Delivering our 2030 ambition will yield significant emissions savings. Our modelling suggests that the use of low carbon hydrogen enabled by 5GW production capacity could deliver total emissions savings of around 41MtCO_2e between 2023 and 2032, equivalent to the carbon captured by 700 million trees over the same time period.[8] This covers the period of the UK's Fourth and Fifth Carbon Budgets (CB4 and 5), and will contribute to achieving our Nationally Determined Contribution (NDC) under the Paris Agreement of reducing emissions by 68 per cent compared to 1990 levels by 2030. Further scale up of low carbon hydrogen post-2030 would yield even larger emissions savings, and will play an important role in delivering CB6, to be set out in more detail in the government's forthcoming Net Zero Strategy.

Our 5GW ambition would also mean the creation of a thriving new hydrogen industry, which could support over 9,000 jobs and £900 million of GVA by 2030.[9] Government investment in hydrogen to de-risk early projects could unlock over £4 billion of private sector co-investment up to 2030.[10] Our ambition also sets us on a promising pathway post-2030. Our analysis shows that, under a high hydrogen scenario, up to 100,000 jobs and £13 billion of GVA could be generated from the UK hydrogen economy by 2050.[11]

Many countries around the world have signalled the importance of low carbon hydrogen in reducing emissions, and there is an expectation that a global market for trade in hydrogen will develop in the long term. However, it is unlikely that market will be mature by 2030, meaning that the UK cannot, and would not want to, rely solely on low carbon hydrogen imports. An over-reliance on imports could create risks around the security of supply for hydrogen and associated investment in the wider value chain. It would also reduce opportunities for UK companies to leverage domestic capabilities and strengths and translate these into clean growth opportunities. In contrast, moving quickly to develop a strong UK hydrogen economy by 2030 can help ensure security of supply and wider investment, create high-quality and sustainable jobs, and position UK companies to take advantage of opportunities in international markets.

We aspire to take a leading global role in developing low carbon hydrogen technologies and markets, working with our international partners including through existing initiatives for collaboration. This will be particularly important in the lead up to the UK hosting COP26 later this year, as we seek to turbo-charge the development and deployment of low carbon technologies that will help countries achieve their clean energy transitions – but will continue beyond COP26, as we pursue opportunities to work with other leading global hydrogen nations in helping to build a global hydrogen economy.

1.5 A strategic framework for the UK Hydrogen Strategy

In developing a UK hydrogen economy, it will be important that we set clear and consistent direction to give industry and investors confidence and certainty, whilst remaining flexible to ensure that we act on learning from early projects and can take decisions which offer the greatest decarbonisation and economic value in the long term. Our strategic framework informs the policy direction and commitments set out in this strategy, and will guide our actions over the course of the 2020s to provide a coherent long term approach.

Our vision

Our vision is that by 2030, the UK is a global leader on hydrogen, with 5GW of low carbon hydrogen production capacity driving decarbonisation across the economy and clear plans in place for future scale up towards Carbon Budget 6 and net zero, supporting new jobs and clean growth across the UK.

Our principles

Our principles will guide future policy decisions and government action, providing clarity on future policy direction for investors and users:

- **Long term value for money for taxpayers and consumers:** To deliver value for UK taxpayers and consumers we will seek to minimise the cost of action, and drive down costs over the long term, as we reach for our 5GW ambition and beyond to CB6 and net zero.
- **Growing the economy whilst cutting emissions**: We will harness opportunity to create new, high-quality jobs to support levelling up, including in transition from existing high carbon sectors. We will ensure that the actions we take are aligned to our net zero target, recognising that hydrogen production will need to become increasingly low carbon over time.
- **Securing strategic advantages for the UK:** We will nurture UK capabilities and technological expertise to grow new industries of the future, so that UK companies can position themselves at the forefront of the growing global hydrogen market. We will support private sector innovation, develop policy to mobilise private investment and promote UK export opportunities.
- **Minimising disruption and cost for consumers and households:** We will build on our successful hydrogen research and innovation to date to reduce costs, address risks and provide safety and technical assurance of technologies at commercial readiness, focusing on 'learning by doing' in the 2020s to minimise disruption and cost for consumers and households, and prime the UK market for expansion.
- **Keeping options open, adapting as the market develops:** There are uncertainties around the role of hydrogen in 2030 and out to 2050, including the likely split of production methods and scale of demand. We will seek to ensure optionality to deliver a number of credible pathways to 2050, bringing forward a range of technologies that could support our 2030 ambition and CB6 and net zero targets.
- **Taking a holistic approach:** We will focus on what needs to be done across the whole hydrogen system, supporting coordination across all those who need to play their part, and ensuring we stay in step with developments in the wider energy system as the UK drives to net zero.

We recognise that there may be trade-offs within and between some of these principles at any point in time. For example, the levelised cost of hydrogen using electrolytic production technology is higher today than for CCUS-enabled hydrogen, and it will take time for production to reach industrial scale. That said, with the right support today, this technology presents a genuine opportunity for export of UK expertise and technology, and there is also significant potential for longer-term cost reduction with continued innovation, scale up of manufacture and access to increased amounts of low-cost renewable electricity. This is a clear example of the need to seek balance across these principles in current and future policy decisions.

Challenges to overcome

There are a number of strategic challenges across the value chain that will need to be overcome in order to produce and use hydrogen at scale in the UK:

- **Cost of hydrogen relative to existing high carbon fuels:** Although costs are likely to reduce significantly and rapidly as innovation and deployment accelerate, hydrogen is currently much more costly to produce and use than existing fossil fuels.

- **Technological uncertainty:** While some technology is already in use, many applications need to be proven at scale before they can be widely deployed.

- **Policy and regulatory uncertainty:** Hydrogen is a nascent area of energy policy; industry is looking to government to provide capital and revenue support, regulatory levers and incentives, assurance on quality and safety, direction on supply chains and skills, and broader strategic decisions.

- **Need for enabling infrastructure:** The use of hydrogen will require new networks and storage, as well as integration with CCUS, gas and electricity networks.

- **Need for supply and demand coordination:** Developing a hydrogen economy will require overcoming the 'chicken and egg' problem of needing to develop new production and use cases in tandem and balancing supply and demand, including potentially through storage over time.

- **Need for 'first-of-a-kind' and 'next-of-a-kind' investment and deployment:** Scaling up a low carbon hydrogen economy will require addressing 'first mover disadvantage' and other barriers to bring forward early projects while establishing a sustainable environment for increasing investment and deployment in the longer term.

The chapters that follow discuss these challenges in further detail and outline how government will overcome them to develop a thriving UK hydrogen economy.

Outcomes by 2030

As we head towards 2030, we will measure our success across a range of strategic outcomes:

- **Progress towards 2030 ambition:** 5GW of low carbon hydrogen production capacity with potential for rapid expansion post-2030; hope to see 1GW production capacity by 2025.
- **Decarbonisation of existing UK hydrogen supply:** Existing hydrogen supply decarbonised through CCUS and/or supplemented by electrolytic hydrogen injection.
- **Lower cost of hydrogen production:** A decrease in the cost of low carbon hydrogen production driven by learning from early projects, more mature markets and technology innovation.
- **End-to-end hydrogen system with a diverse range of users:** End user demand in place across a range of sectors and locations across the UK, with significantly more end users able and willing to switch.
- **Increased public awareness:** Public and consumers are aware of and accept use of hydrogen across the energy system.
- **Promote UK economic growth and opportunities, including jobs:** Established UK capabilities and supply chain that translates into economic benefits, including through exports. UK is an international leader and attractive place for inward investment.
- **Emissions reduction under Carbon Budgets 4 and 5:** Hydrogen makes a material contribution to the UK's emissions reduction targets, including through setting us on a pathway to achieving CB6.
- **Preparation for ramp up beyond 2030 – on a pathway to net zero:** Requisite hydrogen infrastructure and technologies are in place with potential for expansion. Well established regulatory and market framework in place.
- **Evidence-based policy development:** Modelling of hydrogen in the energy system and input assumptions improved based on wider literature, qualitative and quantitative evidence and real-world learning. Delivery evidence from innovation and deployment projects collected and used to improve policy making.

We are developing clear indicators and metrics to monitor progress against these outcomes (set out in Chapter 5). This will be important to ensure that we remain on track to rapidly scale up activity across the hydrogen value chain over the course of the 2020s – so that we can realise our 2030 vision, and can position the UK hydrogen economy for scale up beyond this to CB6 and net zero, while making the most of the opportunities that hydrogen holds for UK businesses and citizens.

As our policy work progresses, we will provide regular updates to the work and actions outlined in this strategy – with the first of these updates expected in early 2022. We intend to publish these updates at half-yearly intervals to provide a clear signal of policy direction and provide industry and our other stakeholders with certainty as our thinking develops.

1.6 Hydrogen in Scotland, Wales and Northern Ireland

Developing a hydrogen economy is a whole-UK story, with potential to produce and use low carbon hydrogen right across the UK and provide local economic benefits, in support of UK and devolved administration net zero plans. The government is working with the devolved administrations to support research and innovation and deployment of low carbon hydrogen technologies, and there are already pioneering projects and companies producing and using low carbon hydrogen across Scotland, Wales and Northern Ireland.

Scotland has a key role to play in the development of a UK hydrogen economy, with the potential to produce industrial-scale quantities of hydrogen from offshore and onshore wind resources, wave and tidal power, as well as with CCUS – supported by a strong company base and valuable skills and assets in oil and gas, offshore wind, and energy systems. Economic analysis for the Scottish Government suggests that Scotland could deliver 21-126TWh of hydrogen per year by 2045, with up to 96TWh of hydrogen for export to Europe and the rest of the UK in the most ambitious scenario, delivering significant jobs and local economic benefits.[12] The Scottish Government published a Hydrogen Policy Statement in December 2020, which set out their vision for the development of a hydrogen economy in Scotland and ambitions for renewable and low carbon hydrogen generation. A Hydrogen Action Plan will be published later this year, supported by a £100m programme of investment from 2021 to 2026.[13]

Scotland is home to a number of world-leading hydrogen demonstration projects that are helping determine the role that hydrogen could play in Scotland and the UK's future energy system. The European Marine Energy Centre in the Orkney Islands has a £65 million portfolio of renewable hydrogen projects that is still growing – providing a smaller-scale example of elements of a hydrogen economy (see case study below). Aberdeen is host

to 25 hydrogen double decker buses which have helped establish the infrastructure to support an ecosystem of over 60 hydrogen fuelled vehicles of many shapes and sizes – a catalyst for the Aberdeen Hydrogen Hub initiative, which seeks to become one of the key model hydrogen regions in Europe. The H100 neighbourhood trial project in Fife is building a 100 per cent electrolytic hydrogen production and distribution network and installing 300 homes with new hydrogen boilers to demonstrate hydrogen for domestic heating in the UK (see case study at Chapter 2.4.3). In March 2021, the UK and Scottish Government also outlined plans to each invest £50m as part of Heads of Terms for the Islands Growth Deal, to support the future economic prosperity of Orkney, Shetland and the Outer Hebrides, including several projects providing support for hydrogen.[14]

Orkney Islands: BIG HIT project

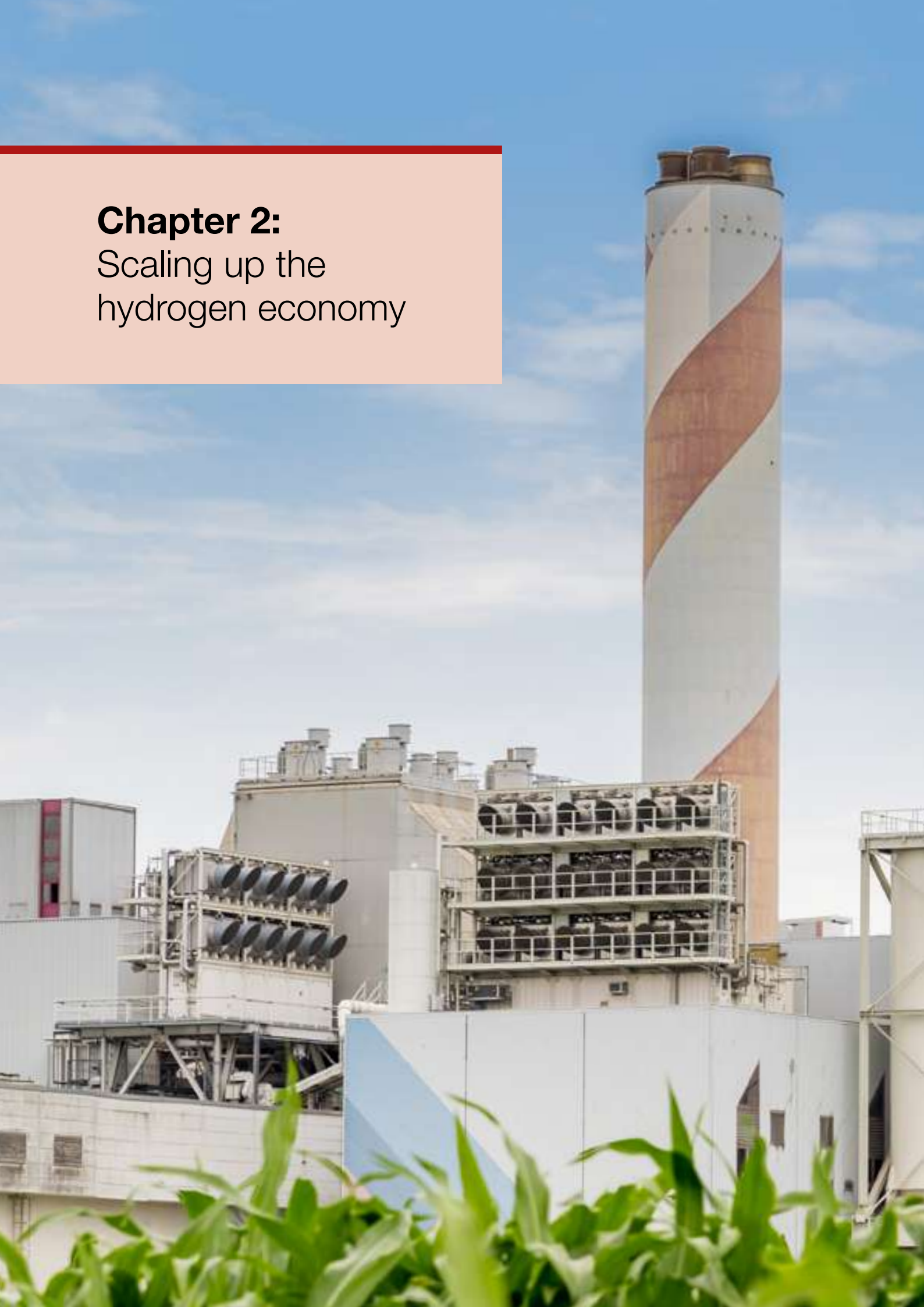
BIG HIT (Building Innovative Green Hydrogen Systems in Isolated Territories) is a six-year, Orkney based demonstration project which aims to create an integrated low carbon and localised energy system establishing a replicable model of hydrogen production, storage, distribution and use for heat, power and transport. Funded by the Fuel Cells and Hydrogen Joint Undertaking, the project builds on Orkney's Surf'n'Turf project – an innovative community renewable energy project using wind and tidal energy to produce hydrogen. State-of-the-art Proton Exchange Membrane (PEM) electrolysers in Eday and Shapinsay Islands produce hydrogen from electrolysis, using locally generated wind and tidal energy. This hydrogen is stored and used for heat, power and transport in the surrounding area. BIG HIT positions Orkney as an operational and replicable small scale Hydrogen Territory: the learning from BIG HIT will support wider replication and deployment of renewable energy with fuel cell & hydrogen technologies in isolated or constrained territories.

Wales has significant opportunities for low carbon hydrogen production and use. Its offshore wind and tidal and wave power potential, strong infrastructure networks and ports, research and development strengths, skills base and readily available internal markets provide a platform for deployment of hydrogen and fuel cell technologies under a favourable policy environment. The Welsh Government published a hydrogen pathway report in December 2020[15] and is now finalising its strategic position on hydrogen, which it will publish in early autumn 2021. A complementary Welsh Hydrogen Business Research and Innovation for Decarbonisation (H2BRID) initiative is also being developed for launch around the same time to support the challenges set by the Welsh hydrogen pathway and invest in innovative hydrogen projects across Wales.

Wales is home to several pioneering hydrogen companies, projects and research clusters. Welsh SME Riversimple is designing, building and testing innovative hydrogen fuel cell electric vehicles. The Dolphyn FLOW study is exploring the feasibility of a 100-300MW commercial hydrogen wind farm off South Wales, to be expanded in future, with hydrogen pipelines to strategic locations along the Milford Haven waterway for transport and heat applications, and potentially to Pembroke Dock for marine operations. The Hydrogen Centre, part of the Baglan Energy Park at Neath Port Talbot, is the focal point for a series of collaborative projects between the University of South Wales and other academic and industrial partners. The Centre focuses on experimental development of renewable hydrogen production and novel hydrogen energy storage, as well as further research and development of hydrogen vehicles, fuel cell applications and hydrogen energy systems. The UK Government also recently announced capital funding of up to £4.8m (subject to business case) for the Holyhead Hydrogen Hub, a demonstration hydrogen production plant and fuelling hub for HGVs to serve freight traffic at Holyhead and port-side vehicles, which could be operational by 2023.

Northern Ireland is likewise well-positioned to accelerate hydrogen innovation and deployment, with its significant wind resource, modern gas network, interconnection to Ireland and Great Britain, availability of salt cavern storage and strong reputation for engineering and manufacturing. Northern Ireland Water will be procuring a new electrolyser for one of its waste water treatment works – the first project of its kind in the UK. The public transport operator, Translink, is introducing new hydrogen buses built by local company Wrightbus in Ballymena and is procuring a new hydrogen fuelling station. The GenComm project led by Belfast Metropolitan College has received funding from both the EU and UK Government to trial hydrogen production via electrolysis for hydrogen buses. The Department for the Economy is currently consulting on policy options for a new Energy Strategy, including on hydrogen, which will set out Northern Ireland's energy focus and direction to 2050 and is expected to be published at the end of the year.

The UK Government is committed to working closely with the devolved administrations – including through the joint government-industry Hydrogen Advisory Council – to harness the UK's full potential to develop a world-leading hydrogen economy, and to make sure that low carbon hydrogen can contribute to emissions reduction and clean growth across the United Kingdom.

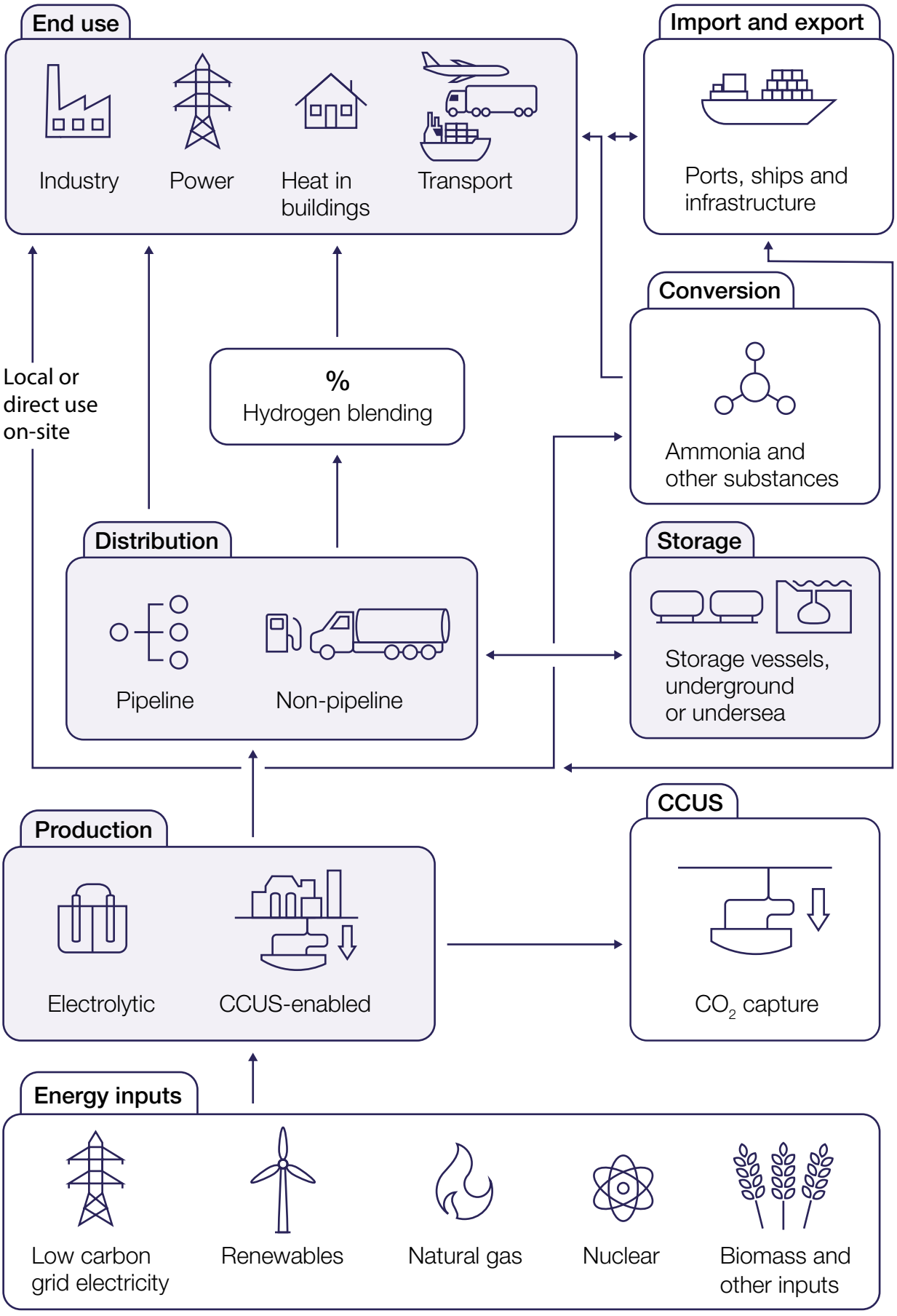


Chapter 2:
Scaling up the hydrogen economy

Our ambition is clear, and the opportunities are great. Government cannot do it alone – we will need the collective efforts of industry, the research and innovation community and the UK public to be able to scale up the hydrogen economy over the coming decade to achieve our 2030 ambition. We know that action is needed across the entire hydrogen value chain in the 2020s to support commercial, technical and user readiness for new technologies and to create a thriving market for hydrogen and associated goods and services. The progress we make this decade will be crucial to pave the way for further scale up of production and use from 2030 so that hydrogen can contribute to achieving CB6 and net zero.

This chapter sets out government's whole-system approach to developing a UK hydrogen economy. It begins by outlining our 'roadmap' for the 2020s, our vision for how the hydrogen economy will develop and scale up over the course of the decade and into the 2030s, and how to enable this. The chapter then considers each part of the hydrogen value chain in detail and outlines the key steps that are needed to realise our 2030 ambition and position us for achieving our CB6 target. The chapter also sets out how we will create a thriving hydrogen market, supported by market and regulatory frameworks and with buy in and engagement from consumers and citizens. Further detail, including on demand by sector, factors influencing hydrogen supply mix, and analysis of the main barriers to hydrogen uptake across the value chain, is set out in our analytical annex.

Figure 2: The hydrogen value chain



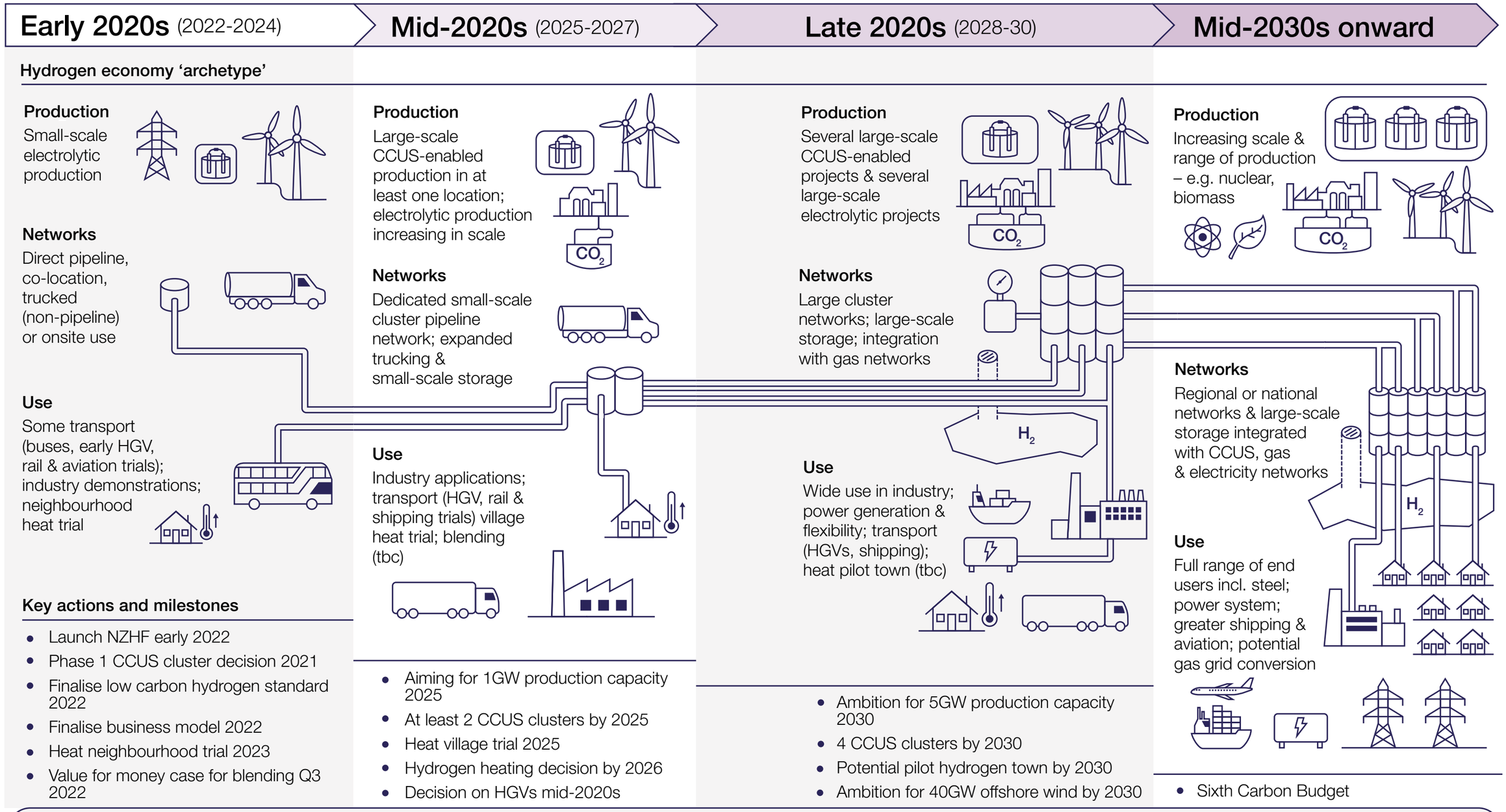
2.1 2020s Roadmap: a whole-system approach to developing a hydrogen economy

Our 2020s Roadmap (Figure 2.1 below) sets out our vision for how we expect the hydrogen economy will develop and scale up over the course of the decade, and what may be needed to enable this, framing the detail set out in the strategy. Developed in collaboration with industry through the Hydrogen Advisory Council, it is not a critical path, but is intended as a shared understanding and guide for what government and industry need to do during the 2020s to deliver our 2030 ambition and position the hydrogen economy for ramp up beyond this for CB6 and net zero.

The roadmap takes a 'whole-system approach' to developing the hydrogen economy, setting out how government and industry need to coordinate and deliver activity across the value chain and supporting policy, and how this will evolve over time. This will help bring forward early projects to build out the supply chain and enable learning by doing, while establishing the longer-term frameworks needed to develop a mature, competitive hydrogen economy and capture the resulting economic opportunities for the UK.

The roadmap is based around archetypes of a hydrogen economy we would expect to see in the early 2020s, mid-2020s and late 2020s, as well as by the mid-2030s for CB6. For each archetype, it sets out what supporting policies or activities need to be in place to deliver, with further detailed actions and commitments set out in the rest of the strategy. This roadmap and further detail offers a blueprint for implementation which will guide our work over the coming months and years.

Figure 2.1: Hydrogen economy 2020s Roadmap



Key actions and milestones

Early 2020s (2022-2024)

- Launch NZHF early 2022
- Phase 1 CCUS cluster decision 2021
- Finalise low carbon hydrogen standard 2022
- Finalise business model 2022
- Heat neighbourhood trial 2023
- Value for money case for blending Q3 2022

Mid-2020s (2025-2027)

- Aiming for 1GW production capacity 2025
- At least 2 CCUS clusters by 2025
- Heat village trial 2025
- Hydrogen heating decision by 2026
- Decision on HGVs mid-2020s

Late 2020s (2028-30)

- Ambition for 5GW production capacity 2030
- 4 CCUS clusters by 2030
- Potential pilot hydrogen town by 2030
- Ambition for 40GW offshore wind by 2030

Mid-2030s onward

- Sixth Carbon Budget

Supporting policy and activity: what needs to be in place to deliver?

- Networks & storage infrastructure
- Regulatory frameworks
- Market frameworks
- Grant funding
- Research & innovation
- Sector development
- International activity & markets
- Public & consumer awareness
- Private investment
- Industry development & deployment

Supporting policy and activity: what needs to be in place to deliver?

	Early 2020s (2021-2024)	**Mid-2020s** (2025-2027)
Networks & storage infrastructure	Pipeline/ non pipeline/ co-location infrastructure in place Storage requirement and type(s) established for range of pathways (clusters, heat, power system) Decentralised storage in place	Dedicated networks in place/ repurposed, expanded trucking & necessary centralised storage in place Links in place with existing gas, & electricity & new CCUS networks Future of gas grid decision, informing future network/ storage infrastructure development
Regulatory frameworks	Networks delivered through existing regulatory and legal framework Regulatory signals (e.g. H_2 readiness) in place Wider standards (e,g. safety and purity) updated/in place Critical first-of-a-kind deployment barriers addressed Planning and permitting regimes in place	Initial network regulatory and legal framework in place including potentially blending Initial system operation in place Further deployment barriers addressed – purity, installation, equipment Gas billing methodology in place
Market frameworks	Hydrogen business model (BM) finalised and in place Wider market framework structures and implications for BM understood Low carbon hydrogen standard in place Revenue support (RTFO) in place for transport sector	Dedicated revenue support framework, financial arrangements & wider market frameworks in place and driving private investment Market framework aligned to wider energy system frameworks Hydrogen potentially blended into existing gas grid
Grant funding	Capital grant funding mechanisms in place driving investment across production, as well as end use e.g. industry, transport	Capital grant funding supporting investment & project delivery alongside revenue support
Research & innovation	Programmes in place coordinating effort, support & de-risking/ demos for production, industry, transport, storage, heating R&I ecosystems in place supporting supply chain development	Programmes in place & de-risking of less developed technologies for late 2020s/30s Questions addressed as technologies developed & deployed

Supporting policy and activity: what needs to be in place to deliver?

	Late 2020s (2028-2030)	**Mid-2030s onward**
Networks & storage infrastructure	Large dedicated networks & storage in place (new or repurposed)	Regional & potentially national distribution networks in place Multiple storage sites in place Import/export infrastructure in place
Regulatory frameworks	Long-term regulatory and legal framework and role for regulation in place to support network expansion Long term system operator(s) in place Necessary regulations, codes and standards addressed and in place	Framework in place enabling cross-border pipeline/ shipping trade Regulatory framework adapted as market matures
Market frameworks	Long-term market frameworks, financial arrangements & market design in place	Competitive open market in place including path to subsidy free production and use
Grant funding	Possible role for capital grant funding supporting investment & project delivery alongside revenue support	Competitive market drives bulk of private sector investment
Research & innovation	Programmes support and accelerate next generation technology development	Well-established R&I ecosystem continues to drive forward technological advances

Supporting policy and activity: what needs to be in place to deliver?

	Early 2020s (2021-2024)	**Mid-2020s** (2025-2027)
Sector development	Sector & government work to develop UK supply chains & skills base	Framework in place to support supply chain & skills development, maximising value to UK Plc.
International activity & markets	Key technology & regulatory barriers identified through coordinated effort/ info sharing Early progress made on technology innovation & cost reduction, standards & policy/ regulatory coordination	Coordinated innovation, policy & regulation delivering accelerated deployment across value chain in key markets
Public & consumer awareness	Critical end user consumer barriers understood e.g. heat, industry Civil society & regional stakeholders & community priorities understood	End user consumer barriers addressed for early projects Civil society, regional stakeholders fully engaged
Private investment	FEED and FID secured for early 2020s projects Strategic partnerships with key organisations in place Private investment secured for small scale projects Private capital for innovation in place Financial sector engaged on hydrogen	FEED & FID secured for large-scale CCUS enabled/ mid 2020s projects Private investment and financial arrangements secured unlocking deployment Private investment in demonstration/innovation Investment in workforce – training, resourcing
Industry development & deployment	Industry led technology development & testing across value chain (including with government support) Government engaged, including through formal consultation Consumers engaged including communities local to key hydrogen projects / participating in hydrogen trials Early 2020s projects constructed	Continued technology development & testing across value chain to enable wider range of applications & less developed technology Demand for projects secured & necessary enabling infrastructure Leading larger scale on/off cluster projects developed – industry, power, transport, potentially blending Mid 2020s projects constructed

Supporting policy and activity: what needs to be in place to deliver?

	Late 2020s (2028-2030)	**Mid-2030s onward**
Sector development	UK supply chains & skills base well positioned to support increased deployment & exports of technology, expertise & potentially hydrogen	UK supply chains & skills base capitalise on accelerated UK/ global deployment through exports of technology, expertise & hydrogen
International activity & markets	Significant cost reduction & commercialisation driving deployment across multiple markets Framework to facilitate cross border-trade finalised	Framework for international hydrogen trade and competitive open market in place
Public & consumer awareness	Consumer acceptance secured across end use sectors Widespread support secured for hydrogen	Hydrogen widely accepted as a decarbonised energy source
Private investment	FEED and FID secured for large-scale electrolytic/late 2020s projects Private sector investment in manufacturing facilities aligned to UK sector development opportunities New market entrants as market framework demonstrated	FEED and FID secured for 2030s projects Private investment drives hydrogen economy expansion New market entrants & business opportunities secured
Industry development & deployment	Project partnerships in place to secure benefits of shared infrastructure Second phase on-cluster projects & new small-/ medium-scale projects Late 2020s projects constructed	Post 2030 development & testing delivered New projects cluster/off cluster constructed and existing expanded

2.2 Hydrogen production

Key commitments

- Ambition for **5GW of low carbon hydrogen production capacity by 2030**.
- We will launch the **£240m Net Zero Hydrogen Fund** in early 2022 for co-investment in early hydrogen production projects.
- We will deliver the **£60 million Low Carbon Hydrogen Supply 2** competition.
- We will finalise design of **UK standard for low carbon hydrogen** by early 2022.
- We will finalise **Hydrogen Business Model** in 2022, enabling first contracts to be allocated from Q1 2023.
- We will provide further detail on our **production strategy and twin track approach** by early 2022.

There are a variety of different ways to produce hydrogen; whether this hydrogen is low carbon or not depends on the energy inputs and technologies used throughout this process. Current hydrogen production in the UK is almost all derived from fossil fuels, using steam methane reformation from natural gas without capturing and storing any of the resulting carbon emissions. At present an estimated 10-27TWh[16] of hydrogen is produced in the UK, mostly for use in the petrochemical sector. There is currently only a very small amount of electrolytic hydrogen production in the UK, mostly for use in localised transport projects or trials for different uses of hydrogen, such as blending into the gas grid.[17]

As we scale up low carbon production through the 2020s, we expect the main production methods to be steam methane reformation with carbon capture, and electrolytic hydrogen predominantly powered by renewables. But these are not the only methods that could play a role in our future energy mix.

The main hydrogen production methods expected to be deployed in the 2020s, and some methods currently under development that could play a role in the future, are included in Table 2.2 below. Further detail is included in the analytical annex and report on Low Carbon Hydrogen Standards published alongside this strategy.