

Hydrogen Strategy briefing

Highlights

Nuclear hydrogen features regularly throughout the Strategy in reference to its contribution to hydrogen production in the 2030s. The majority of the Strategy is technology agnostic and nuclear is not excluded from any funding opportunities, although the document is more of a vision than a detailed plan. Multiple consultations and work with stakeholders over the next couple of years will help to develop the latter.

Low carbon hydrogen is essential to meeting the UK's Net Zero by 2050 target and is set to be used heavily in heat and transport, but more work is needed by the nuclear industry in these areas to inform and convince Government, as well as other low carbon industries, of its ability to supply demand from these end uses.

Production

In most of the pathways modelled by BEIS for CB6, hydrogen demand doubles between 2030 and 2035, and continues to increase rapidly over the 2030s and 2040s. By 2050, between **250-460TWh** of hydrogen could be needed across the economy, delivering up to a third of final energy consumption.

In the NIA's Hydrogen Roadmap, the industry believes that **75TWh** of this target could be fulfilled by nuclear hydrogen, although the majority of this production will come in the 2030s. The Government reaffirmed its commitment to pursuing large-scale and advanced nuclear technologies in the pursuit of Net Zero as well as exploring the possibility of nuclear hydrogen.

On the latter, the Strategy refers to nuclear hydrogen mostly as part of intended research and innovation plans as the main focus of the document are technologies deployable in the 2020s.

The Strategy identified the following production methods of nuclear hydrogen:

Production method	Definition	Carbon Intensity estimates ¹⁸	Levelised Costs ¹⁹	Role to 2030 / 2050	Next steps
Low temperature nuclear electrolysis	Low temperature electrolysis from existing nuclear facilities	Not modelled but expected low GHG emissions.	Not modelled by BEIS	Can apply existing technologies to current plants in the 2020s.	Further developments expected in 2020s.
High temperature nuclear electrolysis	High temperature nuclear power to electrolyse water	High temperature electrolysis: 4.8 gCO ₂ e/MJ H ₂ (LHV)	Not modelled by BEIS	Could develop hydrogen from advanced nuclear for 2030s	Further innovation and developments expected in 2020s.
Thermochemical water splitting	Direct splitting of water using very high temperature heat from advanced modular nuclear facilities	Not modelled but expected low GHG emissions.	Not modelled by BEIS	Could develop hydrogen from advanced nuclear for mid-late 2030s	Further innovation work to develop to commercial technology

BEIS made the following relevant commitments:

- Work with industry to deliver our ambition for 5GW of low carbon hydrogen production capacity by 2030. In doing so, we would hope to see 1GW of production capacity by 2025.
- £240m for the Net Zero Hydrogen Fund out to 2024/25 for co-investment in early hydrogen production projects. This will be launched in early 2022.
- £60m under the Low Carbon Hydrogen Supply 2 competition, which will develop novel hydrogen supply solutions for a growing hydrogen economy.
- Finalise design elements of a UK standard for low carbon hydrogen by early 2022.
- Finalise business models in 2022, enabling the first contracts to be allocated from Q1 2023.

They also identified several barriers that may be of interest to nuclear:

- Higher cost of low carbon hydrogen supply compared with fossil fuels
- The capital cost of retrofitting or replacing equipment to be hydrogen-ready

- Operational disruption of conversion and the subsequent costs associated with optimising new processes using hydrogen
- Operational risks associated with the security of supply of low carbon hydrogen, particularly in the short term while the market develops.

Market creation

This section primarily highlights Government plans to establish enabling regulatory frameworks as well as work on business models and funding mechanisms (BEIS currently favour Contracts for Difference (CfD) models) to support the scaling up of the hydrogen sector. A consultation on the latter was published alongside of the Strategy.

BEIS made the following relevant commitments:

- Develop further detail on our production strategy and twin track approach by early 2022.
- Undertake further work to understand and develop appropriate market frameworks to drive investment and deployment and transition to longer term competitive market frameworks. They will publish initial conclusions and proposals in early 2022.
- Continue to work with industry and regulators to identify, prioritise and address regulatory barriers faced by hydrogen projects. They will publish initial conclusions and proposals in early 2022.

They also identified several barriers that may be of interest to nuclear:

- Higher production and user costs (featured heavily in the media on the Strategy's release)
- Uncertainty in demand, policy and regulation, technologies that are not yet commercially viable, and investors
- Lack of hydrogen distribution and storage

Economic benefits

Research and innovation will benefit greatly from the development of a low carbon hydrogen sector in the UK, the Strategy says, as there are several technologies currently in development that are yet to be commercialised but will play a significant role in the 5GW by 2030 target and beyond.

The Government will work with the Hydrogen Advisory Council and other partners to better understand the scale, scope and type of private sector investment into hydrogen R&I in the UK, and how it can be further promoted.

BEIS made the following relevant commitments:

- Support hydrogen innovation as one of the ten key priority areas in the £1bn Net Zero Innovation Portfolio. £240m allotted already as referred to above.
- Work with experts including the newly established R&I Working Group under the Hydrogen Advisory Council to develop a hydrogen technology R&I Roadmap to inform public and private sector R&I investment and prioritisation.

The Strategy also set out its intentions to develop immediate and long-term plans for hydrogen skills and to commit to similarly ambitious targets as seen in the Offshore Wind and Nuclear Sector Deals. These plans will include reskilling of workers from high carbon industries, although these skills are likely to be transferred to the 'blue' hydrogen sector.

Next Steps

The Strategy was published alongside the following consultations:

- [Low Carbon Hydrogen Standards Consultation](#) – due **25 October 2021**
- [Net Zero Hydrogen Fund Consultation](#) – due **25 October 2021**
- [Hydrogen Business Model Consultation](#) – due **25 October 2021**