Gas
Transmission

Enabling the Gas Markets Plan 2019/2020

nationalgrid

The Gas Markets Plan (GMaP) 2019

Introducing the Gas Markets Plan (GMaP)

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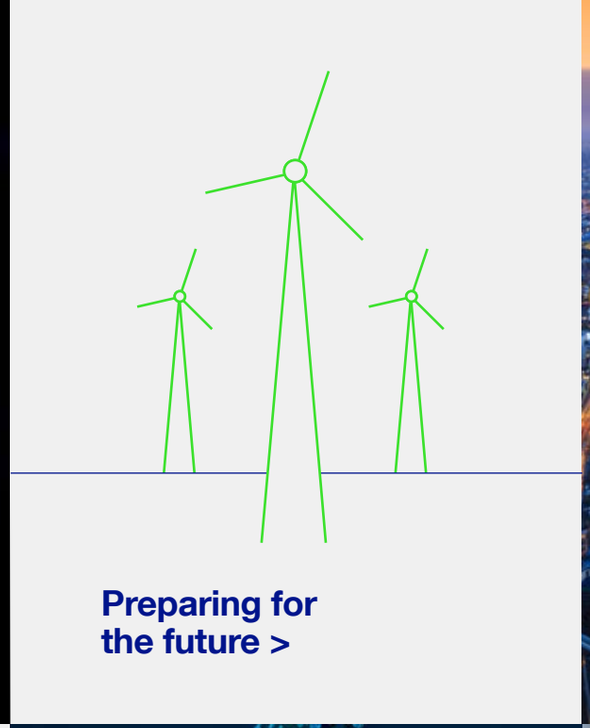

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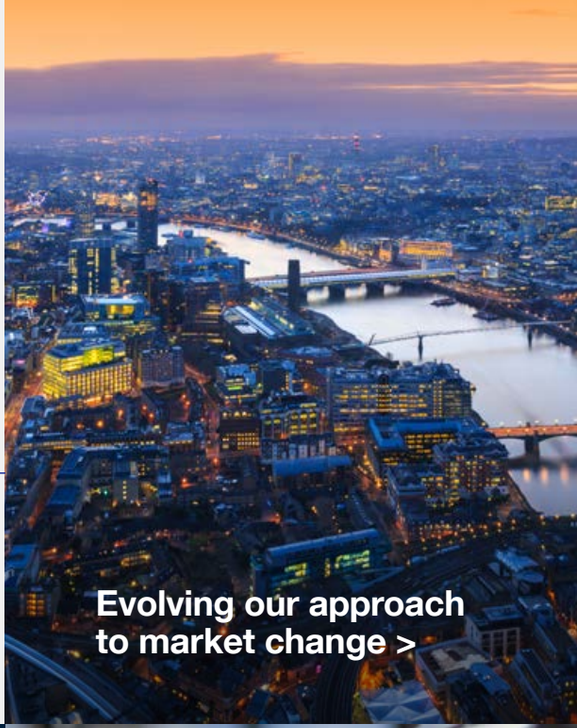

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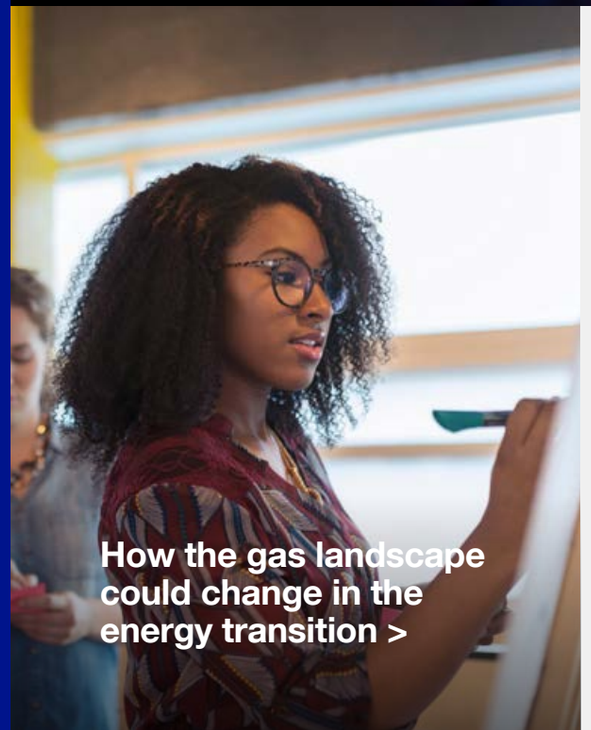

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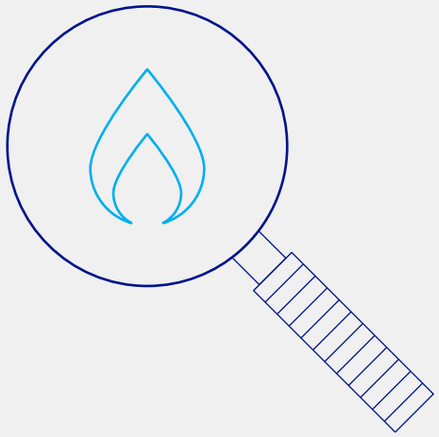

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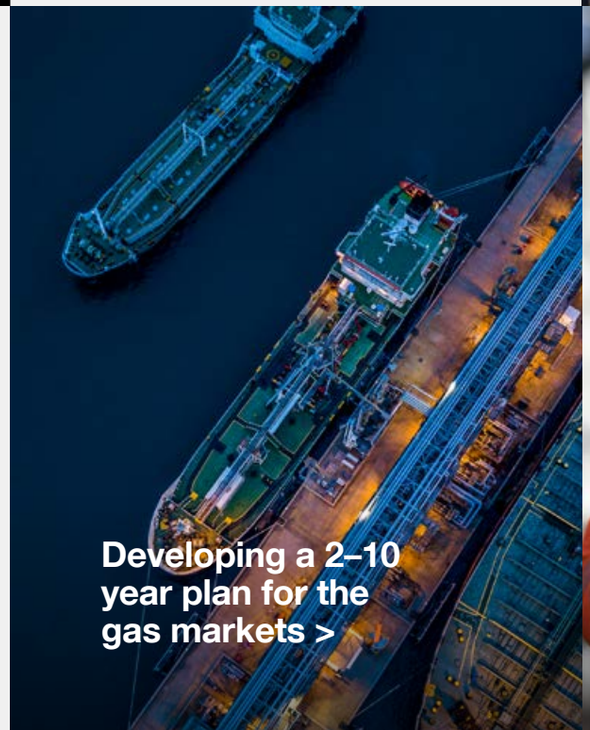

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Introducing the Gas Markets Plan (GMaP)

Gas will be vital as we transition to a net zero, sustainable energy system. However, we need to manage the challenge of high levels of uncertainty about the future direction and pace of change.

To continue to deliver safe, reliable gas supplies at the best value for consumers, a process is needed to proactively and strategically consider how market frameworks need to change across all potential futures.

To achieve this, National Grid Gas Transmission, in collaboration with industry, decision-makers, and stakeholders is launching the Gas Markets Plan (GMaP).

This is the first annual GMaP publication. It outlines the areas of change we will be exploring with industry over the next year, as well as what industry should be proactively preparing for in the next 2–10 years. In sharing this document with you, we hope to stimulate conversation on how market frameworks will need to evolve over the next decade.

The path ahead for gas is both exciting and uncertain, and we must navigate this together as an industry. We welcome your input and reflections on this first iteration of the GMaP.

How to use this document

To help you find the information you need quickly and easily we have published this GMaP as an interactive document.

How to utilise the interactive document:

Home
This will take you to the contents page.

Arrows
Click on the arrows to move backwards or forwards a page.

‘Hover over’ content
Words underlined will reveal a glossary when you hover over them with your cursor.

Enlarge/Reduce
Hover over the magnifying icon to make charts bigger or smaller.

WWW.

Hyperlinks
Hyperlinks are underlined and highlighted in light blue throughout. You can click on them to access further information.

Executive summary

1

The Future of Gas (FOG)

Decarbonising gas is fundamental in the transition to a net zero future.

In 2018, National Grid published the Future of Gas: How gas can support a low-carbon future[1]. We committed to actions we would take and made recommendations to policy makers to help the UK transition to a low-carbon economy.

A key action was to work with the gas industry to develop a Gas Markets Plan (GMaP), a process that proactively coordinates market change as an industry over the next 2 to 10 years.

2

Industry collaboration

The GMaP process brings together a broad range of stakeholders, who have local to international perspectives, to prepare today for the gas market frameworks of the future.

To start building this process, National Grid, in collaboration with industry and stakeholders, established a bi-annual FOG Forum and a tri-annual FOG Steering Group.

Collaborative working across industry will be crucial in making sure the gas system and markets deliver consumer value throughout the energy transition.

Executive summary

3

GMaP 2020 focus areas

Following the first FOG Forum in May 2019 and FOG Steering Group in September 2019, three areas of focus have been prioritised for 2020: gas quality, hydrogen and balancing.

Small industry working groups will be set up in early 2020 to explore these focus areas, with the aim of recommending:

- new (or modifications to existing) energy codes, products and processes
- further exploratory work to consider for the next annual cycle of the GMaP.

GMaP focus areas for 2020

Gas quality

Why gas quality?
Expanding gas quality specifications could help to extend UKCS recovery and improve the attractiveness of the UK gas market for imports. It is also crucial in transitioning to a low-carbon future.

However, wider specifications may create undesirable conditions for customers taking gas off the network.

Balancing

Why balancing?
With increasing renewable generation and the potential for distributed low-carbon gas supplies, the GMaP will explore various aspects of balancing to make sure it will continue to maximise market efficiency and consumer value.

Hydrogen

Why hydrogen?
Hydrogen is expected to play an important role in decarbonising heat and other sectors. Incorporating hydrogen into the energy mix will have a significant impact on the gas market.

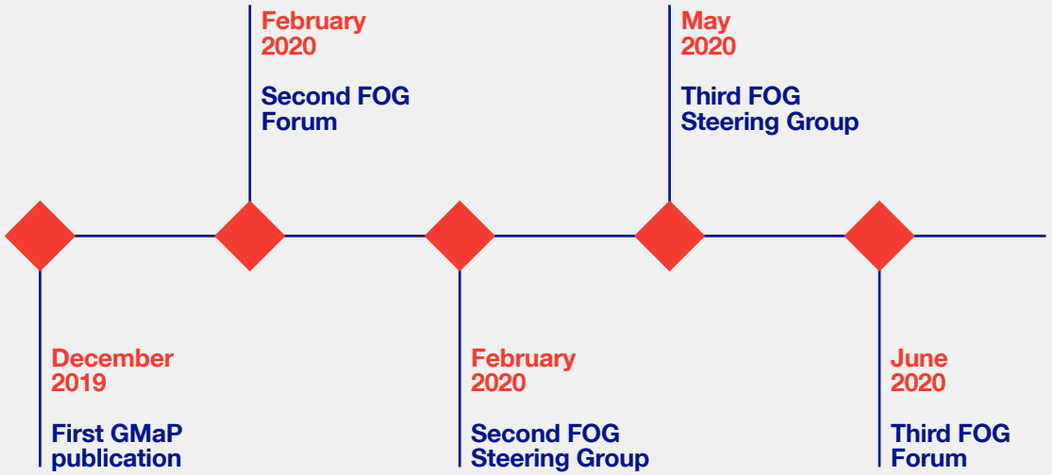
4

Get involved

How the gas landscape will evolve is uncertain. No single organisation can prepare for the future alone.

We have brought together decision-makers from industry and societal interests groups so that the GMaP is focusing on the right areas of market change, at the right time, to maximise value for consumers.

We have several events in 2020 for you to get involved in. Email us at box.FOGForum@nationalgrid.com or visit the FOG website[2] for more details.



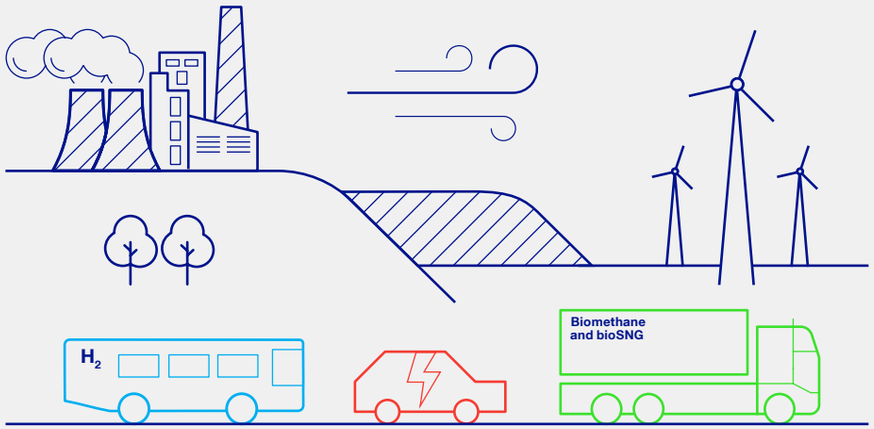
Preparing for the future

In June 2019, the United Kingdom (UK) became the first major economy to commit to achieving net zero by 2050. This has accelerated the need to reform energy systems away from unabated fossil fuels.

Progress has already been made on this journey.

Power generation has decarbonised significantly by moving away from coal-fired generation and incorporating renewables.

Road transport is at the start of its transformational journey, with increasing momentum to decarbonise through electric and low-carbon gas vehicles.



Natural gas plays a crucial role in UK society. It supports consumers' heating and power needs and is key in meeting industrial and commercial energy demands.

In 2018:

22m
gas customers in the UK

85%
of households are using gas for heat

39%
of power needs are supplied by gas

57%
of industrial and commercial energy needs are met by gas

To reach net zero, we need to continually drive change across all sectors, especially those heavily reliant on natural gas as an energy source, such as heating.

Evolving our approach to market change

Since the gas industry's privitisation in the mid 1980s, Great Britain's wholesale gas market has developed into one of the most liberal, competitive and liquid markets in the world, to the benefit of consumers.

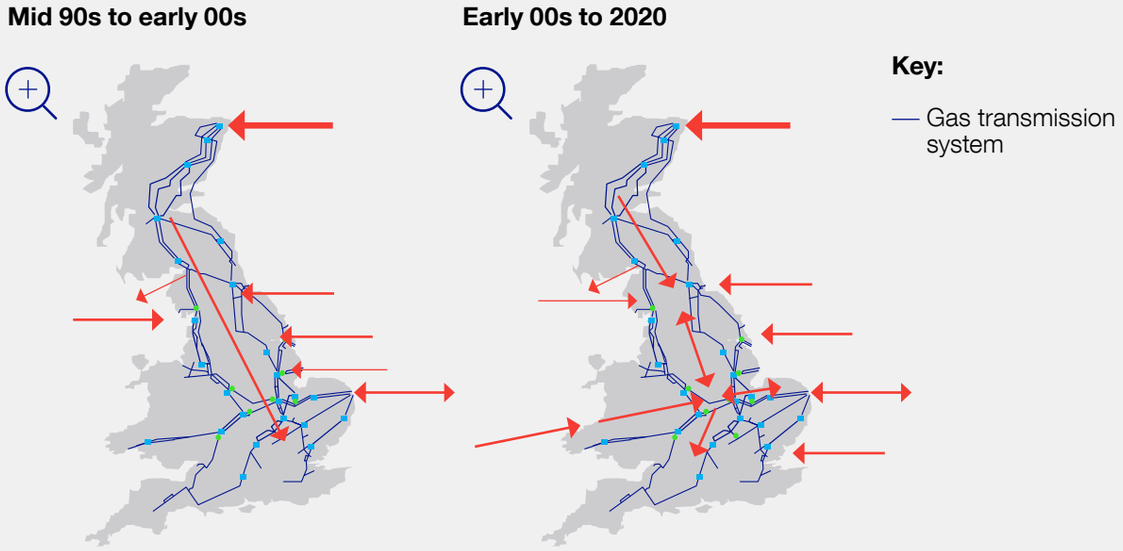
Key to this has been the continual development of the Uniform Network Code (UNC) to create a traded gas market, network balancing mechanisms, capacity auctions and charging frameworks.

Over the last two decades, the gas supply landscape has changed from being dominated by UK Continental Shelf (UKCS) to one with a more diverse set of supply sources.

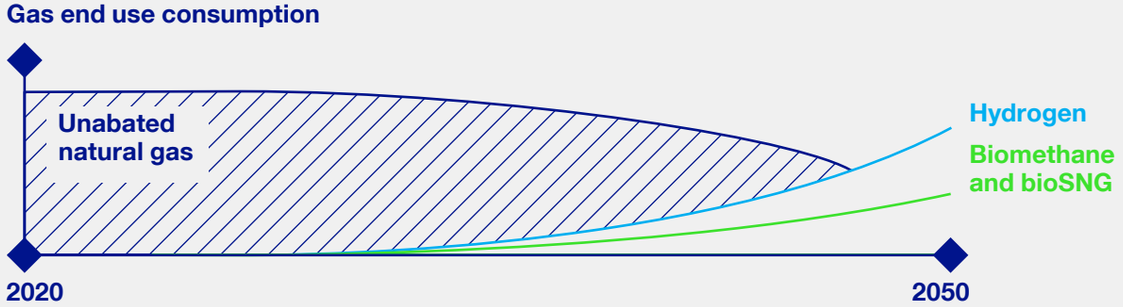
The gas demand landscape has undergone a similar change, with huge growth in the use of gas for power generation.

Throughout these transitions, continually developing and optimising market frameworks has been vital in ensuring security of supply and maximising value for consumers. In order to meet net zero, the amount of unabated natural gas used by end consumers will need to fall to zero by 2050. The rate of change the industry has seen to date will only accelerate.

Major gas flows in GB



Illustrative potential GB gas end use consumption on the path to 2050



Evolving our approach to market change

Decarbonising the natural gas system raises many challenging questions, such as:

- What is the likely role of gas-to-power in supporting greater penetration of renewable generation?
- Will Carbon Capture Usage & Storage be developed at scale to enable carbon abatement of gas and its uses across the economy?
- What role will hydrogen, biomethane and bio-synthetic natural gas (bioSNG) play in decarbonising the gas system?
- What will gas decarbonisation mean for all sectors, including power, industry, heating and transport?

Answers to these are uncertain and will be guided by many influences, including energy policy developments, commercialisation of new technologies and the public's decarbonisation ambition and acceptance of new technologies.

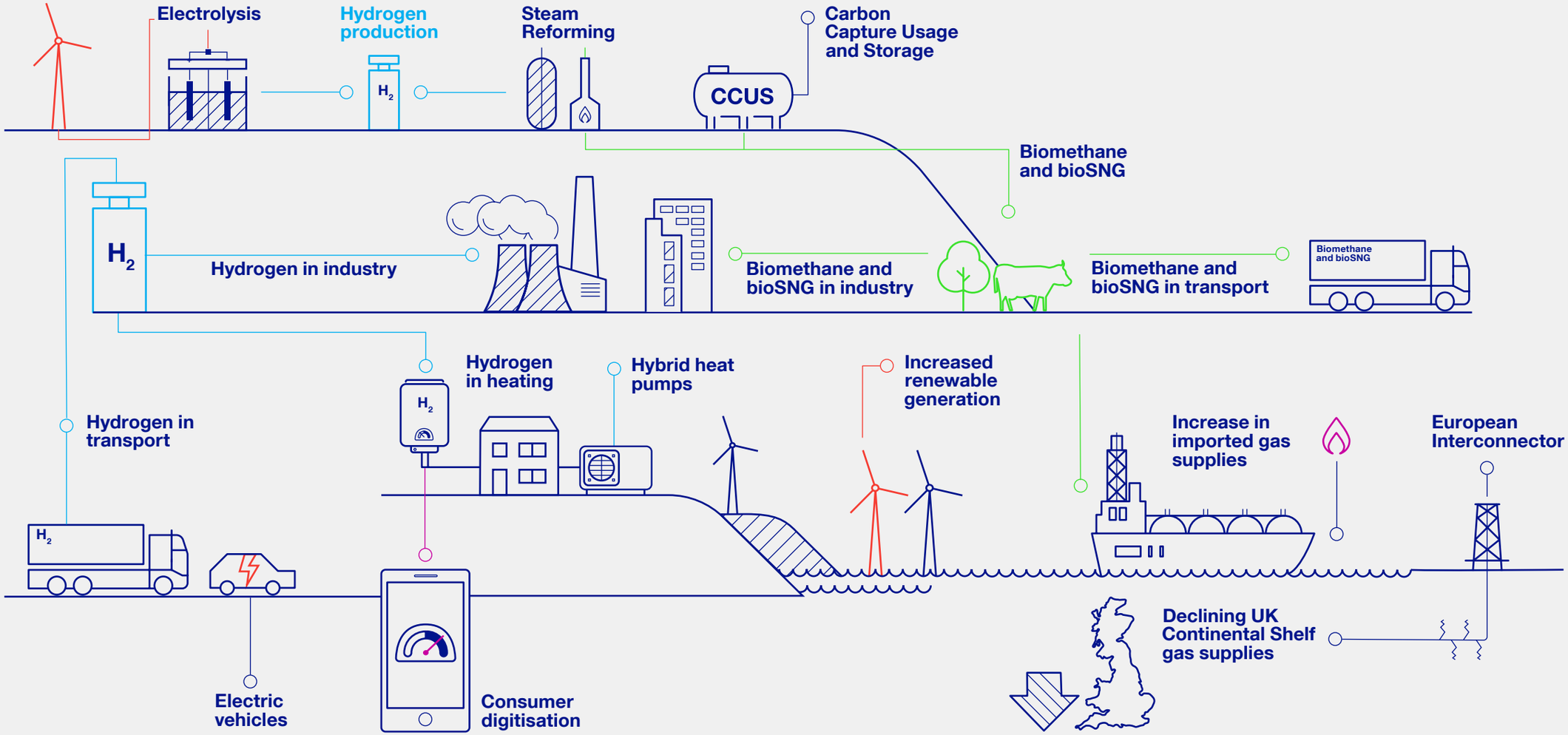
Across all potential futures, gas market frameworks will need to continue to evolve to help deliver decarbonisation ambitions, maintain security of supply, and provide value for consumers.

Given the level of change and uncertainty expected in the next decade, an industry-based process is needed to proactively and strategically consider how market frameworks may need to change, outside of the existing market change process.

To achieve this, National Grid, in collaboration with the gas industry, decision-makers and stakeholders have launched the GMaP.

Evolving our approach to market change

What could a future gas market look like?



Evolving our approach to market change

The GMaP brings industry and stakeholders together to explore, plan and develop options to prepare proactively for potential gas market change over the next 2–10 years.

It aims to provide strategic direction that promotes the interests of existing and future consumers. It will draw on industry expertise to design market frameworks that continue to deliver safe, reliable gas supplies at best value to consumers.

Explore

Understanding how the energy system could transform

How the energy system will transform over the next 10 years is uncertain.

The first stage is to work with industry and stakeholders to identify potential gas system transformations and explore how these could impact market operation.

Plan

Identifying GMaP focus areas for the upcoming year

By collectively debating the impacts that transformations could have on the gas market and the probability of them occurring, industry will prioritise the areas to be explored over the next 12 months.

Act

Shaping and executing GMaP projects

GMaP working groups will explore focus areas and scope, prioritise, and execute projects across the year.

Outputs from these could be:

- Recommendations for new market rules, products etc.
- Recommendations to modify existing market rules, products etc.
- Recommendations for further exploration through GMaP projects.

Implement

The GMaP process of prioritising which transformations to explore, and projects to progress will be reviewed frequently throughout the year.

This is so that industry is focusing on the right areas of market change, at the right time, to add the most value for industry and consumers.

These recommendations could be delivered through existing market change processes.

How the gas landscape could change in the energy transition

Over the next decade, how energy is used in society will change. These changes will drive transformations in how all forms of gases (natural gas, biomethane, bioSNG, hydrogen) are produced and consumed by society.

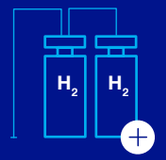
By weighing up the probability of particular transformations occurring over the next ten years, and the level of clarity around the potential impacts on the gas markets, we can group these transformations into **"likely"** or **"potential"** futures.

How we will explore potential transformations of the energy system over the next decade through the GMaP: Example case study for hydrogen.

Identify possible technology changes

- Hydrogen in transport
- Hydrogen production by methane reforming with CCUS
- Hydrogen production by electrolysis
- Hydrogen for heat
- Hydrogen for industrials
- Hydrogen for power generation

Group changes into broader transformations



Hydrogen consumer acceptance, production and consumption.

Categorise into likely and potential futures

"Likely" future transformations

Likely transformations are those that are already underway, and the only uncertainty is the scale of future change.

"Potential" future transformations

For potential transformations, it is not only unclear whether these will come about, but if they do, how, when and where.

Sources of industry intelligence

- 1-2-1 meetings and industry working groups
- Gas Future Operability Planning[3]
- Future Energy Scenarios[4]
- FOG Forum[5]
- FOG Steering Group[6]

How the gas landscape could change in the energy transition

During the Future of Gas programme, we explored how the gas system could change out to 2050. Since the conclusions in March 2018, we have focused on exploring what could emerge in the next decade in collaboration with industry and stakeholders. We have identified an initial set of likely and potential future transformations over the next 2–10 years.

Initially identified **likely** and **potential** future transformations

Likely future transformations

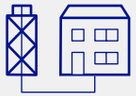
Reducing unabated natural gas end-usage demand
Over the past decade, we have seen annual gas demand decline. With increased levels of energy efficiency and the need to decarbonise, demand for natural gas as it is used today will reduce.

Changing natural gas supply mix
With the decline in UKCS supplies expected to continue, the UK's dependence on imports is expected to continue to rise.

Changing natural gas to power needs
The growth of renewables is changing the primary role of gas-fired power generation. Gas is moving from being a steady generator of electricity across the day to one that is more flexible and commercially-responsive. This shift is expected to continue.

Potential future transformations

Increased hydrogen production and consumption
Hydrogen, alongside other technologies, is expected to play a significant role in the decarbonisation of heating (and other sectors).



Shale production
Shale flow, which has been explored in Lancashire, could provide an additional domestic supply of natural gas to the UK.

Gas and electricity interactions
The potential for power-to-gas (hydrogen) and growth in hybrid heat pumps could lead to a large change in the ways gas and electricity markets interact.

Increased biomethane and bioSNG production and consumption
Biomethane and bioSNG could play a role in providing a low-carbon alternative to natural gas, and in helping to decarbonise transport.

EU future energy trends
It is expected that the next European gas package will help progress towards decarbonisation. Depending on their priorities, member states may choose to take different pathways to decarbonisation. This could impact how gas is brought on and off the transmission system.

Defining GMaP focus areas for 2020

Explore | **Plan** | Act

Given **likely** transformations are already underway, their future impact on the gas market is better understood. This makes it possible to explore how these transformations could drive the need for market reform on specific aspects of the existing market frameworks. As an example, does reducing unabated natural gas demand make some long-term capacity processes or auctions redundant?

For **potential** transformations, given their uncertainty, the first step is to understand the broad range of market impacts. This will enable the consideration of what market reforms are needed to existing market frameworks, and what new market frameworks may be needed, to successfully facilitate these transformations. As an example, what impacts does hydrogen have on system and market operation, and how does this translate into needs for market reform?

Through the FOG Steering Group, industry, decision-makers and stakeholders undertook a prioritisation exercise to identify which specific areas of the market and **potential** transformations have the most immediate need to be explored.

Three focus areas were chosen: gas quality, balancing and hydrogen.

Gas quality | **Balancing** | **Hydrogen**

The FOG Steering Group, a collection of stakeholders that together represent the energy industry, plays a critical role in providing leadership and direction on what areas the GMaP will focus on.

This group has been set up and is chaired by National Grid.

If you would like to be involved, please get in touch with your industry representative[7].

How we identified the GMaP focus areas for 2020

March 2019 Workshop

May 2019 FOG Forum

September 2019 FOG Steering Group

December 2019 First GMaP Publication

Ongoing bilateral and industry discussions

Defining GMaP focus areas for 2020

Focus area 1 – Gas quality

Explore | Plan | **Act**

Why gas quality?

The quality of gas that enters the gas network must be within pre-determined limits, primarily for consumer safety. Gas Safety Management Regulations (GS(M)R) play a critical role in operating the gas system safely and reliably. These limits are monitored at system entry points and at specified points across the gas network.

As the natural gas supply mix continues to change, expanding gas quality specifications could help to extend UKCS recovery and improve the attractiveness of the UK gas market for imports. It is also crucial in transitioning to a low-carbon future.

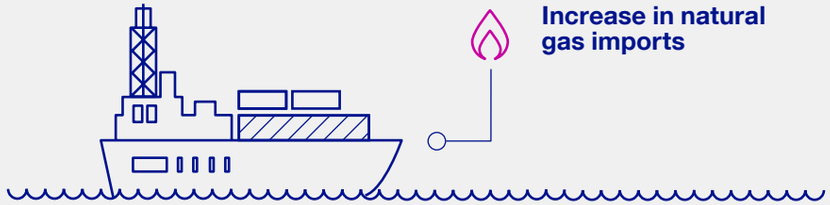
However, wider specifications may create undesirable conditions for customers taking gas off the network. This creates the case to explore gas quality over the coming year.

Likely transformations that drive the need to explore potential gas quality reforms:

Changing natural gas supply mix

The natural gas supply mix continues to change, with UKCS supplies continuing to decline and imported supplies increasing.

Gas quality specifications and associated services will be a key factor in fully maximising recovery of UKCS supply and increasing ease of entry for natural gas imports e.g. reducing processing costs for LNG.



Future transformations that drive the need to explore potential gas quality reform:

Increased hydrogen, biomethane and bioSNG production and consumption

The current GS(M)R limits hydrogen at 0.1%. In additon, biomethane producers must make sure biomethane injected into the gas networks is within the GS(M)R limit of oxygen, adding further processing costs.

How GS(M)R develops, and how the markets transform to manage wider gas specification limits will be key in enabling these low-carbon gas futures.

Defining GMaP focus areas for 2020

Focus area 2 – Balancing

Why balancing?

Natural gas arrives from many supply sources. The companies that ask us to transport it through our pipeline network (shippers) are incentivised so that every day they put as much gas into the system as their customers take out. This is called balancing. If the levels of gas brought on and off the network do not match, National Grid Gas System Operator can step in to incentivise shippers to balance the system.

Growing variability in where and how gas is brought on and off the network has led to an increase in within-day linepack swings and balancing related operational actions. National Grid's GFOP work[8] predicted that this would continue. Given the network was originally designed for flows at a constant rate (1/24th), there is a case to look at various aspects of balancing: shipper incentives to balance, the role of linepack in operational balancing, commercial services that could be offered by operators of flexibility etc.

Likely transformations that drive the need to explore potential balancing reforms:

Changing natural gas supply mix

As UKCS continues to decline, we are becoming increasingly reliant on commercially-driven import supplies which could increase supply volatility.

Changing natural gas to power needs

With the increasing penetration of renewables, gas-to-power will need to become more flexible and potentially less predictable in its operation.

Future transformations that drive the need to explore potential balancing reform:

Increased hydrogen, biomethane, bioSNG production and consumption

Depending on how low-carbon gases are produced, transported and consumed, reform may be needed to effectively manage how supply and demand is kept in balance for all forms of gas, both nationally and geographically.

Defining GMaP focus areas for 2020

Focus area 3 – Hydrogen

Explore | Plan | **Act**

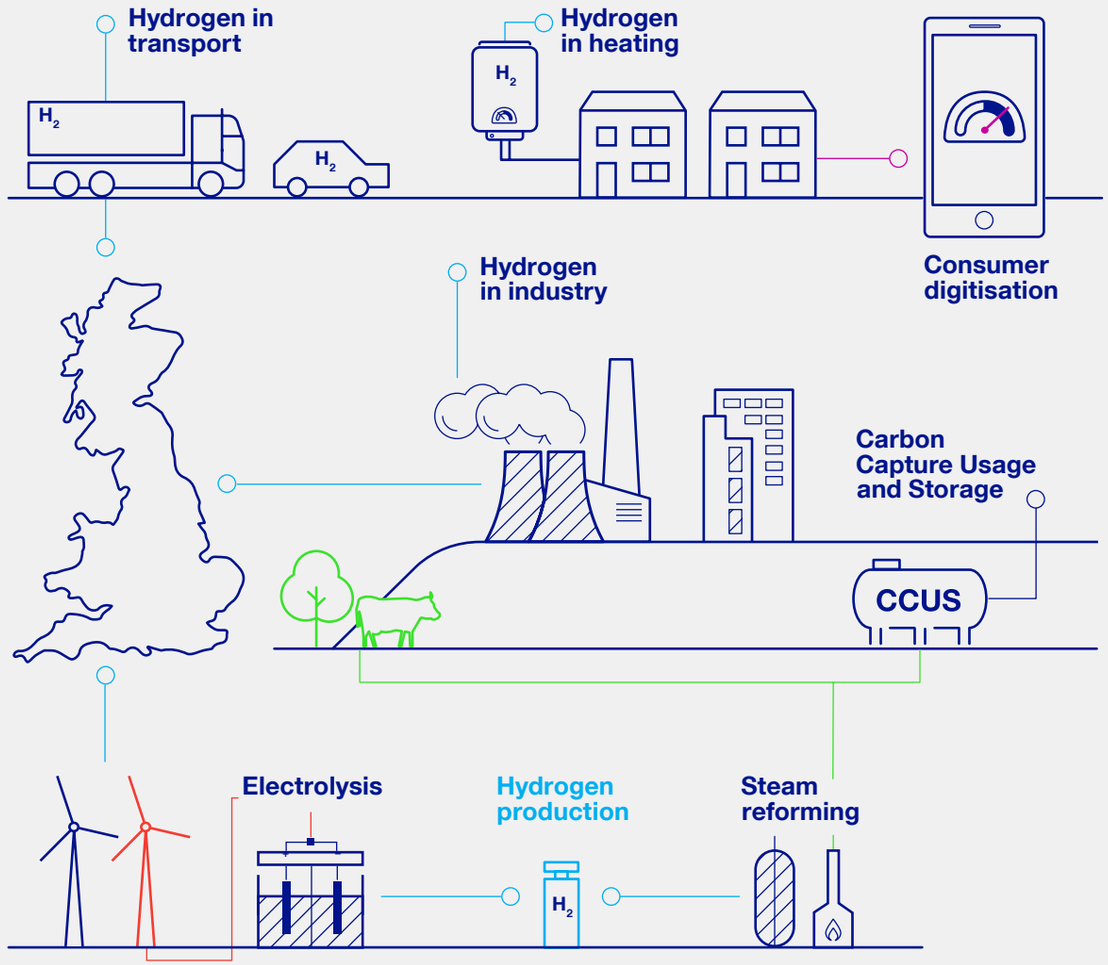
Why hydrogen?

Hydrogen, alongside other technologies, is expected to play a significant role in the decarbonisation of heating (and other sectors).

However, it is unclear how and where it will be produced and consumed, how it will be transported and when a hydrogen transition could begin.

For example, will hydrogen be produced from electrolysis and/or methane reforming? Will a hydrogen economy begin by being transported centrally through a transmission system or in a more region-by-region model?

This uncertainty creates the need to initially understand the broad market impacts of hydrogen in different production, consumption and transportation scenarios.



Defining GMaP focus areas for 2020

How GMaP focus areas will be explored

Explore | **Plan** | **Act**

Stage 1 (Scoping and understanding impacts):

To identify specific areas of exploration for **hydrogen**, given the uncertainty, the first step is to understand the broad impacts hydrogen could have on market operation over the next 2–10 years under different scenarios.

For **gas quality** and **balancing**, a scoping exercise will be carried out to identify where further work can be undertaken to drive immediate value to the consumer whilst supporting decarbonisation.

Stage 1 (Output):

For each focus area, a set of recommendations will be produced, taking into account whether market impacts are likely to occur in the short or long term, and what work is already being progressed by industry.

We are looking to deliver this by March 2020 for gas quality, balancing and hydrogen.

We will decide with the industry and stakeholders which recommendations from stage 1 to progress immediately, and which to consider in subsequent years.

Stage 2 (Projects):

Selected projects will be scoped, and undertaken with industry engagement throughout the remainder of 2020.

Stage 2 (Output):

Depending on the project, this could be:

- recommended modifications to existing codes (could be executed through existing market change processes)
- recommended creation of new codes or services (could be executed through existing market change processes)
- further exploratory work to consider for the next annual cycle of the GMaP, factoring in how developments in technology could impact the need to explore.

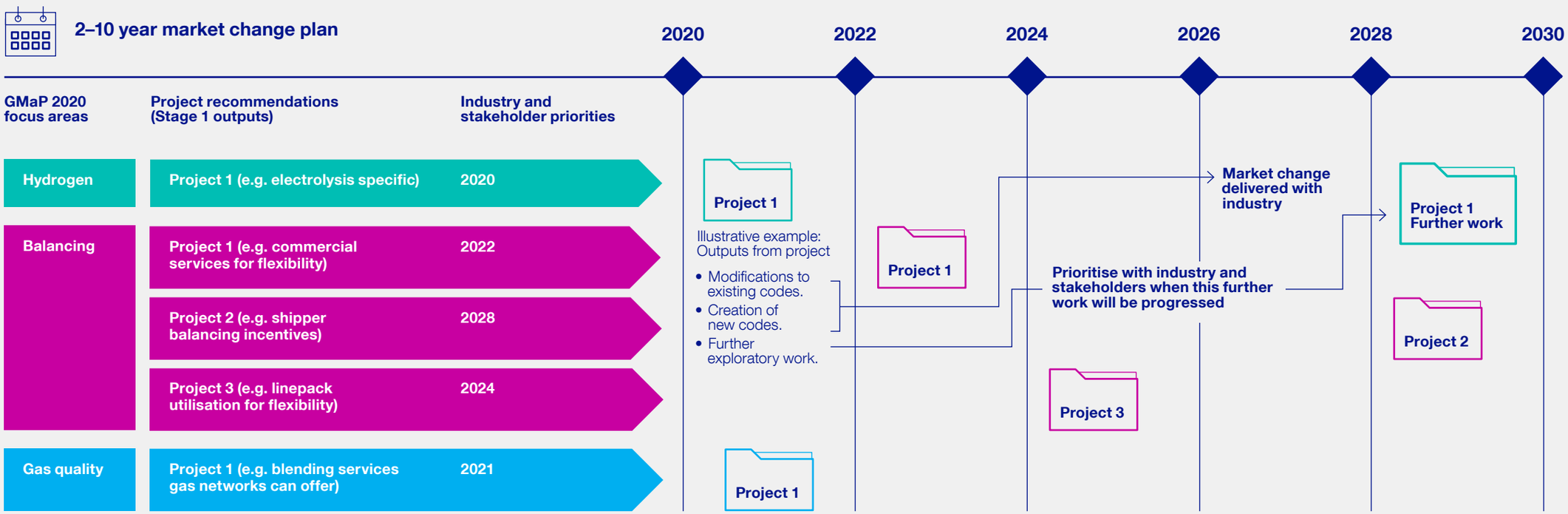
The potential benefit to market operation will be quantified for each recommendation.

Developing a 2–10 year plan for the gas markets

As focus areas are explored with industry, specific projects will be scoped and recommended for future work. Industry prioritisation through the FOG Steering Group will determine when over the next 10 years these projects will be progressed.

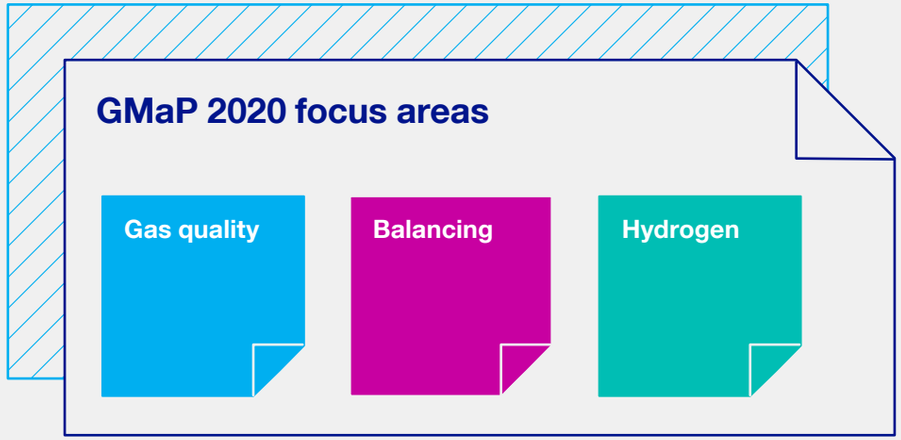
This process, alongside the outputs from the projects themselves, will help to form a 2–10 year change plan for the gas markets.

For illustrative purposes only: How the GMaP process will form a 2–10 year change plan for the gas markets



Developing a 2–10 year plan for the gas markets

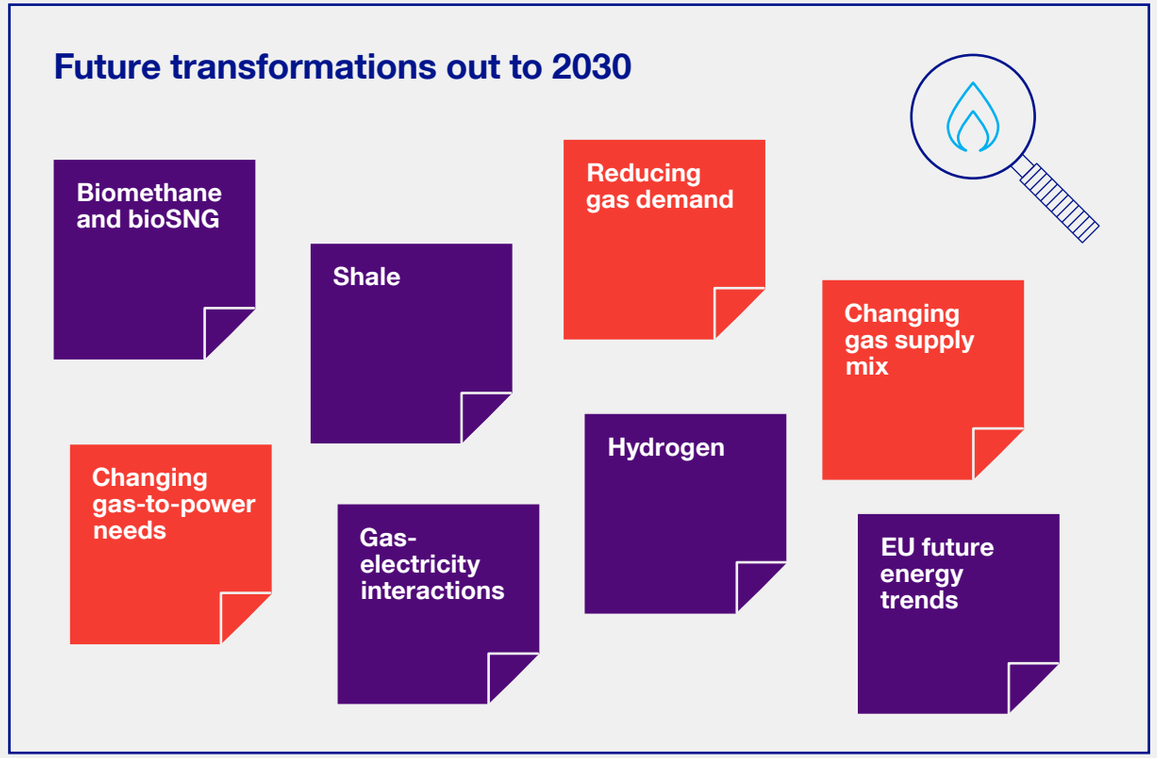
Each year, as an industry, we will refresh the GMaP to determine what focus areas and projects to explore, taking account of learnings and outputs from the previous year, policy and regulation developments, together with commercial and technical developments that could impact the gas markets.



We will regularly reprioritise based on the potential impact on market operation and probability of change to determine which area of focus would provide the most value for consumers.

Potential future GMaP focus areas

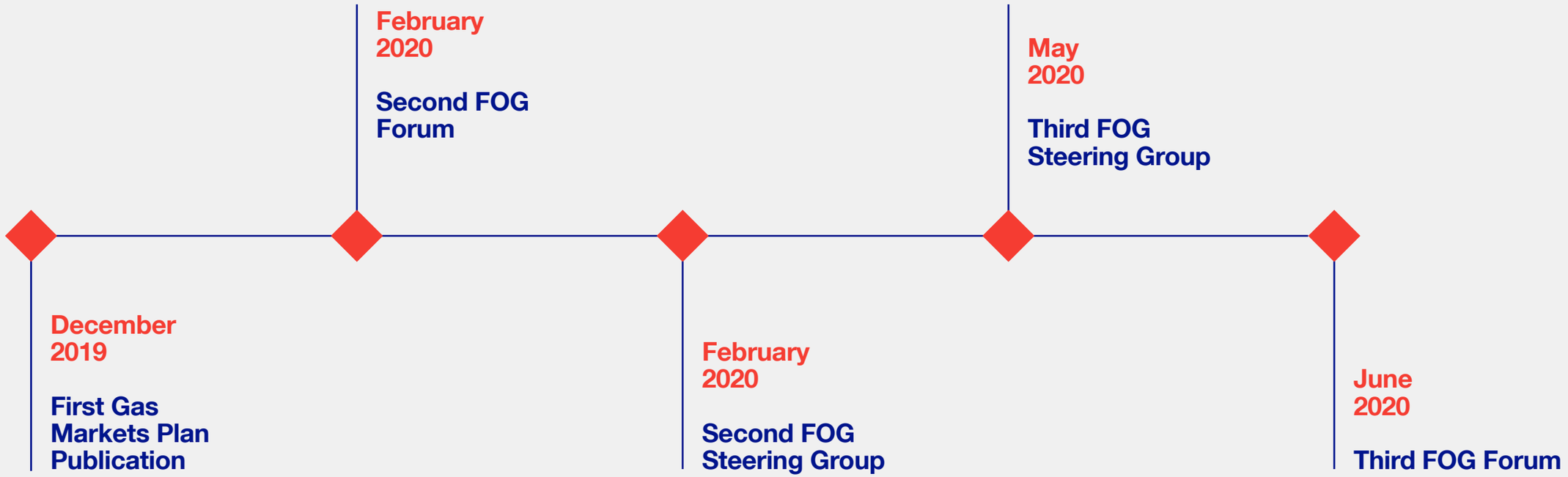
Given how rapidly the energy system is transforming, we will work with the gas industry and stakeholders to continually gather intelligence to keep up-to-date on what future transformations could occur over the next 10 years. This list already includes:



Get involved

Understanding what is of value to industry, decision-makers and stakeholders will be an instrumental part of building the GMaP programme.

There are lots of ways for you to get involved.



Get involved

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Glossary

Unabated
Unabated is where emissions have not been treated to remove carbon dioxide or other pollutants.

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[1] https://futureofgas.uk/news/future-of-gas-how-gas-can-support-a-low-carbon-future/
[2] https://futureofgas.uk/

How the gas landscape could change in the energy transition

[3] https://www.nationalgridgas.com/insight-and-innovation/gas-future-operability-planning-gfop
[4] http://fes.nationalgrid.com/fes-document/
[5] https://futureofgas.uk/news/future-of-gas-forum-may-2019/
[6] https://futureofgas.uk/news/introducing-the-future-of-gas-forum-steering-group/

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[7] https://futureofgas.uk/news/introducing-the-future-of-gas-forum-steering-group/
[8] https://www.nationalgridgas.com/insight-and-innovation/gas-future-operability-planning-gfop/understanding-within-day-behaviour

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[9] https://futureofgas.uk/

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