Department for
Business, Energy
& Industrial Strategy

Electrolytic Hydrogen Working Group Meeting

Hydrogen Business Model and Hydrogen Production teams

10 February 2022

Note: The content in the following slides does not represent BEIS policy, but provides ideas for discussion

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Meeting etiquette

Please can you:

- ✓ Turn off your video when not speaking
- ✓ Mute your microphone when not speaking
- ✓ Raise questions via the chat function or put your hand up

This meeting will be recorded for BEIS internal use only.

Welcome and forward look

Background/proposed terms of working

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Agenda

	Item	Time	Lead
1	**Welcome and forward look**	12:00 – 12:15 15 mins	Alison Conboy
2	**Electrolytic Hydrogen Allocation – update on Market Engagement document proposals**	12:15 – 12:35 20 mins	Corinne Ribbons & Jacqueline Gomes
3	**Low Carbon Hydrogen Standard – additionality update**	12:35 – 13:20 45 mins	Anton Orpin-Massey
4	**AOB and close**	13:20 – 13:30 10 mins	Alison Conboy

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Forward look – Hydrogen Policy landscape

Implementation of Hydrogen Strategy roadmap and commitments

Consultation period closes
(25th October 2021)

Analysis of Consultation Responses
(Late 2021)

- **Aim to publish government response to consultations**
- **Aim to publish indicative Heads of Terms for the Business Model contract**
- **HBM allocation process update for projects not eligible to participate in the ongoing CCUS cluster sequencing process.**
- **Launch of Net Zero Hydrogen Fund**
- **Aim to finalise design of Low Carbon Hydrogen Standard**

(Early 2022)

Aim to finalise Business Model
(2022)

Publication of Net Zero Strategy
(October 2021)

- **Develop further detail on our production strategy, including less developed production methods**
- **Publish a Sector Development Action Plan**
- **Reviews of Networks & Storage**

(Early 2022)

View to allocate first support contracts for projects reaching final investment decisions
(from 2023)

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Net Zero Strategy

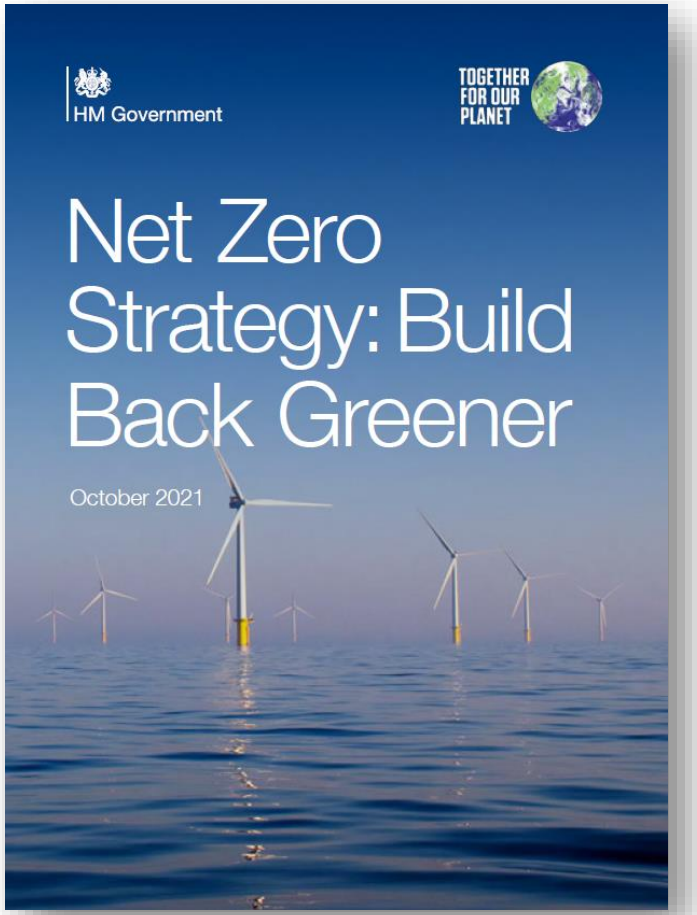
We have set up the **Industrial Decarbonisation and Hydrogen Revenue Support scheme (IDHRS)** to fund our new hydrogen and industrial carbon capture (ICC) business models and help unlock up to £6bn of private sector capital by 2030.

We will initially be providing **up to £100 million to award contracts of up to 250MW electrolytic hydrogen production capacity in 2023**, with further allocation in 2024, meaning 500MW of electrolytic hydrogen production projects will be operational or in construction by 2025.

We will also announce a **funding envelope for CCUS-enabled hydrogen and industrial carbon capture in 2022**, allowing us to award CCUS-enabled hydrogen projects and deliver up to 1.5GW of total hydrogen production capacity by the mid-2020s.

Subject to costs falling, **we will hold future allocation rounds for all types of eligible low carbon hydrogen production** to help meet our deployment ambitions of 5GW of hydrogen production capacity.

From 2025, revenue support for hydrogen production will be funded by a levy, subject to consultation and legislation being in place. We will work to ensure fairness and affordability in developing the levy.



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NZHF Scheme Design: Allocation Strands

The Net Zero Hydrogen Fund (NZHF), announced in the Prime Minister's Ten Point Plan, is worth up to £240 million and will be delivered between 2022 and 2025. It is intended to stimulate new low carbon hydrogen production in the early 2020s by supporting projects with upfront costs; and stimulate a future pipeline of projects to contribute towards meeting our 5GW ambition by 2030.

NZHF Strands	Eligible tech types	Application launch (TBC)
Strand 1: DEVEX (e.g. for FEED studies)	**All tech types**	**Window 1, early 2022 (further rounds tbc)**
Strand 2: CAPEX for projects that do not require a hydrogen specific business model	**All non-CCUS tech**	**Window 1, early 2022 (further rounds tbc)**
Strand 3: CAPEX for electrolytic projects that require a HBM	**Electrolytic**	**Window 1, late June/early July 2022 Window 2, 2023**
Strand 4: CAPEX for CCUS-enabled projects that require a HBM	**CCUS-enabled**	**CCS Cluster Sequencing Track 1 phase 2, November 2021**

Focus for today's discussion

Electrolytic Hydrogen Allocation – update on Market Engagement document proposals

10 February 2022

Aims of meeting

- Update group on progress since last meeting

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Electrolytic Hydrogen Allocation – update on Market Engagement document proposals: Context

Strategic Objectives

- Support projects to deploy at scale at the earliest opportunity, advancing 1GW by 2025 (5GW by 2030) aspiration.
- Kickstart the low carbon hydrogen economy across the UK.
- Deliver carbon savings to allow us to stay on track to meet CB5, CB6 and other net zero commitments.
- Ensure the application process is simple and accessible for applicants.
- Ensure the application process is fair and transparent. This includes being consistent where appropriate with the approach taken for Phase 2 and other NZHF only application windows.

Indicative timeline

- Market Engagement exercise: April 2022.
- Launch application window: late June/ early July 2022.
- Close application window: late September/ early October 2022.
- Following eligibility check and evaluation, confirm shortlist of projects and commence negotiations: from spring 2023.
- Sign contracts and award funding: we expect all contracts to be signed no later than December 2023.
- Projects in operation: by end of 2025.

What's the minimum amount of time you would require to complete an application if the window opens in late June/ early July?

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Electrolytic Hydrogen Allocation – update on Market Engagement document proposals: Proposed eligibility criteria

Criterion	Notes and questions
Located in the UK	• Commitment to support decarbonisation across the UK in line with 2050 net zero target and Carbon Budget 6 obligations.
New build hydrogen production facility	• Hydrogen Strategy aim to stimulate investment in new production capacity.
Electrolytic hydrogen production facility	• Allows for better comparison between projects with similar technologies in first allocation round and ensures the assessment remains on track to meet ambitious timelines • Feedback received at 13/12 session and pipeline analysis suggests that almost all projects likely to meet other eligibility criteria will be using electrolytic hydrogen production technology, for example 'TRL of 7 or more' and 'COD of end of 2025'.
COD of end of 2025	• 1GW by 2025 (5GW by 2030) aspiration. • Feedback received at 13/12 session suggested March 2025 would not be feasible for large scale projects
TRL 7 or above	• Ensures projects are at an appropriate stage to be operational by FY25; helps filter out projects where innovation funding is more appropriate.
Identified at least one offtaker	• Indicates project is commercially viable if it were to receive funding, though further assessment likely to be done on offtaker arrangements in evaluation criteria (like phase 2) • Aim to cover a range of possible end users.
Identified an electrolyser supplier	• Gives assurance that the project is sufficiently developed in concept if it were to receive funding, and that carbon reduction benefits can be realised.
Minimum capacity of 5MW	• Strategic aim to bring forward larger projects which will achieve scale up. • Intelligence suggests that small-scale projects (1-2 MW) are unlikely to need HBM support and can deploy through CAPEX alone. • 5MW reflects nascent stage of hydrogen market; we do not want to be overly restrictive at eligibility. • If following the market engagement period BEIS receives more information to suggest there is a much larger pipeline, we may consider if 10MW is more appropriate.
Meets the Low Carbon Hydrogen Standard	• Ensures hydrogen being produced is sufficiently low carbon to help meet decarbonisation goals.
Demonstrate access to private finance	• Ensures projects are commercially viable.

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Electrolytic Hydrogen Allocation – update on Market Engagement document proposals: Proposed evaluation criteria

- **Deliverability** – Assess viability and credibility of the plant, offtaker, energy input source & h2 T&S to be ready by 2025.
- **Environmental Impacts** – Assess CO2e intensity of plant and possibly overall emission reduction impact like phase 2 to reflect size & offtaker switching. Considering also assessing other environmental impacts e.g. air quality and water disposal plans.
- **Costs** – Levelised Cost of Hydrogen calculation (LCOH).
- **Economic Benefits** – Jobs, skills investment, wider community benefits.
- **Market Development & Learning** – Evidence of planning and collaboration on development of future production, networks and offtakers. Sharing learnings from innovative tech.
- **See next agenda item re additionality – potential for this to be considered as an evaluation criteria**

UK Low Carbon Hydrogen Standard: Low Carbon Electricity Input and Additionality

10 February 2022

Aims of meeting

- Update group on options for low carbon electricity input and additionality
- Seek views on practical application

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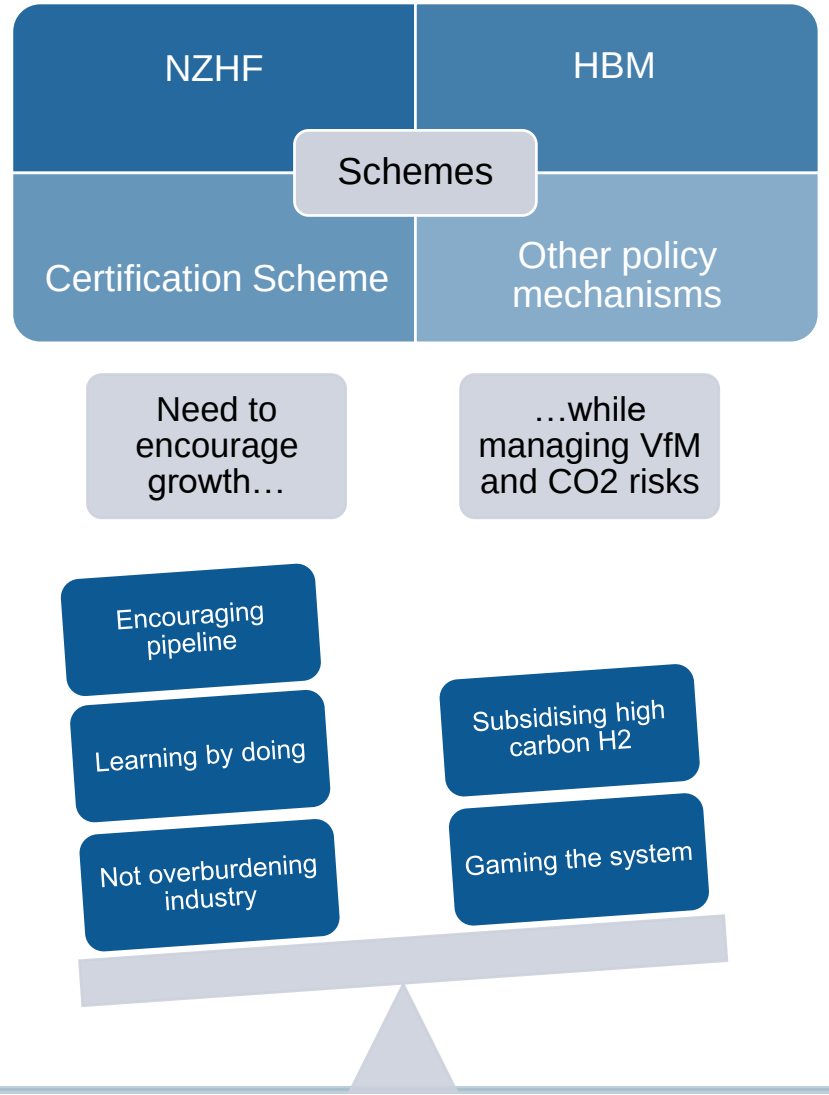
UK Low Carbon Hydrogen Standard

- The standard **will define what is meant by low carbon hydrogen**.
- The standard will establish:
  - **a threshold** for the amount of greenhouse gas emissions**;** and
  - a **methodology** for calculating emissions.
- Intent of standard is to ensure any new low carbon hydrogen production HMG supports makes a **direct contribution to our carbon reduction targets.**
- Could be developed into a **certification scheme to underpin deployment** of low carbon hydrogen production, supporting market development and **support future international trade**.
- Need to consider cost / burden to industry of complex **compliance requirements**.
- Consulted on the options considered as **part of the UK Hydrogen Strategy Package** and invited stakeholder views and evidence.
- Debate on emissions intensity of different production methods highlights the **important role of the standard**.



Low Carbon Electricity Input and Additionality

Two key questions to resolve on low carbon electricity input and additionality as part of the UK Low Carbon Hydrogen Standard:

Threshold: 

- What requirements are needed for electrolysers to demonstrate they are compliant with the emissions threshold in the standard (esp. grid connected)?

Additionality: 

- Do we need an additionality requirement to ensure hydrogen production doesn't divert low carbon electricity from other grid users, and to support deployment of new low carbon generation for hydrogen production?

Aims of today's session;

- Update on key considerations across options on low carbon electricity input
- Gather any final views on options for electricity input aspects of the Standard
- Set out next steps, expected publication dates and opportunities for future engagement

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Low Carbon Electricity Input: Options Considered in Consultation

	 **Option 1. Allow use of electricity grid mix without further conditions**	 **Option 2. Physical Links**	 **Option 3. Traded Activities**	 **Option 4. Traded Activities with further conditions**
How this works	• **Allow hydrogen producers to plug into the grid for all, or a part, of their production operations, without further conditions.** **Unless geographical or temporal data could be provided this would require use of the grid average.**	• **Low carbon electricity use is guaranteed by physical links e.g;** **- Off grid** **- No import from the grid** **- Use of curtailed electricity** **Could allow use of Physical Power Purchase Agreements (PPAs)**	• **Low carbon electricity use is guaranteed based on traded activities, including;** **- Guarantees of Origin (REGOs)** **- Bilateral PPAs with REGOs**	• **Low carbon electricity use is guaranteed based on traded activities, with further conditions such as;** **- Temporal/geographical correlation** **- Additionality requirements (all or a % of power from new build generation, or fund contribution)**
Pros	• Flexible option which allows electrolysers to be located anywhere. Easier to administer than other options (low cost, clear).	• Easier than other options to administer (low cost, clear). Precedent from international regimes. Easy to demonstrate that low carbon electricity has been used.	• Flexible option which allows electrolysers to be located anywhere (still uses grid mix). Ensures renewable electricity input accounted for.	• Benefits of Option 3, plus potential to bring further benefits (e.g. limiting peak demand on the grid, ensuring that electricity generation is additional)
Cons	• The grid mix is currently high carbon intensity; it is only likely to be sufficiently decarbonised from at least 2030 onwards. Hydrogen only as low-carbon as the grid allows.	• Likely to exclude many projects (requires co-location), impacting deployment. May mean greater balancing risk e.g. storage requirements for h2 production)	• Potentially more complex to administer. Without further conditions, impact limited to that of the trading scheme used (e.g. REGOs)	• Potentially more complex data requirements. Depending on further conditions, could impose extra requirements which could exclude projects

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Additionality: Options Considered in Consultation

Option	Pro's	Con's
1. No Additionality Requirement: Allow Producers to use existing generation assets for hydrogen production	- Simple to administer, inclusive & predictable. - Could use other policy instruments to ensure additionality e.g. low carbon electricity targets, incentivisation through allocation assessment.	- GHG emissions could increase if additional power demand from H2 Production is not met by low carbon generation in short-term. - Reliant on alternative measures e.g. CfD and other low carbon electricity deployment.
2. New Build Requirement: Require that all or a percentage of power used has to come from new build low carbon power facilities	- Ensures low carbon electricity isn't being diverted away from the grid. - Likely to lead to lowest emissions.	- Has a large impact on capital requirements for hydrogen producers and could be considered to disadvantage them compared with other electricity users.
3. Fund Contribution: Require that all low carbon electricity users pay a fixed rate per kWhe amount for grid electricity that has to go into a separate fund for low carbon power development/deployment	- Lower cost for H2 Producers than alternatives (e.g. new build requirement).	- Could disadvantage hydrogen producers over other sectors.

Low Carbon Electricity Input and Additionality: Principles

Threshold: overarching principles being considered for low carbon electricity input

Principle	Description of Evidence/Accounting Requirements	Examples
1. Energy Attribute Information	• Demonstrate exclusive ownership over the energy attributes of the low carbon electricity generated, to avoid the risk of double counting.	• 'Behind the meter' (on-site self-generation) contracts. •Renewable Energy Guarantees of Origin (REGOs). • Other contractual information.
2. Low Carbon Electricity Generation Sourced	• All projects to evidence that low carbon power has been sourced and consumed by the hydrogen producer.	• Proof of links to a low carbon generation source, via Power Purchase Agreement (PPA) or other contractual arrangement. • Could be part of the procurement strategy, but not required for all inputs (e.g. some grid import not linked to a low carbon source via PPAs could be permitted).
3. Temporal Correlation Between Generation & Consumption	• Proof electricity was consumed by the electrolyser around the same time the low carbon generator was generating. The stricter the matching, the higher the degree of certainty, but the higher the burden for compliance. We are considering whether any temporal correlation requirements are needed in the Standard.	• 30-min electricity settlement period showing compliant grid intensity, matched to metering data to prove it matches hydrogen production data. Could allow longer averaging periods.

Low Carbon Electricity Input and Additionality

Temporality: In order to ensure electrolysers operate flexibly, balanced against the need to develop the hydrogen economy, we have considered a range of options;

Option 4.	Pro's	Con's
1. No temporal correlation requirements – use REGOs + price signals (traded activities)	- Simple to administer, inclusive & predictable - Reflects needs of producers for grid mix - Could restrict unlimited use with caps on non time linked REGOs or only allow bundled REGOs.	- No limit on use of higher carbon grid mix - May undermine credibility of the standard - Known concerns with the system e.g. greenwashing
2. Energy Tag Initiative: Allowing use of hourly energy certificates (although not likely to be fully operational until 2023).	- More time synchronous monitoring of carbon intensity of electricity used. - Encourages more optimal electrolyser behaviour.	- Industry led scheme not yet in operation; doesn't align with timeframes at present.
3. Allow some use of averaging between low carbon generation and consumption e.g. over the course of a day, week, month or year, and averaging of zero and higher carbon inputs.	- Ensures threshold is met over a set period, but allows flexibility in use of grid imports - Allows a broad range of inputs e.g. grid mix, PPAs etc.	- Some inputs would be above the standard threshold. - Could be complicated to implement, and burdensome to trace.
4. Introducing more granular temporality requirements: e.g. per 30 minute settlement period consignments must be compliant	- Highest credibility - Encourages lowest carbon inputs	- Likely to rule out grid use most of the time (until 2030s), unless linked to a low carbon source. - Could be more burdensome to meet the standard threshold.

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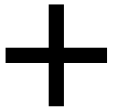
Low Carbon Electricity Input and Additionality

Threshold: 

- Do you have any views on our; i) principles for low carbon electricity input; ii) options for temporality for grid connected electrolysers?
- Do you have views in practical application of options considered?

Additionality: 

- Do you have any further views on additionality options?

Next Steps;

- Expert Group session on broader Standards issues (15th February)
- Publication of the government response & the standard guidance document
- Further engagement post publication
- We remain available for discussion and engagement