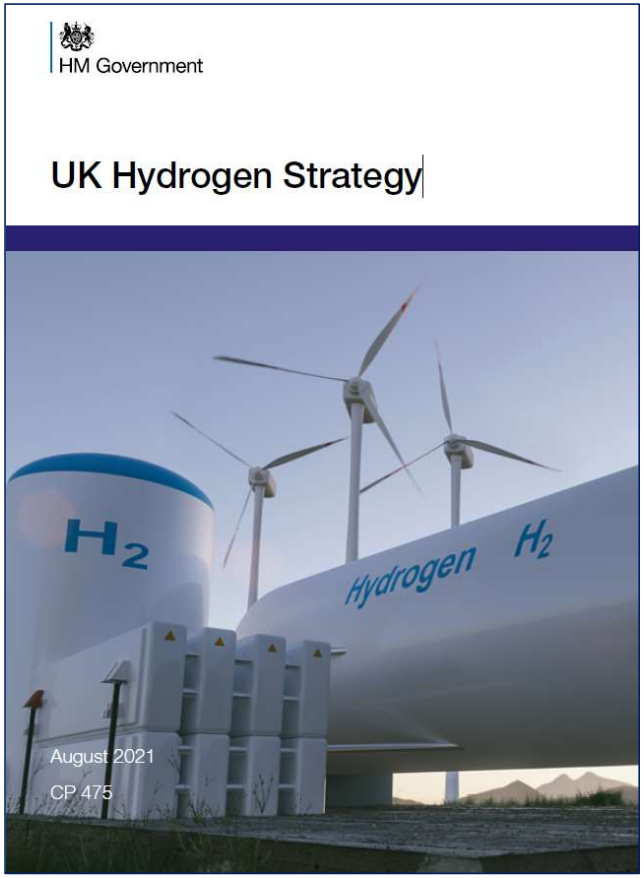
HMG & REA: Hydrogen from Waste and Biomass roundtable

Wednesday 27 July 2022



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Item 2 – HMG Policy Landscape H2 from Bio/Waste

To Cover

1. Introduction to policy officials from across BEIS, DEFRA and DfT.
2. Outline importance of hydrogen in meeting UK emission reduction targets.
3. Briefly describe strategic view and policy landscape relating to these production routes.

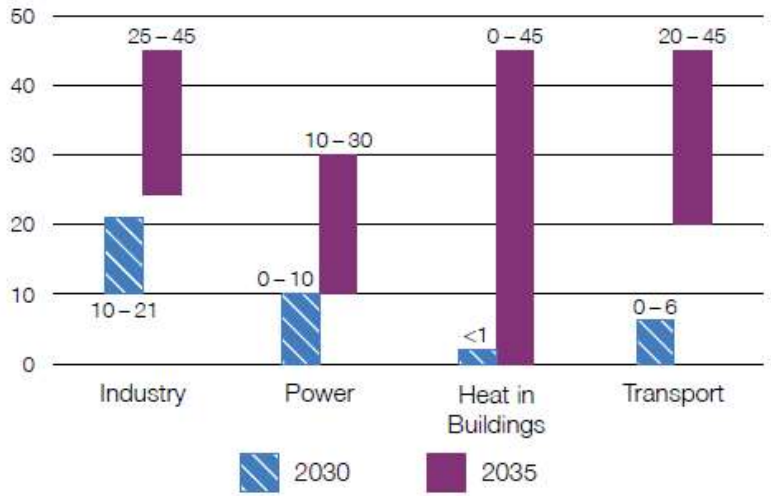
Questions

- Grateful if these can be saved for discussion later, in the interest of time.
- Feel free to post in the chat to come back to later on.

Hydrogen essential to meet net zero & the UK's energy transition

Decarbonising "hard to electrify" sectors.

Figure 2.4: Illustrative hydrogen demand in 2030 and 2035

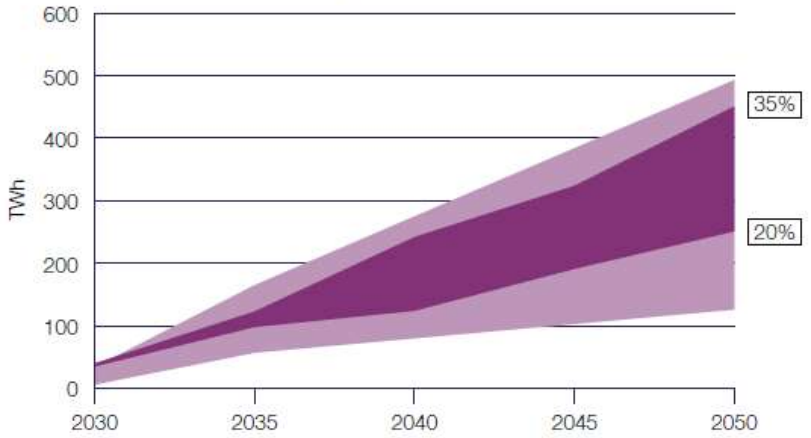


Economic opportunities – 12,000 UK jobs, £9bn investment unlocked based on current ambition.

Security – Multiple production routes provides resilience, can provide long term low carbon power storage at scale.

2050 Scale - Comparable in scale to existing electricity use in the UK.

Figure 1.2: Hydrogen demand and proportion of final energy consumption in 2050

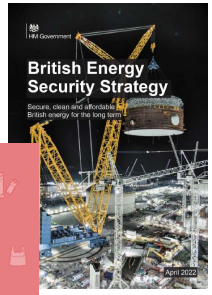


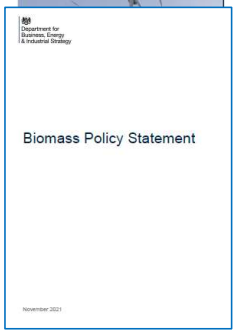
Source: Central range – illustrative net zero consistent scenarios in CB6 Impact Assessment. Full range – based on whole range from UK Hydrogen Strategy Analytical Annex. Final energy consumption from ECUK (2019).

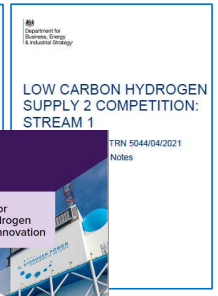
But - virtually no low carbon hydrogen production or use today.

- Clear role for government to provide strategic view and help overcome barriers.

HMG Policy Development – its been a busy time….







Innovation Support

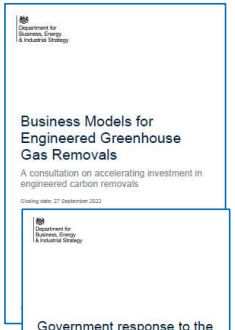
Strategy

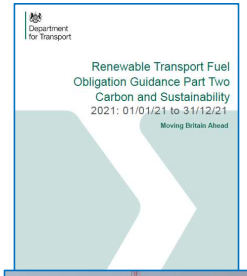
Standards

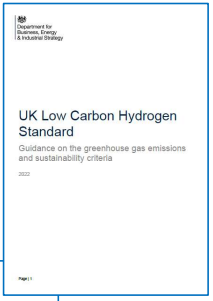
Capital Support

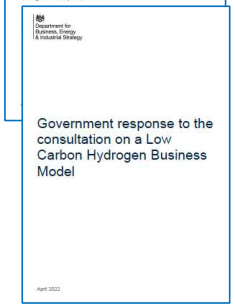
Revenue Support

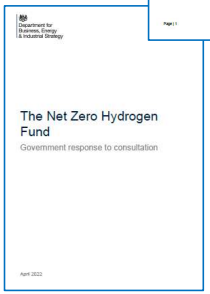
Low Carbon Hydrogen from Biomass and Waste











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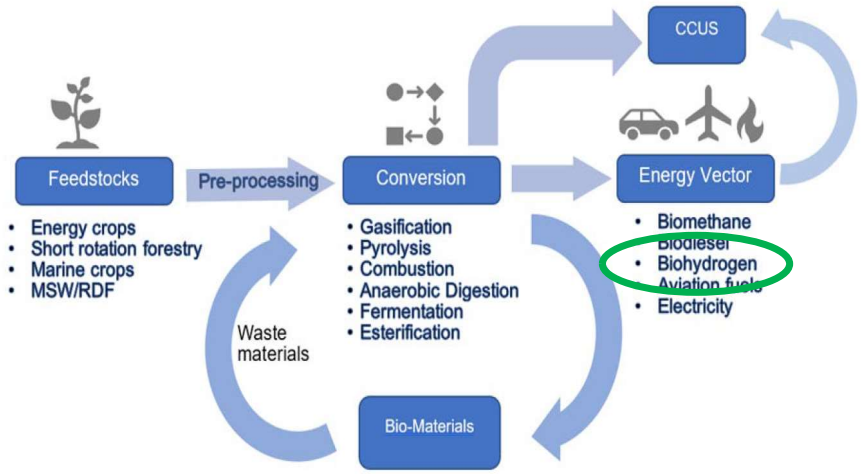
STRATEGY – BEIS H2 Production Strategy – Ben Harrop

Wider Energy Publications

- **CCC 6th CB Advice** – H2BECCS 5% H2 supply in 2030, 11% by 2050 (but could be more).
- **Net Zero Strategy** - BEIS modelling suggested H2BECCS could provide up to 20% of H2 demand by 2050.
- **BESS** - 10GW Low carbon H2 by 2030, 50% electrolysis.

H2 Strategy Update - Production Strategy Annex

- Potential of biomass (and waste routes) to be low carbon now but need to make best use of limited resource, avoid adverse consequences and seek consensus on accounting.
  - Biomass already supported by other policies some of which will deliver more carbon reduction – e.g. biomethane in the GGSS vs reformation to H2.
  - DEFRA waste reduction targets; waste-to-H2 recovery phase of the waste hierarchy.
- Negative emissions appear the driver for bio/waste routes to hydrogen – not the 'need for H2'. In general – gasification and pyrolysis with CCS get the most discussion in literature.
- But – mindful of not shutting down unduly to stifle development and may be cases where local conditions differ from strategic view.



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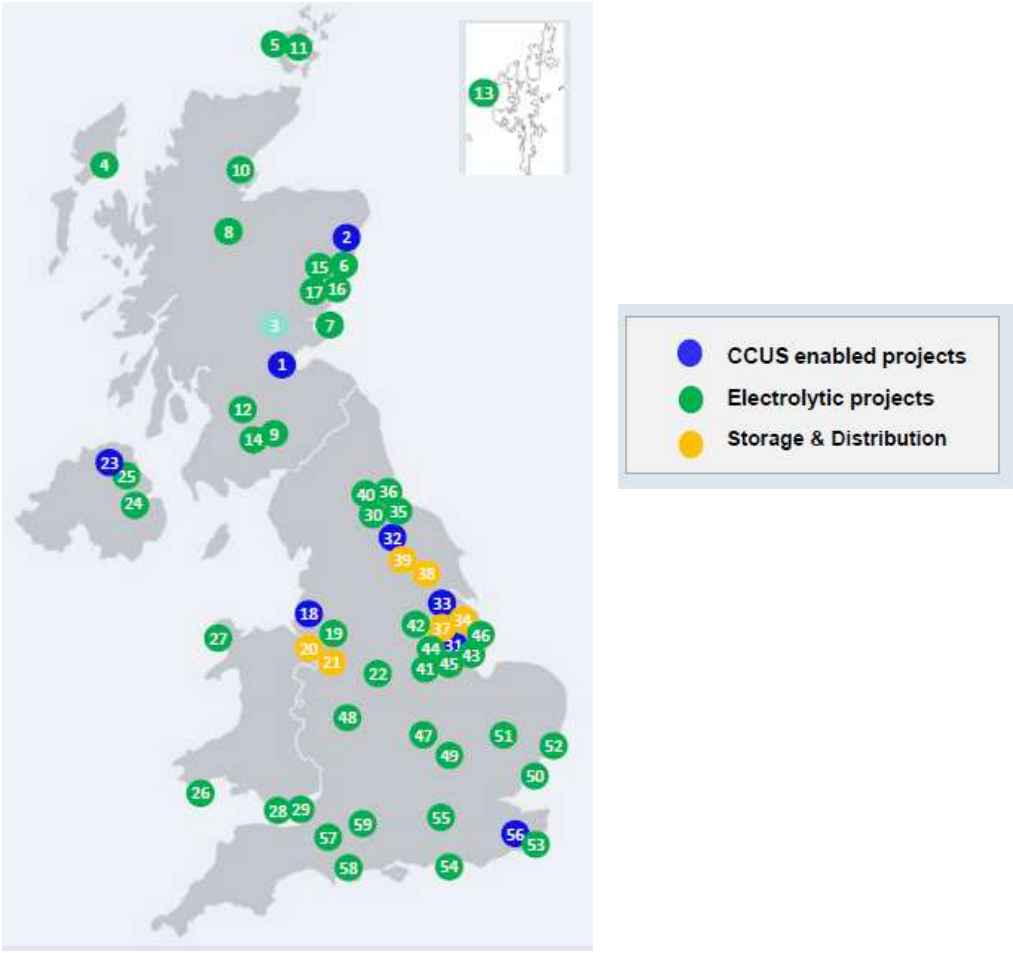
STRATEGY – BEIS Hydrogen Pipeline – Jonathan Swan

Overview

- Market intelligence tool to understand production / networks and storage projects and H2 development hubs in the UK.
- Indication of progress to 2030 production ambition.
- Plan regular updates to aid investment landscape.
- Welcome further engagement from projects.

Hydrogen Investor Roadmap – 2022

- Up to 20GW of potential production capacity identified.
- Mapped sample of production projects.
- Electrolysis, predominantly renewable, and CCUS-enabled methane reformation currently bulk of potential capacity.
- BUT - increasing number of projects developing 'wider production routes' - diversity likely to increase as more reach commercial readiness.



STRATEGY – BEIS Biomass Strategy – Anna Mikis

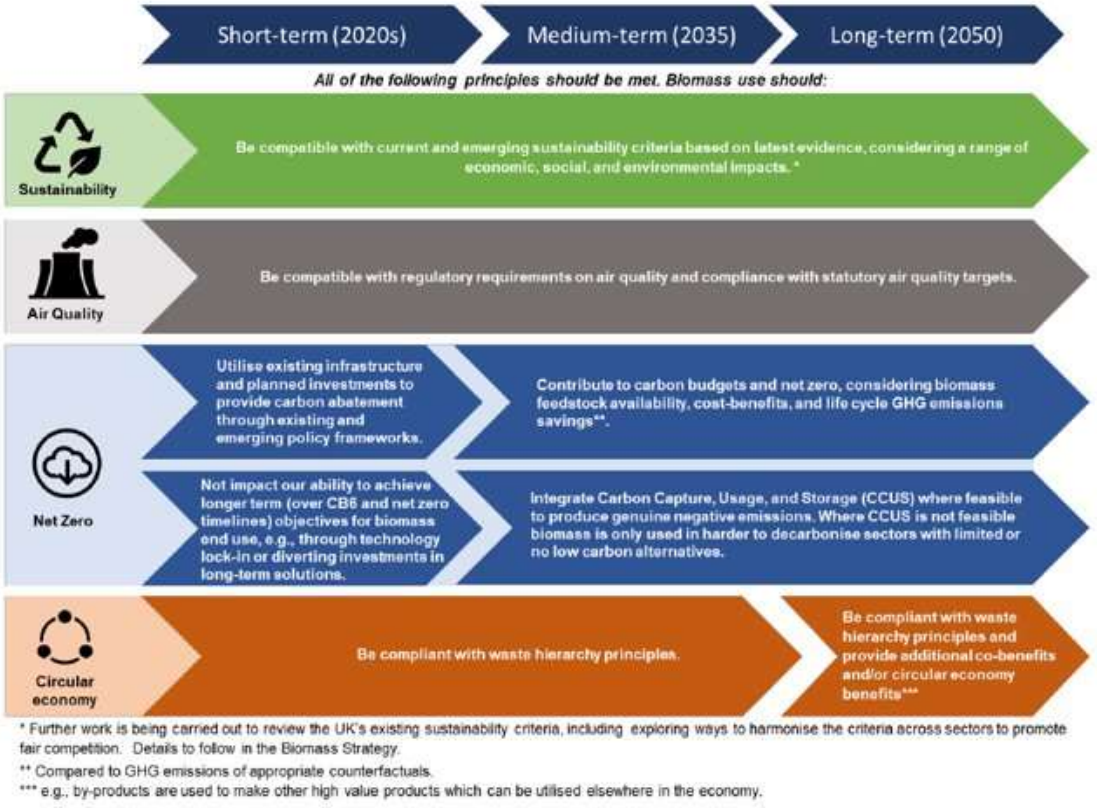
Biomass a limited feedstock in high demand for decarbonisation so important orientated to 'best use' where possible.

Biomass Policy Statement – Nov 21

- Introduced priority use framework and principles to inform 'best use'.
- H2 BECCS likely to sit well against the framework (subject to certain factors) – negative emissions, flexible energy vector, regulated sector.

UK Biomass Strategy – in development

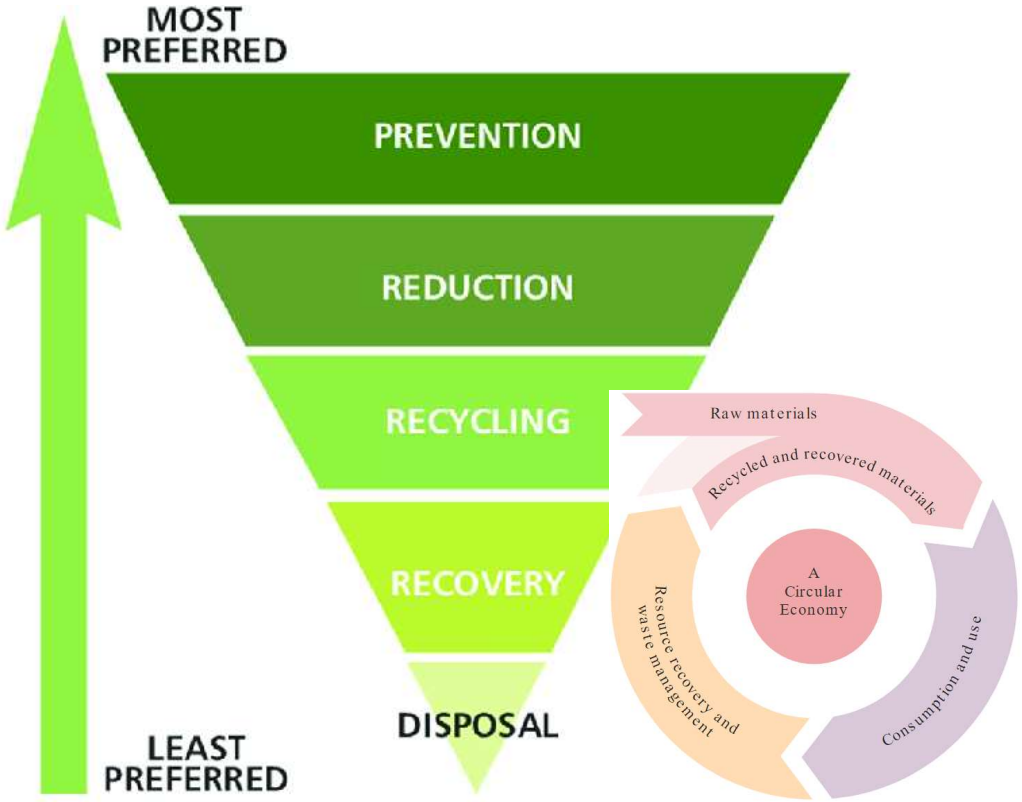
- Publication expected soon.
- Will consider:
  - Volume of available sustainable feedstock from domestic and international sources for variety of end uses, including BECCS.
  - Further detail of HMG position on future biomass use and policies required to support biomass across the economy.
  - Potential future improvements to biomass sustainability criteria to ensure biomass use delivers low-carbon energy or genuine net negative emissions when used in BECCS.



STRATEGY – Defra Waste and Resources Strategy and Recycling Consistency reforms

Waste and Resources Strategy

- **The Resources and Waste Strategy (2018)** sets commits Defra to the **waste hierarchy, a circular economy** and a municipal recycling rate of 65%.



Recycling consistency reforms

- Aim to **make recycling easier** and ensure that there is a comprehensive, **consistent service** across England.
- New requirements set out in the Environment Act 2021 will require all local authorities (LAs) and businesses to arrange for the **separate collection of** paper and card; plastic; glass; metal; **food waste** and garden waste
- **Anaerobic digestion (AD)** presents the best environmental outcome for the treatment of unavoidable food waste, due to the generation of bio-fuel and digestate
- Under the Environmental Permitting Regulations 2016, AD plants must have an Environment Agency (EA) permit to treat food waste.
- For digestate to contribute to a circular economy it must meet the Quality Protocol and PAS 110 requirements before land spreading can occur
- **These reforms will increase the amount of high quality food waste feedstock sent to anaerobic digestion, expanding the potential for H2 and CO2 from waste extraction.**

STRATEGY – Defra thinking on future feedstocks

Non-waste feedstocks

- Exploring potential role of domestic production of **perennial energy crops** (miscanthus and short rotation coppice) and **short rotation forestry** to support the UK's journey to net zero.
- Could play a role in supporting **low carbon energy generation** (alongside other uses in a growing bioeconomy) and also have benefits for **land-based carbon savings** and **nature**.
- Key questions relating to how these types of biomass fit into future vision of best multifunctional land use and what the end markets are for these types of biomass.
    - Specifically what scale and nature of demand might emerge from future markets for these products
    - Interested in REA members' views about potential for use of these types of materials, what key barriers exist to realising this potential

INNOVATION – BEIS Hydrogen Innovation Support – Katherine Woods

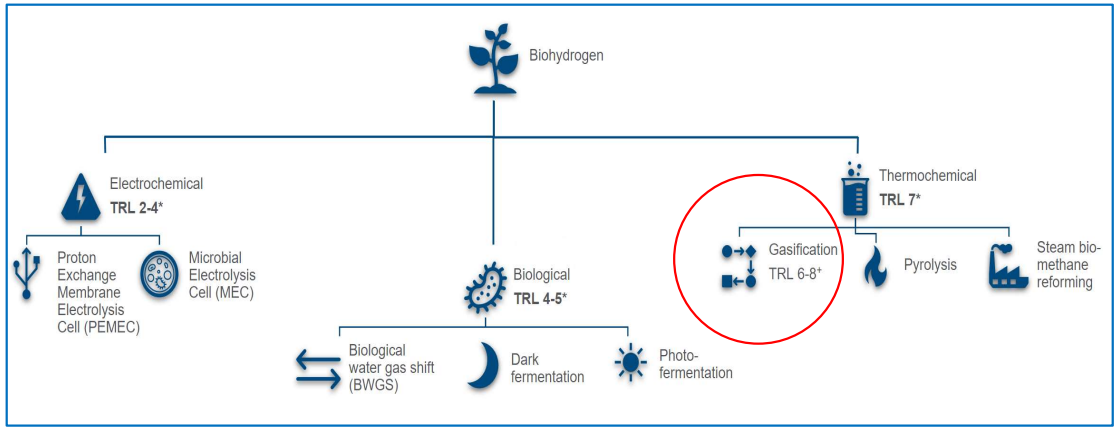
Net Zero Innovation Portfolio, 2021-2025

- £1bn of funding across 10 key areas – including Hydrogen and Bioenergy.
  - **Hydrogen Supply 2** flagship £60m support for H2 production and distribution solutions.
  - **Hydrogen BECCS** £30m to support bio-production routes.

BEIS Support for H2 R&I – 2022/23

BEIS Hydrogen BECCS Innovation Programme – competition now closed

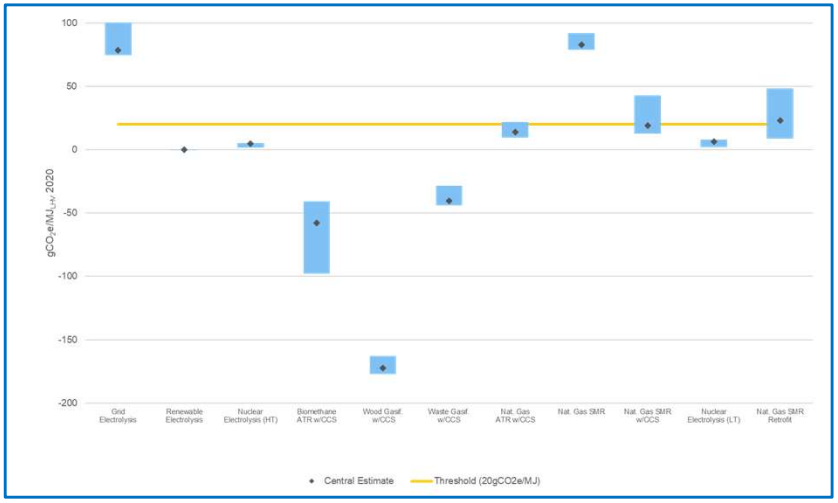
- **Objective:** Support development of technologies to enable the commercialisation and deployment of Hydrogen BECCS at scale // reduce the cost and greenhouse gas emissions associated with hydrogen BECCS technologies.
- Focussed on TRL 4-6
- 22 feasibility projects running in 2022 across 3 categories: **Feedstock pre-processing, Gasification components, Novel biohydrogen technologies**.

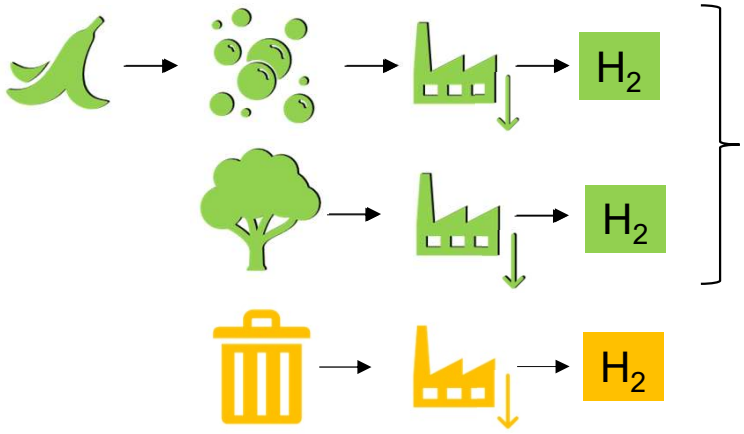


STANDARD - BEIS Low Carbon Hydrogen Standard – Henry Irvine

Overview

- Standard to ensure hydrogen supports under NZHF / Hydrogen Business Model is genuinely low carbon.
- Standard development supported by externally conducted research and consultation (Aug – Oct 2021)
- Standard finalised in July 2022. Plan to review at regular review points to reflect emerging evidence & pathways.
- BESS commitment to develop into certification scheme to underpin trade – upcoming consultation on scheme design.





Biomass and Waste under the Standard

- Direct land use change emissions included where relevant, indirect land use change emissions reported where relevant
- Additional requirements: land, soil carbon and forest sustainability criteria; minimum waste and residue requirement
- Biomethane can only be claimed if dedicated transport used
- Waste feedstocks not considered with counterfactuals
- Permanent storage of CO_2 needed for negative emissions

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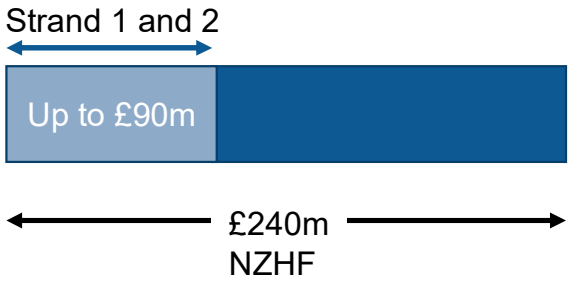
CAPITAL SUPPORT - BEIS Net Zero Hydrogen Fund Strands – Charlie Clay

Overview

- Up to £240 million, delivered 2022-25, to:
  - support new low carbon H2 production in early 2020s with upfront costs; and,
  - stimulate future project pipeline contributing to our 10GW 2030 ambition.
- Strand 1&2 is expected to have a budget of up to £90m and could be flexed as the Fund evolves over its lifetime



- UK-wide funding basis - funding from Devolved Administrations will be complementary rather than duplicative.

NZHF Scope and timings

	Scope	Timings	Biomass and Waste
Strand 1	DEVEX for FEED and post FEED costs.	Closed 22 June	Open to multiple tech types.
Strand 2	CAPEX for projects not requiring H2BM revenue support.	Closed 13 July	Open to multiple tech types.
Strand 3	CAPEX for projects requiring H2BM revenue support and outside of Phase 2 cluster sequencing process.	Opened 20 July 2022	First joint NZHF CAPEX - HBM revenue allocation round electrolytic only.
Strand 4	CAPEX for CCUS-enabled projects requiring H2BM revenue support that are part of Phase 2 Cluster Sequencing Process.	EOI 2022 Full application 2023	Open – where involved in cluster.

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REVENUE SUPPORT - BEIS Low Carbon Hydrogen Business Model – Ed Howe

Overview

- Provides H2 producers revenue support to help overcome the operating cost gap against fossil fuels and a return on investment.
- Funded via the **Industrial Decarbonisation and Hydrogen Revenue Support** (IDHRS) scheme initially.
- From 2025 at the latest, to be **levy funded** (subject to consultation and parliamentary approval).
- Up **to £100m allocated in 2022** for initial electrolytic hydrogen projects, plus **further round in 2023.**
- Funding envelope for up to 1GW of CCUS-enabled hydrogen to be agreed in 2022.
- TRL 7+ technologies.

Waste and Biomass under H2BM

- First joint NZHF-H2BM allocation round is **electrolytic only** – challenging timing and resourcing, informed by pipeline and wider complexities.
- Considering **wider technologies** for next year's allocation round - we will conduct a **market engagement** in **Spring 2023** on this.
- Aiming to move to **price competitive allocation** by **2025** as soon as **legislation** and **market conditions allow**.
- We are minded to include **different allocation rounds / pots** for **different production technologies**.
- Need to ensure complimentary with wider Greenhouse Gas Removal Business Model in development.

REVENUE SUPPORT – DfT Renewable Transport Fuel Obligation – Gareth Mottram

- LCF Support and monitor the Renewable transport fuel obligation (RTFO)
- Manage updates to the RTFO in line with the remit set out in the Energy Act (2004) (amends 2007).
    - This is focussed on using renewable transport fuels to decarbonise the UK
- All decisions have to take into account wider sustainability concerns including diversion of land and resources
- Developing long range strategies for low carbon fuels and biomass usage.
    - Biological feed stocks are a limited resource and are prioritised for direct applications where there are minimal process/system losses

What is the current position?

Waste biomass that is double counting can receive dRTFCs when converted into hydrogen.

- Recently published updates on RFNBO fuels and outlined requirements for reformed biohydrogen from next year
- Wastes converted through biomethane and reformation without CCS will not qualify for dRTFCs from next year

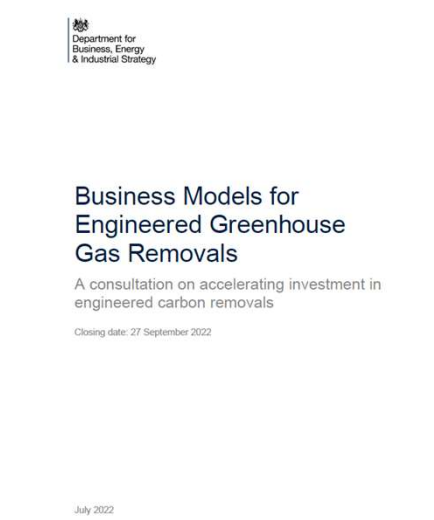
Method of production	Current eligibility	Proposed eligibility
Biomethane+SMR	Development	Regular
Biomethane+SMR+CCS	Development	Development
Biomethane+ATR	Development	Regular
Biomethane+ATR+CCS	Development	Development
Biomass gasification	Development	Development
Direct to hydrogen biological processes (e.g., fermentation)	Development	Development
RFNBO hydrogen	Development	Development

Table 1 Examples of current and proposed future levels of reward for renewable hydrogen supply under the RTFO

Definition of RFNBOs

1.2 RFNBOs are renewable liquid or gaseous transport fuels for which none of the energy content of the fuel comes from biological sources. These fuels are considered renewable where the energy content of the fuel comes from renewable energy sources[1] but excluding bioenergy. This means that RFNBOs could be made using electricity and/or heat from wind, solar, aerothermal, geothermal or water (including hydrothermal sources, waves and tides). RFNBOs cannot be derived from bioenergy sources and therefore would not be able to be derived from biomass, landfill gas, sewage treatment plant gas or biogases. As the available energy source of RFNBOs comes from electricity or heat, the input raw materials must contain no usable energy. In practice this means that RFNBOs must be made from either water and/or carbon dioxide (CO_2).

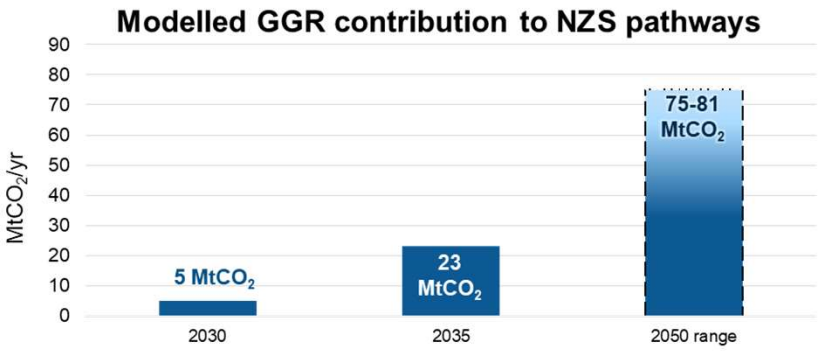
REVENUE SUPPORT – GGR Business Model – Ed Keyser



- BEIS is developing a contractual business model to provide revenue support for negative emissions
- Aims to enable large-scale deployment from the mid-to-late 2020s
- Technology-neutral approach to support a diverse portfolio of engineered GGRs
- GGR Business Model Expert Group will be set up to inform detailed policy design

Closes 27 September

Read and respond here



GGR Business Model and Hydrogen

- Hydrogen BECCS may need to deliver ~2.7 $MtCO_2$ negative emissions by 2035
- Negative emissions is likely to be the key strategic driver for Hydrogen BECCS in the near-term (e.g. late 2020s and early 2030s).
- Further work is required to determine the interaction between the Hydrogen BM and a future GGR BM in relation to Hydrogen BECCS. We are inviting views from project developers on the most appropriate route to incentivising this technology.

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