydrogen pipelines as we transition to net zero.



This map is for illustrative purposes only

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# How we connect the system

National Gas plays an important role in the current and future molecule networks in the UK, as well as supporting the global energy system.

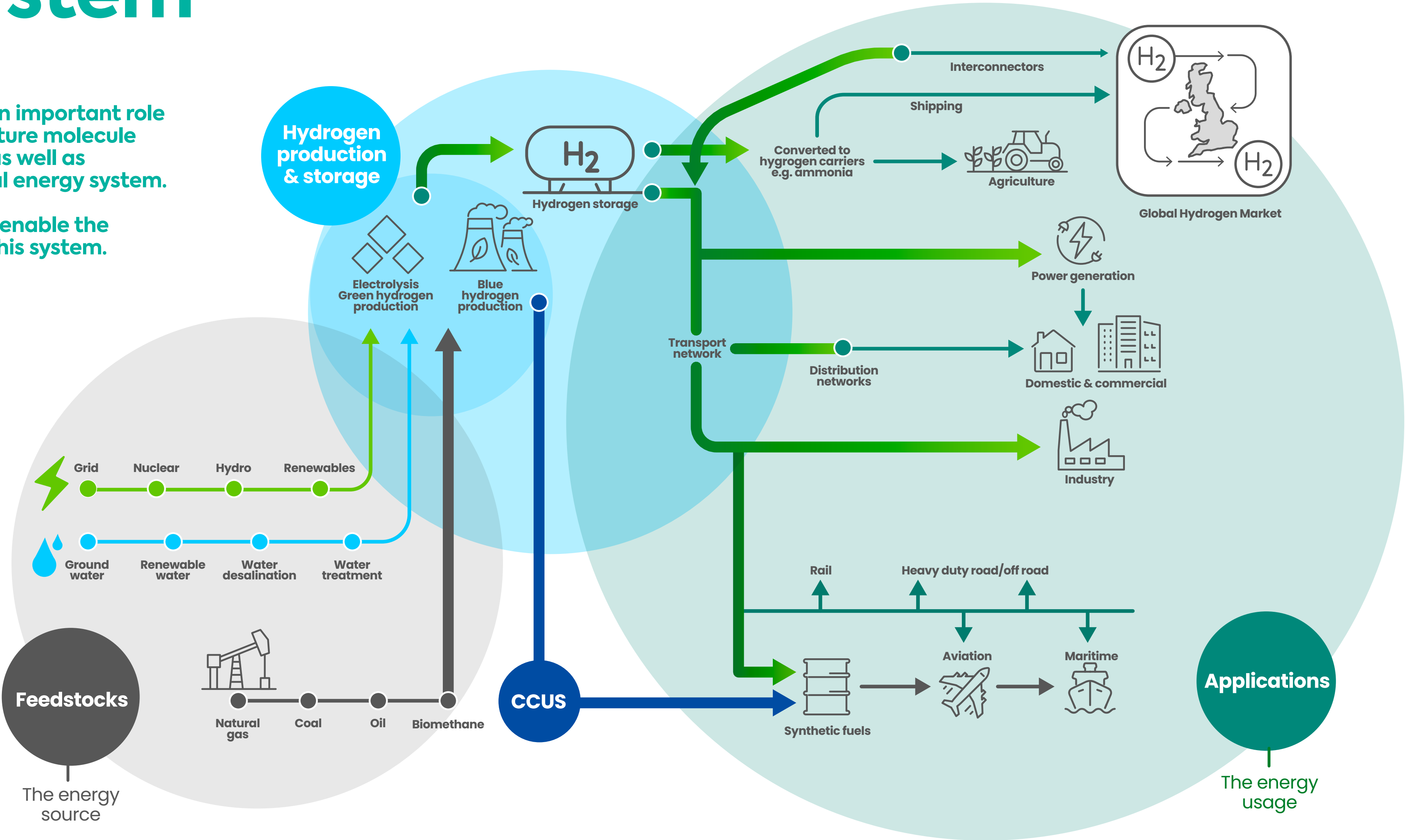
Innovation is vital to enable the decarbonisation of this system.

Key

Low carbon gas

Carbon gas

Hydrogen and hydrogen blends



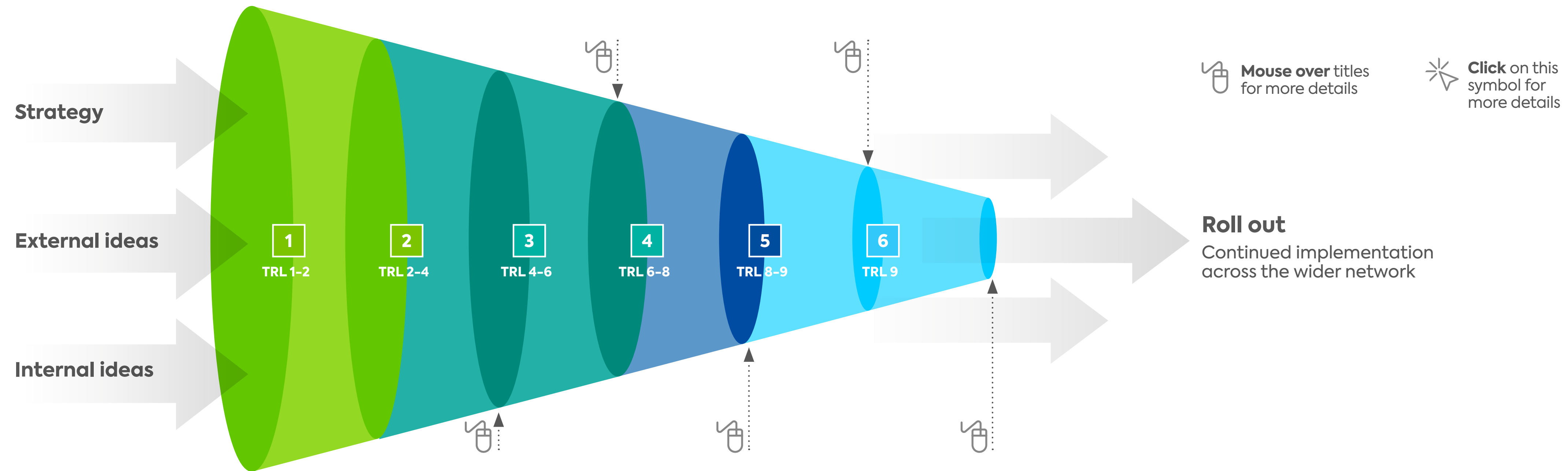
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**"The future of innovation at National Gas has required careful consideration, but I believe this plan is the most focused yet."**

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# Our innovation process



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# Our innovation process: Funding and governance

There are two main funding routes for innovation projects;

## 1. Network Innovation Allowance (NIA)

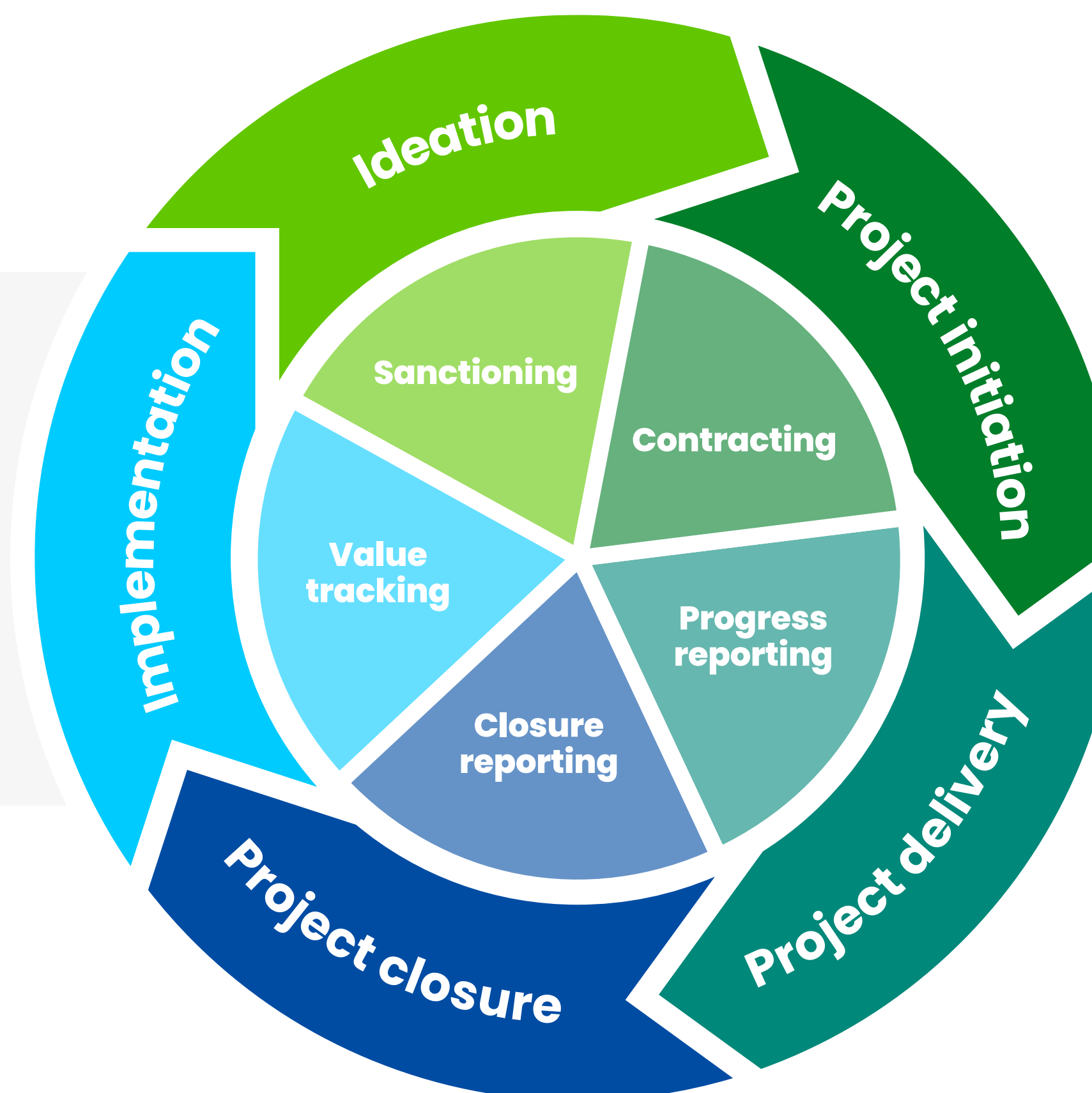
The NIA provides an allowance to fund small-scale low Technology Readiness Level (TRL) projects from early research through to demonstration. <£1-2m

## 2. Strategic Innovation Fund (SIF)

The SIF provides funding for larger-scale demonstration projects through three core project phases: Discovery <£150k, Alpha <£500k and Beta >£1m.

While NIA and SIF funding cover energy transition topics, we also use business investment to fund projects with clear business cases and a focus on improving our existing network. Other external funding opportunities include the Engineering and Physical Sciences Research Council (EPSRC), Innovate UK and Horizon Europe.

**NIA projects are sanctioned and the funding allocated via the Gas Transmission Innovation Governance Group (GTIGG). The core stages of this governance process and the associated regulatory requirements are as follows:**



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# Interactions with the energy system

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### UK Energy Network Collaboration

We engage with all the UK Energy networks through innovation projects from whole energy solutions with electricity to focused gas challenges with the other gas distribution networks.

Our strategic approach with the other networks allows us to collaborate on shared challenges and themes such as:

- Data and Digitalisation
- Flexibility and market evolution
- Net zero and the energy system transition
- Optimised assets and practices
- Supporting consumers in vulnerable situations
- Whole energy system transition



### Broader collaboration with Global Networks

We continue to engage with the European operators. As we are the only gas transmission network in the UK, there are significant benefits in collaborating and developing hydrogen and carbon understanding across the globe.

We primarily engage through two core groups; Hydrogen Gas Assets Readiness (H2GAR) and European Gas Research Group (GERG).

**H2GAR:** a collaborative initiative between European natural gas Transmission System Operators (TSOs). The group aims to share expertise on the effects of hydrogen (H2) transportation and injection into natural gas system.



**GERG:** works with the European energy community to develop innovative solutions that ensure our gas infrastructure remains at the heart of the energy system and integral in our transition to a sustainable energy future.



# Our innovation technology themes for 2025




Our innovation work is focused around five technology portfolios that feed into our business as usual and energy transition targets.

Our roadmaps on the following pages are grouped under these portfolios and our team structure is aligned to these, to ensure efficient delivery of projects.

“Driving innovation across our technology portfolios is essential to achieving a resilient, efficient, and net zero ready energy system. By advancing technology in these areas, we are equipping the gas network to meet the challenges of tomorrow — ensuring secure, sustainable energy delivery for future generations.”

Katie Petherbridge,  
Innovation Delivery Manager

## Our strategic themes

 Fit for the future	 Ready for decarbonisation	 Decarbonised energy system
Safeguarding and preparing our assets for the challenges in operating for the next 50 years and towards a decarbonised future.	Focusing on how the NTS will transport net zero gases and where novel technology will enable us to accelerate our transition.	Developing our net zero Transmission system of the future, we'll explore how the gas will interact with the NTS and its customers.
The portfolio roadmaps are designed to show the direction of travel for each portfolio theme, rather than a timeline of their delivery.  Each roadmap (and it's associated horizons) span a different timescale depending on the theme it is focused on.		

## Our technology portfolios

- 1 Asset development:**  
Developing net zero ready, resilient assets with optimised maintenance systems.
- 2 Automation & measurement:**  
Developing the inspection and monitoring systems required for the future of gas.
- 3 Digital systems & simulation:**  
Providing accessible, accurate data models of the UK energy network, improving network efficiency.
- 4 Materials & processing:**  
Ensuring robust materials and processes extend the lifetime of our assets and enable the repurposing of the network.
- 5 Business development:**  
Enabling future markets and customers of the gas network, by ensuring business systems and processes are relevant for net zero.

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# Asset development for risk mitigation

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# Introduction to: Asset development for risk mitigation

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This theme investigates how National Transmission System (NTS) assets can be transitioned or developed in order to operate a three Molecule network (natural gas, hydrogen and carbon dioxide) to enable a whole energy net zero system. This theme will explore the impact of this transition on investments, construction, safety and operation of these networks.



### Case study

FutureGrid is a unique offline gas network test facility constructed with decommissioned NTS assets at DNV's Spadeadam facility in Cumbria. The demonstrations will provide key evidence for the transportation of blends, H<sub>2</sub> and CO<sub>2</sub> in the NTS.

[Click here to find out more about FutureGrid](#)

## Our challenge areas

Asset development	Is it possible to repurpose existing assets for use with blends, H <sub>2</sub> and CO <sub>2</sub> ?
Operations	What new assets and procedures do we need, to develop and operate a three molecule network?
Safety	How do we ensure our existing and future assets are safe for use with blends, H <sub>2</sub> and CO <sub>2</sub> ?
Policy & standards	How do we update our standards and policies to operate a three molecule network?
Environmental	How do we reduce operational and fugitive emissions from NTS assets and operations?
Construction	How do we reduce emissions from construction and consider whole life principles?

## Asset development for risk mitigation – Innovation roadmap

**Target:**  
Efficient, lower emission assets

Sub theme	Horizon 1 - Fit for the future	Horizon 2 - Ready for decarbonisation	Horizon 3 - Decarbonised energy system

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 **Click** on this symbol for case studies.

 **Click** on the outline chevrons in the roadmap for more detail.

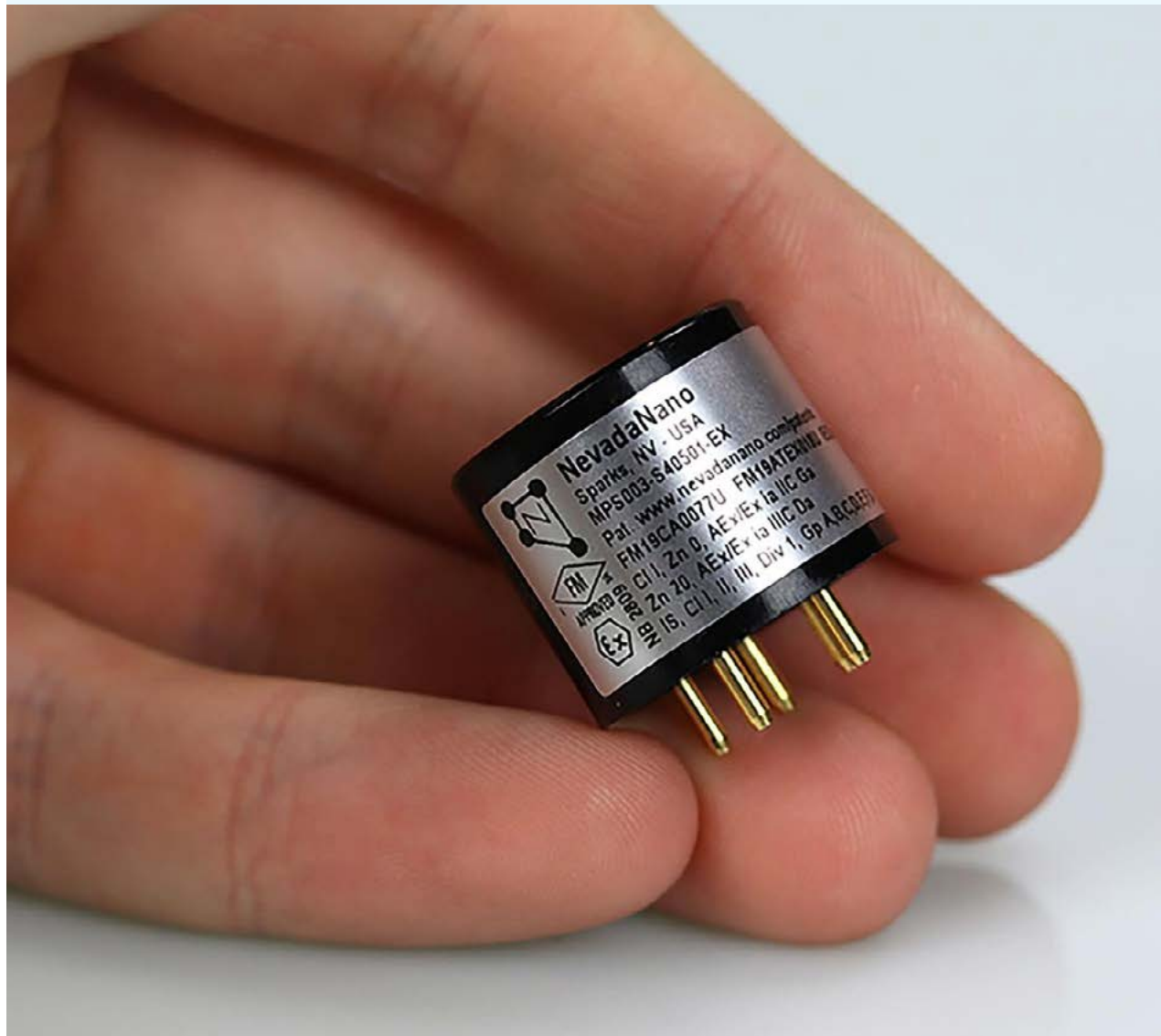
# Automation & measurement

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# Introduction to: Automation & measurement

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This theme investigates the inspection and monitoring systems required for the future of gas. The automation and measurement theme determine the optimum systems for measurement and inspection of our network, utilising autonomous and robotic systems where appropriate.



### Case study

The multi gas detection project is deploying a novel gas sensing solution to measure multiple gases with a single device - with a basic installation, little downtime, and no requirement for recalibration. It can be utilised for current and future molecules.

[Click here to find out more about Multi-gas detection](#)

## Our challenge areas

Integrity	How do we use measurement technologies to ensure asset integrity for a range of gases?
Network Monitoring	How do we utilise IOT solutions for more efficient and integrated network operations?
Safety & Security	Can we deploy intelligent, autonomous, multi-purpose safety systems?
Gas Quality & Metering	How to measure the mass and composition of future gas molecules? What new aspects need to be understood?
Control Systems	How do we automate and develop the future control systems as they become more complex?
Robotics & Automation	How do we develop appropriate robotic systems for inspection of hazardous systems?

## Automation & measurement – Innovation roadmap

**Target:**

## Robust, Accurate & Safe Measurement

Sub theme	Horizon 1 - Fit for the future	Horizon 2 - Ready for decarbonisation	Horizon 3 - Decarbonised energy system



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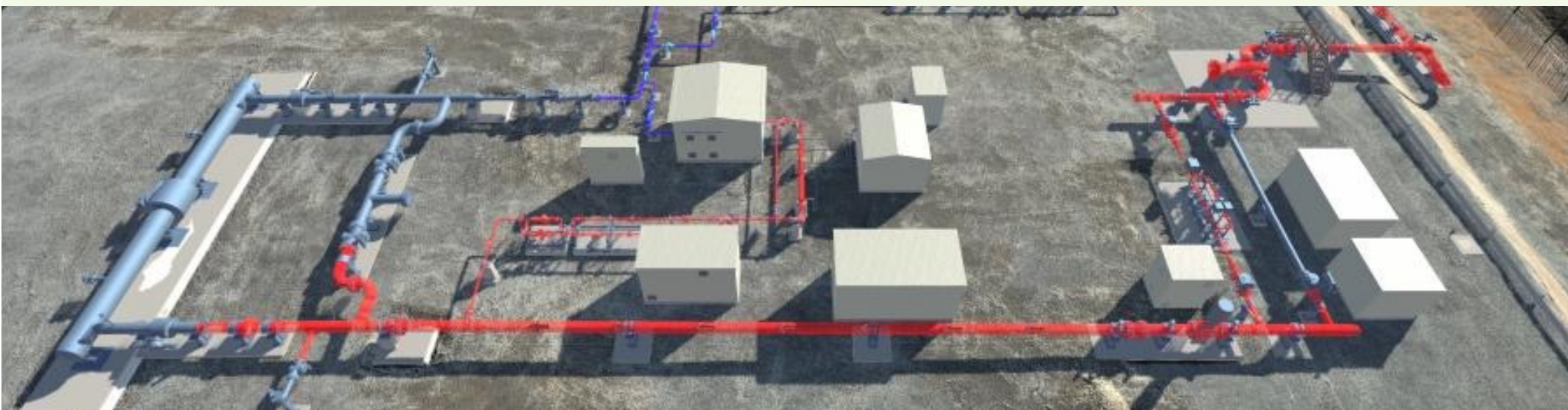
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# Digital systems & simulation

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# Introduction to: Digital systems & simulation

This theme supports the digitalisation of our assets and network in addition to developing new data models to optimise our network efficiency. We also engage with the UK’s wider gas and electricity networks to support the development of ‘whole’ energy system models as we work towards Clean Power 2030 and Net Zero by 2050.



## Case study

This project aims to link a developing Digital Twins platform with our data clouds and live data to ensure integration is aligned with our data quality and security requirements. Our CVDT will serve as the blueprint for creating digital twins for all our assets in preparation for RIIO-3. Ultimately this will provide a virtual representation of wider NGT physical assets, processes and data exchanges within business systems. This will enable users to understand and model their performance, optimise operations, test scenarios, and manage maintenance regimes for current and future networks.

**Click here**  
to find out  
more about  
**Collaborative  
Visual Data  
Twin**

## Our challenge areas

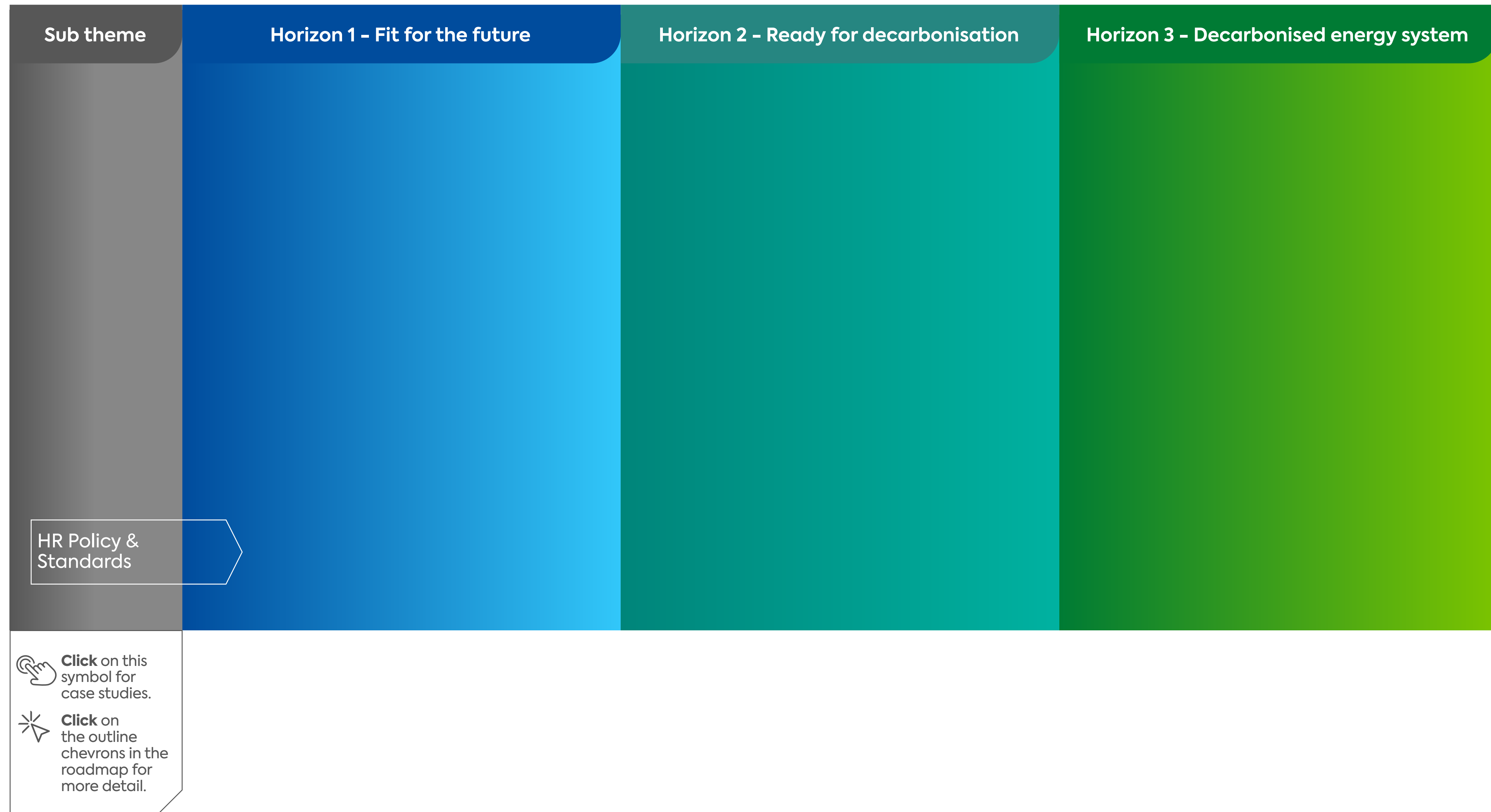
<b>Data Modelling &amp; Analytics</b>	How do we develop multi gas models for our transmission network? Can analytics be used to drive predictive/autonomous control room decisions?
<b>Data Sharing</b>	How do we ensure digital interoperability across energy networks and wider industry
<b>Digital Twins</b>	What should digital twins look like to meet our network needs?
<b>Digital Training</b>	What digital tools can be used for training staff and maintenance?
<b>Machine Learning</b>	How do we use alorithms for asset management and predictive monitoring?
<b>Quantum</b>	How can we use new quantum computing and sensors to support the network?

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# Digital systems & simulation - Innovation roadmap

**Target:**

## Supporting multi-gas network asset management



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# Materials & processing

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# Introduction to: Materials and processing

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This theme aims to ensure robust materials and processes extend the lifetime of our assets and enable repurposing and reuse through the energy transition. The materials and processing theme has a focus on the enablement of the network assets to accept future molecules whilst delivering improved robustness and maintenance.



### Case study

This project focuses on fatigue of pipework and fittings at compressor sites to review the existing fatigue management methodology with respect to natural gas-hydrogen blends and 100% hydrogen. This will enable us to maintain pipework around our compressor sites in a safe way and identify differences between the hydrogen and methane network.

[Click here to find out more about Fatigue of pipework on compressor sites](#)

## Our challenge areas

Safety & Integrity	To what degree are our existing materials suitable for a three-molecule network?
Materials Testing	What new test protocols do we need to use to validate materials for use with new gases?
Process	How do we need to adapt our processes for alternative gases
Design & Repurposing	What material or operational changes would we need to transport alternative gases?
Environment	Can we identify new materials with lower environmental impact
Novel Materials & Opportunities	Are there new materials or processes which we could implement for assets, integrity management or construction?

## Materials & Processing – Innovation roadmap

**Target:**

## Materials for multi gas networks with optimised maintenance

Sub theme	Horizon 1 - Fit for the future	Horizon 2 - Ready for decarbonisation	Horizon 3 - Decarbonised energy system



**Click** on this symbol for case studies.



**Click** on the outline chevrons in the roadmap for more detail.

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# Business development

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# Introduction to: Business development

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This theme explores how National Gas as a business may develop through the transition towards net zero. It covers a number of areas including; requirements, frameworks and processes related to operating a three-molecule network, skills & competencies, investments, potential new industry sectors and customer behaviours.



### Case study

This project aims to add to the growing evidence base surrounding hydrogen blending by exploring the infrastructure requirements required to blend hydrogen into natural gas on the NTS. Considering hydrogen supply levels of varying scales at either greenfield sites or existing NTS sites this project will support enablement activities for future and current connections.

[Click here to find out more about Blending infrastructure for the NTS](#)

## Our challenge areas

Organisational Capability	How do we support readiness to enable the transition through skills and procurement?
Network Planning	What methods and tools can we utilise to prepare for a multi-molecule system with varying demands?
Developing Markets	How can we support current/new markets in the UK?
Enabling Connections	How can we support and accelerate our stakeholders transition to net zero, utilising the NTS?
Strategic Connectivity	What are the optimal routes to whole system net zero with resilience?
Storage Interactions	How can we support novel technologies and energy security?

## Business development - Innovation roadmap

**Target:**

## Exploring new business models and energy systems

Sub theme	Horizon 1 – Fit for the future	Horizon 2 – Ready for decarbonisation	Horizon 3 – Decarbonised energy system

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 **Click** on this symbol for case studies.

 **Click** on the outline chevrons in the roadmap for more detail.

**A key consideration of our innovation research and projects, are the potential and realised benefits.**

1. Strategy and ideas	2. Project pipeline and sanction	3. Project delivery	4. Project closure	5. Project implementation
This marks stage one of the value tracking process. When an innovation idea is put forward, we rate each idea, before deciding whether to move it to the project pipeline.	For all projects added to the pipeline, as well as those that get sanctioned, we clearly define the proposed benefits for each, before they can progress.	For projects in Delivery, we actively monitor the benefit status of each one, to see whether the proposed benefits are likely to be met. This information is published in the project progress report if longer than 12 months.	Once a project has closed, we publish a closure report where we outline project findings, outcomes against the initial objectives, the associated benefits and any next steps (this could include a follow up project).	At the end of a project, we assess whether there is any benefit to implementing the solution or technology within the business. If we are successful in securing funding to do so, we kick off a business-as-usual follow up project. Once this concludes, we log the realized benefits for the business and publish a value tracking case study to our website.

Financial benefits are important for innovation, and we use the project and deployment costs to work out the financial savings on all our implemented projects

- Safety
- Environment (CO<sub>2</sub> saved)
- Skills and job creation
- Compliance

## Get in touch



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