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Hydrogen Allocation Round 2022 – Process Evaluation

Final Report

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Rita Wainess, Lizahn van Gend, Isobel Urquhart, Barbara Hansen-Duncan, Matthew Jones, Fraser McLeod

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List of Acronyms

Capex	Capital Expenditure
CCUS	Carbon Capture, Usage and Storage
CGL	Central Grants and Loans
COD	Commercial Operation Date
COI	Conflict of Interest
DESNZ	Department of Energy Security and Net Zero
Devex	Development Expenditure
eH2	Electrolytic Hydrogen
EOI	Expression of Interest
FEED	Front End Engineering Design
FID	Final Investment Decision
GW	Gigawatt
HAR1	First Electrolytic Hydrogen Allocation Round
HAR2	Second Electrolytic Hydrogen Allocation Round
HPBM	Hydrogen Production Business Model
ICC	Industrial Carbon Capture
IDHRS	Industrial Decarbonisation and Hydrogen Revenue Support
IRA	Inflation Reduction Act
KPI	Key Performance Indicator
LCCC	Low Carbon Contracts Company
LCHS	Low Carbon Hydrogen Standard
M&E	Monitoring and Evaluation
MW	Megawatt
NZHF	Net Zero Hydrogen Fund
RTFO	Renewable Transport Fuel Obligation
SMEs	Small and Medium Enterprises
SRO	Senior Responsible Owner
T&Cs	Terms and Conditions
TRL	Technology Readiness Level
UKRI	United Kingdom Research and Innovation
VfM	Value for Money

Executive Summary

This report presents the process evaluation of the first electrolytic Hydrogen Allocation Round (HAR1), conducted by the Technopolis Group on behalf of the UK's Department for Energy Security and Net Zero (DESNZ, formerly BEIS). It sets out the methodology and findings of the evaluation and recommendations for future similar hydrogen allocation rounds. The round being evaluated was launched in July 2022 to provide the opportunity for electrolytic hydrogen projects to access capital expenditure (Capex) and revenue (HPBM) support. The overall aim of the process evaluation is to understand and describe the experiences of firms that have applied for support, firms that could potentially have benefitted from this round but ultimately decided not to apply, and officials involved in the design and delivery of HAR1 at DESNZ, as well as technical advisers.

This evaluation ran from February to April 2023 and included: a desk-based documentation review of HAR1 and wider UK Government hydrogen support schemes and policies, a mapping of the HAR1 'process', primary data collection, analysis, and the production of this report. The primary data collection consisted of 38 semi-structured interviews conducted with the following: applicants, non-applicants who submitted an EOI, non-applicants who did not submit an EOI, and DESNZ staff and a technical advisor involved in the design and assessment process of HAR1.

Analysis shows that most stakeholders see HAR1 as a critical component of the development of the electrolytic hydrogen market in the UK. Some recommendations were made on the design and wider policy needs, such as developing more targeted policy support to increase demand (i.e., off-takers), inclusion of hydrogen transport and storage (T&S) development and costs, considerations for a wider scope of electrolytic technologies or project stages, and adjustments to application demands to increase participation opportunities for less-resourced but otherwise eligible companies.

Information about HAR1 and the subsequent application process was found to be readily accessible to firms with established links to the hydrogen industry and to relevant Government bodies. SMEs and organisations new to applying to DESNZ funding, in some cases felt they lacked timely information or struggled with aspects of the application requirements. Most perceived a significant difference in level of effort to complete the EOI versus the formal application, recommending an interim elimination step or increased detailed communications, including bilateral meetings, earlier in the process.

From an application assessor perspective, the quality of applications was found to be variable, with a wide range of level and type of information provided. This was found to be associated with company size, with larger firms more able to provide detailed company and project information. The application was designed to allow for a wide scope of documents to support applications, but recommendations were made to provide more guidance to applicants on evidence submission, to conserve time and effort for both applicant and assessor. Some suggestions were made for a potential review of weighting values for future allocation rounds. The assessment process was found to have clear communication channels and defined processes.

Eligibility and Assessment Criteria:

Assessors completed an eligibility check following submission of applications to confirm the application meets the defined eligibility criteria. Those that were considered to meet the eligibility criteria proceeded to evaluation. During the assessment process government

performed additional checks on the credibility of the evidence provided and the robustness of any calculations involved. If projects failed to provide sufficient evidence in respect of their satisfaction of the eligibility criteria, government considered these to have failed the eligibility check and they did not progress further in the assessment process.

The eligibility criteria designed for this allocation round were sense-checked through a market engagement event with the industry before the start of the allocation round. While most eligibility aspects were agreed with and seen as appropriate, a number of respondents expressed concern over four main points: 1) the 'Commercial Operation Date' (COD) of 2025, 2) 5MW minimum threshold, 3) identification of an off-taker, and 4) ineligibility of gas-blending as a viable offer.

This process evaluation found that several of these concerns remained throughout the application process. The most common eligibility concern for applicants and non-applicants alike was the COD by 2025. This timeline was seen as too ambitious, particularly for larger projects. Several applicants stated they had decreased the scope and ambition of their intended projects to fit this date. Moreover, several non-applicants, including one without an EOI, were fully deterred from the bid due to this criterion.

The 5MW threshold was initially confusing to several applicants and non-applicants, as some expected to be able to combine plants for a cumulative 5MW output, but later found this ineligible. Some saw this criterion as a way to discourage more speculative applications for smaller projects. More non-applicants felt this threshold was a barrier to application. Another challenge was attributed to the delay in clarification over its details, which did not give enough time for some projects to change their plans to bid. However, this point was less prevalent sentiment throughout the interview process with the involved industry participants.

The identification of an off-taker was not noted as a barrier by applicants or non-applicants. Some suggestions were made by both applicants and non-applicants to set up more Government support to engage with off-takers, such as incentives or campaigns, targeting off-takers directly. This may help alleviate off-taker concerns over the stability of the electrolytic market and encourage them to switch their processes to the new fuel.

A range of applicants and non-applicants commented that gas-blending should be reconsidered for eligibility. However, it was not noted to be a large barrier in this round for either group. One concern was the lack of eligibility of transport and storage costs within the NZHF/Capex support of this strand, which most noted to still be very high and in need of support to further develop the market.

Despite the differences in views on eligibility criteria, most of it was well understood by applicants and non-applicants. However, the majority noted that eligibility details came too late, with the initial engagement activities providing more high-level information. There were more non-applicants who expressed that the detailed communication should come sooner, to allow for space to plan accordingly and to not waste resources if they are ineligible.

The application assessment criteria were viewed as being clear and understood by both applicants and non-applicants. Particularly applicants, who stated the guidance was straightforward and logical. However, concerns arose over the type of supporting evidence and level of detailed required in the applications. The nascency of the market was cited as the main barrier for providing some of this evidence, followed by resource constraints. Some assessors suggested a potential review of application scoring weightings.

Motivations and Barriers for not Applying:

HAR1 was overwhelmingly welcomed and appreciated by applicants and non-applicants alike. The majority of respondents saw electrolytic hydrogen production costs and uncertainties over future prices as the main barrier to the development of the market. The establishment of the hydrogen production business model was seen as key to alleviate these uncertainties for producers, investors, and off-takers alike. This was also seen to increase competitiveness of electrolytic hydrogen compared to counterfactual fuels, and increase investment and demand. The support is seen as long-awaited and is acknowledged to be a driver to making possible and expediting electrolytic hydrogen production projects. There is sentiment throughout the industry that future allocation rounds will be needed to drive and stabilise the market, beyond HAR1, which aligns with Government plans.

While most were eager to receive this support, there were several key barriers cited by potentially eligible projects who ultimately decided to not apply. These include the detail and ask of the application, timeframe of the application process, lack of certain clarifications at an earlier stage, and, the COD by 2025.

The most common reason quoted as a deterrent to going through with an application was the level of detail asked for in the application. The three rationales for the level of detail being too high were: 1) it is seen as inappropriate in view of the nascency of the market, 2) potentially qualifying projects are in too early stage of development to provide some details (e.g., letters of support from potential off-takers), and 3) company resource constraints for delivering strong applications based on size and demand of applications.

In conjunction with both the resource constraint and project phase issues, some noted that a longer window of time for the application may have allowed them to pull together more resources and gather the necessary information. Similarly, some noted it would have been helpful to have earlier clarity on what phase of a project was being considered. The arguments made were that some aspects the application required more in-depth project planning, such as an established relationship and plan with a more experienced partner or easily accessible letters of support from other partners.

Lack of scope for more innovative technologies (e.g., second generation electrolysers) was a common barrier addressed by a number of projects who had expressed interest but later realised they were ineligible for the competition. To promote competition and avoid technological lock-in, it is valuable to encourage participation of innovating electrolytic or other clean hydrogen technologies. Some of these were not aware of the NZHF Streams 1 & 2 competitions, suggesting that more consideration may be given to wider market engagement for future allocation rounds.

The concern over not including more innovative technologies was noted to be a factor for such companies to pursue EU or other international grant funding instead. This means that some electrolytic hydrogen projects that may otherwise have been developed in the UK may become based abroad.

Need for Capex in Future HARs:

The evaluation found that just over half of the applicants and 70% of the non-applicants applied for or were interested in applying for both HPBM and Capex support, respectively. A number of projects expressed that the Capex support is necessary to progress their projects and provide the most bankable case for investors. These respondents were more likely to note difficulty with securing private capital investment, and some were either at earlier stages of

project development or had less internal financial resource than those who did not apply for Capex.

Overwhelmingly, it was the HPBM that was cited as most crucial in the development of the electrolytic hydrogen market. Those who did not seek Capex support were adamant that it was the business model, and thus the HPBM, that was most pertinent for creating a strong business case and an investible proposition. In their view, the HPBM, without Capex, wasso strong enough to drive investment for further production development. This suggests that, as the market progresses, demand for Capex support may decrease.

Recommendations of HAR2 Improvement:

Based on the findings outlined throughout the report, the following recommendations have been presented for consideration for future electrolytic hydrogen allocation rounds.

Table 1. Recommendations for HAR2

Recommendations
Design and Eligibility Criteria
• Earlier clarifications of details of technological scope, such as in market engagement meetings or an earlier timeline for EOIs. • Increased competition scope to encourage wider market and technological participation, e.g., second-generation electrolysers. Alternatively, increase in marketing and engagement of the other streams of support for electrolytic hydrogen (NZHF 1&2) with more novel technologies, including continued provision of such support alongside future HARs. • More streamlined or decreased scope of applications, in order to meet the resource capacity of smaller eligible companies. Alternatively, potential segregation of application requirements based on company resources and/or stage of project. • More rigorous market engagement for pre-allocation round eligibility feedback, such as on COD, to align with company expectations (e.g., not having to lower project scope), to provide VfM through the allocation round. • Clarification of T&S level of support included.
Communications and Application Process
• Release of information about eligibility criteria and expected timelines for future allocation rounds earlier to allow better planning for application candidates. • Introduction of earlier elimination of ineligible projects (before opening the application window) to streamline the application process and reduce sunk costs for ineligible candidates. • Alignment of technical terminology with industry norms to clarify eligibility criteria. • Exploration of additional channels of publication about the launch of future allocation rounds to enable participation by potentially novel projects.
Assessment Process
• Potential review of weighting percentages of assessment criteria for future allocation rounds.

- Enhancement of the HAR1 Application Guidance document by supplementing it with examples of what each scoring range represents.
- Optimisation of assessment time by further improving internal communication among assessors on project eligibility, ensuring projects deemed ineligible for one criterion do not continue to be assessed for another, thus optimising assessment time.
- Provision of more guidance to projects on type of evidence most useful for specific criteria and request evidence referencing within application, to alleviate work for both projects and assessors. However, it is important to keep the guidance open enough to accommodate the different stages of projects and capacities of companies.

Table 2. Wider Policy Consideration

Wider Policy Considerations
• Consideration for demand-side policy support, whether through incentives or campaigns, to further assure potential off-takers of the market's move towards electrolytic hydrogen. • Consideration of inclusion of T&S costs in Capex support, which are noted to remain very high for many to handle without support. • Consideration of decreased scope of or more streamlined applications, to meet the resource capacity of smaller eligible companies. Alternatively, potential segregation of application requirements based on company resources and/or stage of project. • Closer alignment with other UK hydrogen policies, such as RTFO, to develop market and policy synergies and agreed definitions of green hydrogen. • Review of wider green hydrogen market development and subsidy policies, within EU and beyond, to better incentivise UK-based industry actors to develop projects and adjacent supply-chain in-country rather than move abroad, enabling the UK to retain the wider economic and energy security benefits.

1. Introduction

1.1 Overview of the first allocation round (HAR1)

The first electrolytic hydrogen joint allocation round (HAR1) was launched in July 2022. It forms part of broad range of support for the development of a UK hydrogen sector. HAR1 offers the opportunity for electrolytic hydrogen production projects to apply for revenue support via the Hydrogen Production Business Model (HPBM) only, or to apply for joint HPBM and capital expenditure (Capex) support via the Net Zero Hydrogen Fund (NZHF).

HAR1 enables projects to take Final Investment Decisions (FIDs) on electrolytic hydrogen production projects, with the aim of supporting at least 250MW of electrolytic hydrogen production capacity. It has the following strategic objectives:

- Kickstart the low carbon hydrogen economy across the UK, helping meet the aspiration of up to 2GW of low carbon hydrogen production capacity in operation or construction by 2025.
- Support projects to deploy at scale at the earliest opportunity, advancing the aim of Government to deploy up to 10GW of low carbon hydrogen production capacity by 2030, subject to affordability and Value for Money (VfM), with at least half from electrolytic hydrogen production capacity, and to do so at affordable costs by harnessing economies of scale.
- Deliver carbon savings to allow us to stay on track to meet Carbon Budget 5, Carbon Budget 6 and other net zero commitments.

1.2 Evaluation aims and objectives

The purpose of the Process Evaluation is to provide an assessment and understanding of:

- Experiences of organisations applying as well as organisations that could potentially have benefitted from HAR1 but ultimately decided not to apply.
- Applicant/non-applicant motivations for choosing to apply or not apply.
- Whether the design and delivery characteristics of HAR1 were appropriate given the objectives of NZHF and HPBM.
- The experiences of DESNZ officials, CGL delivery partners and technical advisors on HAR1.
- Considerations for next application and assessment round (HAR2) to enable potential enhancements to delivery.
- Any short-term unintended consequences of delivery (positive or negative) and an early understanding of outputs.

In order to provide this assessment and understanding, the Process Evaluation aims to answer the set of questions set out below in Table 3.

Table 3. Process Evaluation Questions

1. To what extent is the design and governance of HAR1 consistent with its aims and objectives?		**Section (s) addressing the question**
1.1	Were the eligibility and assessment criteria adequate, i.e., did applicants understand them and find them simple to submit?	3.2.4, 3.3.5, 3.3.6, 4.1.2, 4.1.3
1.2	Did the eligibility and assessment criteria support the objectives of HAR1?	3.3.1, 3.3.2
1.3	Was the timing and length of the application window (excluding full assessment and agreeing an offer/award process) adequate given HAR1's objectives?	3.2.3, 4.1.3
1.4	Have any adaptations to HAR1 been made post-launch and, if yes, how successfully have those changes been communicated and implemented?	3.3.5
1.5	To what extent does the HAR1 design complement interventions by similar policies/funds?	3.3.3, 3.3.7
1.6	Have any obstacles been identified in the delivery that could have been mitigated against in the design of HAR1 activities?	4.1.3, 4.2.5
1.7	Did projects find it a fair and transparent process?	4.1.2, 4.1.3
2. To what extent was HAR1 publicised effectively and was it successful in reaching target audiences?		**Section (s) addressing the question**
2.1	How effectively were HAR1 and its aims publicised?	3.2.1
2.2	How high were awareness levels of HAR1 among eligible projects and how did eligible projects perceive HAR1 ahead of applying?	3.2.1
2.3	How did eligible projects hear about HAR1?	3.2.1
3. What were the main motivations for applying and which aspects of HAR1 acted as enablers or barriers to application?		**Section (s) addressing the question**
3.1	What were the main motivations of applicants for applying?	3.3.1, 3.3.4
3.2	What were the main reasons why some projects applied for Capex and HPBM support, whilst others applied for just HPBM support?	3.3.4
4. What were the experiences and key barriers of those with eligible projects who did not apply to HAR1?		**Section(s) addressing the question**
4.1	What were the reasons some eligible projects did not submit an EOI?	3.2.1, 3.2.4
4.2	Did non-applicants find the EOI and application processes appropriate and effective?	3.2, 4,1

4.3	Did non-applicants pursue relevant electrolytic hydrogen projects? How were these funded?	3.3.6
4.4	What were the reasons some eligible projects submitted an EOI, but did not submit an application?	3.3.5, 3.2.1, 3.2.4, 3.2.2,
4.5	What else could have been done to encourage non-applicants to apply?	3.3.6, 5
5. To what extent did the application support and handling enable successful applications?		**Section (s) addressing the question**
5.1	Were details of HAR1 and the application process communicated effectively? (e.g., details different application strands and windows/timings, eligibility and assessment criteria, details on different types of funding)	3.2.4
5.2	For companies that wanted to apply for different strands, did the windows/timings allow them to do this and allow them to submit an application to the level of quality they wanted to?	3.3.7
5.3	How was pre-application support perceived by projects?	3.2.2, 3.2.3, 3.2.4
5.4	How was the application process perceived by projects? Which elements of the application were more or less challenging/burdensome?	3.2.3, 4.1
5.5	How effective was the process of receiving communications and clarifications during the application process?	4.1.2
5.6	Were the reporting templates and guidance clear, with respect to the ability of applicants to provide all information they wanted to or could provide, and eligibility of costs?	4.1.3
5.7	To what extent did the delivery partners meet objectives and expectations?	4.2.4, 4.2.5
5.8	To what extent do HAR1 applicants understand why they were or were not chosen for funding?	4.1.2
6. To what extent was the assessment process effective and fair?		**Section (s) addressing the question**
6.1	How well was the assessment process structured within DESNZ (formerly BEIS)? Were the governance and division of labour with technical advisors effective?	4.2.2, 4.2.4
6.2	Did the design of the application templates aid in the assessment process? What worked well, what could be improved?	4.1.3, 4.2
6.3	Was the level of evidence assessors received via the Request for Information process in line with expectations?	4.2.1

6.4	What were the particular challenges during the assessment process and how could they be avoided in future?	4.2
7. What future lessons can be learned from HAR1?		**Section (s) addressing the question**
7.1	Which areas of delivery worked well and which areas of delivery require improvement?	3.2, 4.1, 5
7.2	What can we learn from delivery of HAR1 and what does that mean for the design and implementation for HAR2? E.g. changes to activities, timings or eligibility / assessment criteria?	5, 3.2.3, 3.2.4, 4.1.4
7.3	Was the method of delivery the most appropriate and efficient (i.e., admin burden minimised) for these interventions? What have other governments done to reach similar policy objectives? Are there international comparisons?	4.1.2, 4.1.3, 4.1.4
7.4	What are the implications of the process evaluation findings for the future of the UK hydrogen economy?	5

1.2.1 Process evaluation methods

This report is a product of the process evaluation of HAR1. The research draws on the following main sources:

- A desk-based review of relevant programme documentation.
- A semi-structured interview programme with DESNZ officials, applicants, and sector stakeholders who did not apply for funding.

1.2.2 Desk-based review of documentation

The research team gained a more detailed understanding of the scheme and its rationale and delivery processes through a desk-based review of programme documentation. The documentation, supplied by DESNZ, included material such as the application guidance, assessor guidance, and business cases. The research team used this understanding to develop a process map, detailing the individual stages within HAR1. This task also enabled the research team to develop thorough topic guides for the semi-structured interview programme, ensuring sufficient data to answer our process evaluation questions.

1.2.3 Semi-structure interview programme

A total of 38 semi-structured interviews were held with a variety of stakeholders. They were held via MS Teams and guided by interview topic guides. Table 4 indicates the number of each stakeholder interviewed during the evaluation.

Table 4. Summary of interviews held.

Types of interviewees	**Number**
Applicants	16
Non-applicants who submitted an Expression of Interest	9
Non-applicants who did not submit an Expression of Interest [1,2]	2
HAR1 officials, delivery partners (CGL) and technical advisors	11[3]
Total	**38**

Applicants and non-applicants were both interviewed to fully understand the motivations for and barriers to applying for funding through HAR1, as well as to understand the experiences of both groups with the application and assessment processes. Applicants and non-applicants were asked related but tailored questions in order to explore the different experiences of each stakeholder group. The interviews with HAR1 officials and the technical advisor gave further insight into the design and delivery of the scheme. See Appendix 1 for full interview topic guides for each stakeholder group.

Interview transcripts were qualitatively analysed to infer common themes and viewpoints on the different aspects of HAR1 delivery processes.

1.3 Report Structure

This report is a product of the process evaluation of the first electrolytic hydrogen allocation round (HAR 1). The report is structured as follows:

- Section 1: Provides an overview of the aims of HAR1 and the process evaluation.
- Section 2: Describes HAR1 processes and delivery.
- Section 3: Presents the findings of the process evaluation with regard to programme design and the launch of the scheme.
- Section 4: Presents the findings of the process evaluation with regard to the application and assessment processes.
- Section 5: Presents a summary of findings from the process evaluation and recommendations for future allocation rounds.

[1] This category includes one applicant that did not submit an EOI, but did attempt to submit an application. Their views are included in all sections of the report that apply to them, such as views on the application.

[2] Due to the low number of respondents in this category and the distinction in application attempts between the two, their views have at times been grouped under a more general term of 'non-applicants' throughout the report.

[3] This includes 11 DESNZ officials and one technical advisor. One of the interviews was held with two DESNZ officials.

2. Overview of Hydrogen Allocation Round 2022 and delivery process

2.1 Hydrogen Production Business Model and Net Zero Hydrogen Fund: Electrolytic Allocation Round

Low carbon electrolytic hydrogen is an emerging technology, and it is a key enabler in a range of scenarios for the achievement of Net Zero. As well as directly offering a low carbon fuel for industry, heat and transport, hydrogen can potentially play an important role as a flexible means of storing and deploying intermittent renewable power as part of a future energy system requiring much greater volumes of decarbonised power. For example, National Grid includes 40GW of network-connected electrolysers[4] for hydrogen in its pathways for the future of energy in its Future Energy Scenarios 2022.[5]

In November 2020, the Prime Minister's Ten Point Plan for a Green Industrial Revolution announced that the UK is aiming to have developed 5GW of low carbon hydrogen generation by 2030. In April 2022, the British Energy Security Strategy announced that this ambition has been doubled to 10GW of low carbon hydrogen production capacity by 2030 (subject to affordability and VfM. Currently, at least half of this is expected to be through electrolytic hydrogen production. The Energy Security Strategy set a further ambition to support up to 1GW of electrolytic hydrogen production capacity to be in construction or operational by 2025.

There is currently little low carbon hydrogen production in the UK. Key barriers to the hydrogen production sector include significant uncertainty about hydrogen off-takers (end markets) and high upfront costs. As a result, the private sector alone is not expected to invest at the scale required to accelerate low carbon hydrogen production and meet the ambitions of 10GW of production by 2030.

Two major mechanisms have been implemented to support these ambitions:

1. **The Net Zero Hydrogen Fund (NZHF).** Up to £240 million of grant funding until 2025 to support upfront costs of developing and building low carbon hydrogen production projects (both electrolytic and CCUS-enabled hydrogen technologies).

   NZHF is implemented in four distinct support strands, each with a slightly different focus (Table 5). The first funding wave for Strand 1 and Strand 2 of the NZHF was launched in April 2022. Strand 1 received 40 applications and Strand 2 received 17 applications. The projects that pass the technical assessment phase will have been shortlisted into the financial review and due diligence process and there is an aim to issue final grant offer letters in early 2023.

[4] Electrolytic hydrogen is defined as the production of hydrogen via water electrolysis, where water is split into hydrogen and oxygen using low carbon electricity. See IEA 'Electrolysers – Technology deep dive' (Sept 2022): https://www.iea.org/reports/electrolysers

[5] https://www.nationalgrideso.com/future-energy/future-energy-scenarios

Table 5. Description of the four strands of the Net Zero Hydrogen Fund.

NZHF Strand	Description
Strand 1	Providing Devex (development expenditure) for Front End Engineering Design (FEED) studies and post FEED activities (Note for projects not tied to the HPBM).
Strand 2	Providing Capex (capital expenditure) for projects not requiring revenue support through the HPBM. For example, such as smaller electrolytic projects that are able to access revenue support through the Department for Transport's Renewable Transport Fuel Obligation (RTFO), which also supports hydrogen production.
Strand 3	Providing Capex for electrolytic projects that require revenue support through the HBPM.
Strand 4	Providing Capex for CCUS-enabled projects that require revenue support through the HPBM.

2. **The Hydrogen Production Business Model (HPBM).** A contractual business model for hydrogen producers to incentivise the production and use of low carbon hydrogen through the provision of ongoing revenue support. HPBM is aiming to allocate revenue support over a 15-year contractual period and is funded through the Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme. From 2025, HPBM is intended to be levy funded.

   IDHRS was announced in October 2021, and aims to support the delivery of low carbon hydrogen and carbon capture, usage, and storage technologies. It funds new hydrogen and Industrial Carbon Capture (ICC) business models, which are designed to provide long-term certainty on revenue support to industry, enabling final investment decisions on ICC and hydrogen production projects. HPBM specifically aims to address the significant risks facing hydrogen producers, including: (1) the risk that the price which the producer is able to achieve for selling hydrogen does not cover the cost of production; and (2) the risk that the producer is unable to sell volumes of hydrogen to cover costs.

Stakeholder feedback indicated that many electrolytic hydrogen projects require both revenue support and capital expenditure (Capex) support. HAR1 was launched in July 2022 and offers the opportunity for eligible projects to apply for revenue support via the HPBM only or for joint HPBM revenue support and Capex support via NZHF. HAR1 was open to new build low carbon hydrogen production facilities located entirely within the UK. The organisations applying must also use a core production technology that has already been tested in a commercial environment (at TRL 7 or above).

The first allocation round aims to support at least 250MW of electrolytic hydrogen, however a lower amount of funding will ultimately be allocated and contracted if the projects do not satisfy the eligibility criteria and present VfM to Government. The initial HPBM contracts are able to include transport and/or storage. While there is a focus on electrolysis in HAR1, other technologies will not necessarily be excluded from future allocation rounds if they are able to demonstrate a meaningful contribution to hydrogen production and to broader Government policy.

The HAR1 application window closed in October 2022, with 41 applications received. At the time of this report, a shortlist of 20 projects has been published.[6] A market engagement exercise for the next allocation round (HAR2) was launched in Q2 2023, with HAR2 contracts to be awarded in 2024. Future allocation rounds would aim to move towards a price competitive allocation as soon as legislative and broader market conditions would permit.

2.2 HAR1 as part of broader forms of hydrogen support

The UK Government has already set out over £1 billion of funding for hydrogen and low carbon technologies across the value chain. For hydrogen this includes NZHF and HPBM, alongside other interventions such as:

- The Low Carbon Hydrogen Supply 2 competition, aiming to provide funding for projects that can help develop a wide range of innovative low-carbon hydrogen supply solutions.
- The Net Zero Innovation Portfolio (NZIP) Industrial Hydrogen Accelerator (IHA), which aims to demonstrate end-to-end industrial fuel switching to hydrogen to provide evidence on feasibility, cost, and performance.
- The NZIP Industrial Fuel Switching (IFS), which aims to support the development of fuel switching and fuel switch enabling technologies, including hydrogen, for UK industry.
- The Industrial Energy Transformation Fund (IETF), which aims to support the deployment of technologies that enable businesses to transition to a low carbon future, including industrial fuel switches to low carbon hydrogen.

As well as funding opportunities, other related interventions with a hydrogen focus/component implemented by Government include:

- The Low Carbon Hydrogen Standard, which sets the maximum thresholds for the amount of greenhouse gas emissions allowed in the production process for hydrogen to be considered 'low carbon hydrogen'.
- The Renewable Fuel Transport Obligation (RFTO), which requires transport fuel suppliers to ensure that 5% of all road vehicle fuel is sourced from renewable fuels, in order to support the decarbonisation of transport.

2.3 Process Map

A process map is used to visualise the programme's processes and activities in a clear, step-by-step way. Process maps are useful in process evaluations in order to ensure every step of the process is understood and evaluated. Figure 1 below shows the process map for HAR1, outlining all the major processes involved in the delivery of the scheme between April 2022 (allocation round launch) and March 2025.

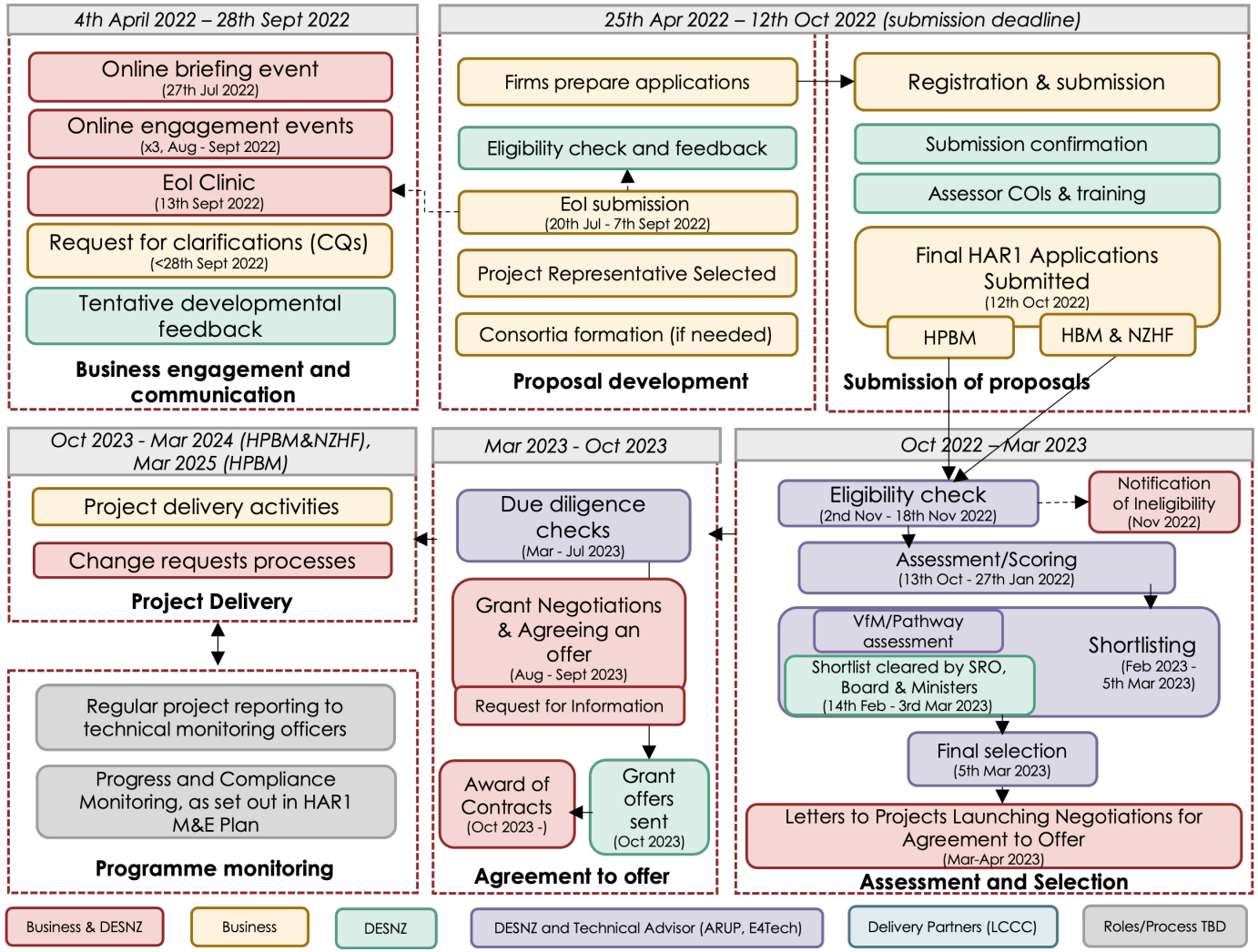
The HAR1 delivery team began market engagement in April 2022, when online briefing and engagement events were held. Interested parties were invited to submit an Expression of Interested (EOI) between July and September 2022. Once EOIs were received, applicants began preparing their applications for submission before October 2022. The HAR1 delivery

[6] DESNZ, 30 Mar, 2023. Hydrogen Business Model / Net Zero Hydrogen Fund: shortlisted projects allocation round 2022 here: https://www.gov.uk/government/publications/hydrogen-production-business-model-net-zero-hydrogen-fund-shortlisted-projects/hydrogen-business-model-net-zero-hydrogen-fund-shortlisted-projects-allocation-round-2022

team offered support to interested parties ahead of both the EOI submission and application submission.

Application assessment took place over Q4 of 2022 and Q1 of 2023. At the time of this report, a shortlist of highest-ranking projects to participate in the Agreeing an Offer stage has been published and 20 projects have been shortlisted. The scope of this process evaluation is focused on stages up to the notification of shortlisting and does not include assessment of outputs in terms of the number of shortlisted projects and their outcomes. Following the Agreeing an Offer stage with shortlisted projects, it is expected that contracts will be awarded later in 2023. Project delivery activities will then start, during which time it is expected that there will be an ongoing progress of project reporting and monitoring, with the details to be set out in the HAR1 M&E Plan and agreed upon by DESNZ.

Figure 1. Process Evaluation Map



3. HAR1 Design and Launch

This section addresses the following high-level evaluation questions as set out in Table 3:

1. To what extent is the design and governance of HAR1 consistent with its aims and objectives?

2. To what extent was HAR1 publicised effectively and was it successful in reaching target audiences?

3. What were the main motivations for applying and which aspects of HAR1 acted as enablers or barriers to application?

4. What were the experiences and key barriers of those with eligible projects who did not apply to HAR1?

7. What future lessons can be learned from HAR1?

3.1 HAR1 Design and governance arrangements

3.1.1 Rationale for scheme design

HAR1 addresses several market failures within the electrolytic hydrogen sector. Firstly, this is a nascent marketplace in need of investment, however this investment is associated with high levels of risk. These risks include (1) the risk that the price which the producer is able to achieve for selling hydrogen does not cover the cost of production; and (2) the risk that the producer is unable to sell volumes of hydrogen to cover costs. Therefore, projects can struggle to raise the necessary funds to construct the facilities required, and even when this is done, the price of hydrogen production is not currently competitive with fossil fuel alternatives. As a result, these low carbon hydrogen production facilities may not be sustainable in the short to medium term, without revenue support. Therefore, the decision was made to offer the funding through a joint allocation round, in which projects can access revenue support via HPBM only, or joint revenue support via HPBM and Capex support via NZHF.

The scheme was built upon lessons learnt from previous interventions, including NZHF Strands 1 & 2 and support for CCUS-enabled hydrogen. Consultations with stakeholders were also held, including market engagement with industry, and one-to-one engagement with potential applicants to understand their needs. The result of these consultations indicated that many projects need both Capex and revenue support and did not want to apply for both types of funding separately. Seven of the 12 delivery representatives interviewed also felt that the scheme was designed to align with other interventions, such as specific hydrogen strategies and policies, and wider decarbonisation strategies, such as the Net Zero Strategy.

HAR1 delivery representatives stated in the interviews that HAR1 was designed at fast pace. The majority of the design was finalised in a "Sprint Week" in January 2022, which brought together all the key people from across the Department to make the major final decisions for HAR1 design.

3.1.2 Key aspects of eligibility criteria

To determine the criteria for this allocation round, consultation was sought from the industry through an HBM/NZHF Electrolytic Allocation Market Engagement exercise in early April 2022. 51% of the 39 written responses showed industry agreement with eligibility criteria. 41%, however, did not, with many expressing concerns over the 'Commercial Operation Date'

(COD) of 2025 being a barrier to projects, particularly those of larger size[7]. Many[8] also disagreed with the 5MW minimum capacity threshold, reasoning that it should be lowered to aid market development and learning and increase competition. Suggestions were made to aggregate several smaller projects to reach this threshold in time. Identification of an off-taker and demonstration of access to finance were identified as challenges by some. Others also felt that gas blending should be considered as a viable offer. A few were concerned about meeting the LCHS and clarity of its definition.

The Government issued responses to these concerns and set up the criteria accordingly in the HAR1 Application Guidance document. For the concern of meeting COD by 2025, a caveat was added that the deadline was contingent on the signing of contracts from July 2023. The target of a 5MW threshold was reaffirmed, to ensure that public resources are not being used to assess smaller projects that do not meet the strategic objectives and scale-up which HAR1 seeks to address. It was also clarified that a project must identify at least one qualifying off-taker, as some volumes sold, such as for blending into the gas grid, remained ineligible. Finally, more details on meeting LCHS were added to the guidelines, as well.

The criteria for HAR1 also builds on the criteria set out by the NZHF Strands 1 & 2 consultation, in which 72% agreed with the high-level criteria (HAR1 Application Guidance 2022). However, there were some key differences in criteria between NZHF Strands 1 & 2 and HAR1 to meet the goals of the latter, including that projects must be production facilities, rather than technology neutral, as in NZHF Strands 1 & 2. The latter scheme includes support for both production facilities and associated local network/storage infrastructure[9], a minimum Technology Readiness Level (TRL) of 7, and no prescriptions with regards to type of end use.

The HAR1 Guidance sets out the following eligibility criteria for HAR1:

1. Project plant located entirely in the United Kingdom and the project representative's business being registered in the UK.
2. Demonstrate ability to be operational no later than the end of December 2025.[10]
3. Using core technology that has been tested in a commercial environment, Technology Readiness Level (TRL) 7 or more.
4. New build hydrogen production facilities.[11]

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[7] Hydrogen Business Model and Net Zero Hydrogen Fund: market engagement on Electrolytic Allocation: government response here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1092176/hbm-nzhf-market-engagement-electrolytic-allocation-govt-response.pdf

[8] The engagement document notes this was a significant amount of participants, but less than half; specific percentage is not provided.

[9] Originally, the NZHF's funding boundary was to be for production facilities, only. However, the NZHF Official Business Case (OBC) explains that consultation responses indicated that the lack of support for hydrogen transport and storage is a key market barrier to the hydrogen economy and there is no government support available for on-site transport and storage Devex costs. Therefore, Devex support was agreed to be provided for both production facilities and associated local network/storage infrastructure.

[10] Depending on the signing of contracts from July 2023.

[11] The UK Government defines 'New Build Production Facilities' as a newly constructed facility built for the specific purpose of producing hydrogen. This comprises the entirety of the production process. An exemption from this requirement will be applicable for hydrogen generation projects that have receives funding from the NZIP and EIP

5. Electrolytic hydrogen production facilities.
6. Has identified at least one qualifying off-taker.[12]
7. Has identified an electrolyser supplier(s).
8. Minimum hydrogen production capacity of 5MW.[13]
9. Meets the requirements of the Low Carbon Hydrogen Standard (LCHS).[14]
10. Demonstrate access to finance.

Further detail of each criterion was provided in the HAR1 Application Guidance document. Findings in the sections below reflect on perceptions of this eligibility criteria and whether the concerns from the Market Engagement were mirrored in the experiences of the interviewees, including any effects on decisions to apply.

3.1.3 Key aspects of assessment criteria

In addition to the eligibility criteria, the competition guideline outlined six main criteria, with respective weightings, against which each application would be assessed. These were: 1. Deliverability (35%), 2. Carbon and Environmental Factors (10%), 3. Cost (20%), 4. Economic Benefits (20%), 5. Market Development and Learning (10%), and 6. Additionality of electricity source (5%). Table 6 in section 4.2.3 provides a further breakdown of the sub-criteria evaluated under each criterion.

Projects were guided to upload their completed version of the Project Application Form, their Supporting Evidence, and Annex Templates to the Online Application Form. Sections 3.2 and 4.1 below reflect applicants' views of the clarity and appropriateness of the assessment criteria, while section 4.2 evaluates this from the perspective of DESNZ officials and technical advisors.

3.2 HAR1 launch and pre-application communications

3.2.1 Publicising HAR1

The launch of HAR1 was publicised across several channels, both formal and informal. Formal communications included announcements within government websites and at national hydrogen events, and direct correspondence via subscription newsletters. Less formally, news of HAR1 was transmitted through networks within the hydrogen and hydrogen-adjacent industries, such as wider renewables and energy communities, as well as through regular engagement with DESNZ. Many noted this type of allocation round has been anticipated for some time, with some describing it as a natural progression in the industry.

Most of the applicants and non-applicants (including those who did not submit an EOI) interviewed learned about HAR1 from their connections to the hydrogen industry, closely followed by engagement with DESNZ through dedicated internal functions, such as those for

programmes and may already be under construction/operational but require revenue support via HBM to operate on an ongoing basis. These projects will still be required to meet the subsidy control requirements.

[12] Where qualifying off-takers refers to off-takers that are eligible for HBM support.

[13] The 5 MW threshold applies to individual projects. Projects will not be able to aggregate capacity across different locations or have a phasing approach to build capacity gradually to 5MW.

[14] The LCHS sets a maximum threshold for the amount of greenhouse gas emissions allowed in the production process for hydrogen to be considered 'low carbon hydrogen.' Several versions of Hydrogen Emissions Calculators were provided on government website for applicant use for HAR1.

grant applications or for policy engagement. On the other hand, those who reported finding out about the allocation round very late were generally smaller organisations with less experience in the hydrogen industry; they were also less likely to have completed the application process. This suggests that information about HAR1's launch dispersed effectively within established industry networks or to those with the capacity to maintain close ties to government, while new entrants may have struggled with timeous access to information about the allocation round.

3.2.2 Pre-application communication

Before submitting an Expression of Interest (EOI) or formal application, prospective applicants could attend a number of online events to familiarise themselves with HAR1 and to ask questions. Most interviewees (applicants, non-applicants and delivery representatives) found these helpful and to a high standard, with the possibility of being enhanced by additional formats. Specifically, they suggested that smaller groups or even bilateral consultations with DESNZ could improve engagement with the process and could be used to quickly sift speculative applicants from more committed ones. This is reflected in comments by several DESNZ officials, who noted it was common to receive queries that were related to information that had been communicated before, which took time and resources to close. Applicants with internal Government-facing functions, such as for grant applications or for regulatory engagement, found it easier in general to resolve their queries given their understanding of all potential channels for communication.

3.2.3 Timing of HAR1 pre-application communications

The timing of communications fell within five months of the opening of the application window. Applicants and non-applicants alike noted they would have preferred a longer period between initial communication of allocation round timelines and the application window given the need to plan resources for the application process. They also noted the need for access to detailed allocation round eligibility criteria several months in advance; the chief reason being that projects must be mature in their development to possess all the information required by the application process. Early availability of detailed criteria allows applicants to align their projects with the eligibility criteria of the allocation round while such alignments are feasible. In the case of HAR1, applicants and non-applicants noted that this kind of information was made available only after submission of an EOI, upon which access to an application portal and detailed information was granted. Those applicants with dedicated policy functions learned some of these details before HAR1's launch through their engagement with Government (during industry consultation for the design of HAR1, for example), and noted that this foresight was critical to their ability to complete their applications to a high standard within the given window.

3.2.4 Clarity of HAR1 pre-application communications and published allocation round guidance

Most respondents agreed that the allocation round guidance was widely regarded as well-worded and clear. A common sentiment was the understanding that some details, such as technological scope, would need to be cleared up in clarifying questions and Frequently Asked Questions (FAQs) (more on this in section 4.1).

A handful of interviewees with strong ties to the hydrogen industry through their own commercial ventures or prior projects noted some misalignment between the terminology used in HAR1 and that of the industry at large. For example, the eligibility criteria involved a 5MW minimum capacity which caused some confusion; when referring to electrolyser capacity, those in the industry interpret this to mean the input capacity, whereas the output would be

referred to as the plant capacity (which is significantly smaller than the input). In the case of HAR1, the minimum electrolyser capacity referred to the output. This misunderstanding led at least one prospective applicant to realise that their project was ineligible (and too far along to adjust) after submitting an EOI and accessing the application portal's detailed information. This prospective applicant started the application process but abandoned it once the misunderstanding became apparent. It is further reflected in a comment by one DESNZ official who mentioned the large volume of clarification questions received about the minimum capacity threshold. To avoid misinterpretation and use DESNZ resources efficiently, it is important to align terminology with industry norms.

Another area for clarification was around the details of the HPBM. A small number of interviewees noted their uncertainty about the form HPBM support would take, such as the distribution of overall funds to projects being awarded a contract, strike prices, and details about off-taker agreements. This caused some concern about the refinement of their financial plans for the application process, and more details were desired. However, there seems to be a general understanding that this is something to be further developed subsequent allocation rounds.

One applicant noted they were only interested in Capex funding in this round, suggesting some room for misconception in guidance and moreover in the EOI stage, as this project moved forward to the full application process.

3.3 Motivations and barriers to application

3.3.1 Motivations for applying to HAR1

The responses from applicants and non-applicants show the main barrier within the electrolytic hydrogen production sector is the high cost of hydrogen production and uncertainty over future prices. The majority of respondents reflect that the development of a hydrogen production business model is a key factor in addressing this barrier, as it will enable producers to provide lower, stable prices to off-takers and increase electrolytic hydrogen's competitiveness against counterfactual fuels, like oil and natural gas. More than half of both applicants and non-applicants were also motivated by the joint Capex offer, to increase private investment and realise projects more quickly and at a larger scale than they would be able to otherwise. These considerations mirror the rationale for the policy design, and many agreed that the bid is a necessary and long-awaited public move to address the key barrier.

Other barriers noted include: 1) lack of public investment, 2) limited number of electrolyser producers to meet Government scale, and 3) uncertainty/instability on the demand side. Views on these additional barriers were mixed among applicants, as multiple applicants pointed out that there is enough funding available for investment as well as electrolyser producers. Some also argued that the business model support adequately addresses the cost uncertainties faced by the off-takers, which would increase interested off-takers, negating the necessity of additional policy support to drive up demand.

Overwhelmingly, HAR1 is seen as a critical component to move the projects forward and overcome the barriers of high costs and uncertainties for producers, investors, and off-takers. Respondents see one of its key contributions as the strengthening of a business case for electrolytic hydrogen production. Thus, public support is viewed not only as a financial enabler to realise and expedite electrolytic hydrogen productions projects, but to reach FID and secure private investment, as it de-risks the projects and creates a more investible proposition. HAR1 offers a strong signal to investors about the growth of the electrolytic hydrogen production market and policy stability in pursuing this direction, with further government support and surrounding regulation to follow. Many attributed the alleviated cost and directionality

uncertainties for producers and off-takers largely to the revenue support, more than to the Capex funding, as the former is seen as addressing the main gap in the marker (*see more in Sec. 3.3.4*). Most anticipate that more support beyond this allocation round will be needed to develop the electrolytic hydrogen market to a self-sustaining level, which mirrors government intentions for future allocation rounds.

3.3.2 Other HAR1 design considerations from industry respondents

Some applicant and non-applicant respondents commented on barriers or design aspects of the electrolytic hydrogen sector that would need support beyond the HAR1 mechanism:

- Several respondents noted concerns over the demand-side uncertainties not addressed by HAR1. The HPBM's support in lowering and stabilising hydrogen prices for off-takers is highly acknowledged and appreciated. However, many argue this alone is not enough to assure potential off-takers to switch their fuel needs to green hydrogen and grow the demand-side of the market. A push from both applicants and non-applicants was made for wider policy-side initiatives to address this barrier of off-taker uncertainties in the future of the market and risks of fuel transition. Suggestions were made that policy could provide incentives or develop campaigns to engage and further assure off-takers of the shift toward electrolytic hydrogen.
- Another aspect that some found not to be addressed through the policy support was the nascency of the transport and storage (T&S) business models and the respective high costs. As these costs often materialise alongside electrolytic hydrogen production projects and are costly in themselves, the disconnect between production and T&S support seems arbitrary for some.
- Another barrier, noted more by non-applicants, is a perceived lack of consistency and regulation on the definition of green hydrogen, including within policies. A few called for more alignment, highlighting the discontinuity between the definition presented within HAR1 and that in RTFO. An additional rationale was that the difference creates barriers to company projects being eligible for both types of schemes.
- One non-applicant noted some concern on whether a variable premium for price support and levy systems for the HPBM were adequate, suggesting the use of certificates first, with reference to the success of the Renewable Obligation Certificates (ROCs)[15] that supported the renewable wind industry market development when it was at a nascent state. Similarly, several others suggested fixed premium or tax relief subsidies to be included in electrolytic hydrogen market development policies, in some cases referencing the USA's Inflation Reduction Act (IRA) and EU's Innovation Fund approaches.

3.3.3. Other support schemes noted by industry respondents

Most applicants are aware of other schemes of support, including the RTFO, Industrial Fuel Switching scheme, USA's IRA,[16] EU Innovation fund with fixed premium auctions for green

[15] The Renewable Obligation Certificates (ROCs), introduced in the UK in 2002, are issued to operators of accredited renewable generating stations for the eligible renewable electricity they generate. Operators can trade ROCs with other parties or sell them directly to a supplier here: https://www.ofgem.gov.uk/environmental-and-social-schemes/renewables-obligation-ro

[16] https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/

hydrogen,[17] Germany's H2 Global carbon scheme (analogous to the CfDs approach)[18], Netherland's SDE++,[19] Scotland's Hydrogen Innovation Scheme,[20] and the Welsh-Japanese hydrogen project,[21] all of which address the hydrogen market. However, most are either seen as targeting other critical components (e.g., EU schemes focused on decarbonising specific sectors, such as cement, through hydrogen) or not meeting the scale of support that HAR1 provides (e.g., Scotland or Wales schemes). A few did show preference to the US IRA's approach of receiving credits based on level of carbon emitted by the project's hydrogen production and its lack of a ROI cap for investors.

3.3.4 Reasoning for applying for joint support (Capex and HPBM) vs only HPBM support

56% of the HAR1 applicants applied for both Capex and HPBM revenue support funding. One of these, however, was indifferent to Capex support, stating they would leave the choice to the discretion of the Government. Of the non-applicants, both who submitted EOIs and those who did not, 70% were interested in the joint funding.

Those who view Capex as important noted it to be crucial to the progression of their project. The main reasons for seeking Capex support include: 1) view that the joint funding holds best value for money, 2) the stage of the project at time of application, and 3) combatting the issue of lack of infrastructure investors with the Capex funding decreasing project costs. However, it was generally agreed that the HPBM is most crucial for developing the electrolytic hydrogen market and decreasing costs for off-takers.

Those who sought only HPBM support saw Capex funding as easy to secure, whether through the company itself or private investments. Some noted investment is contingent on the development of a viable business case, which is why the HPBM support was deemed both pertinent and sufficient without Capex. For some, the Government's visible initiative of providing support to the electrolytic hydrogen market is a driver for increased access to private investment, reducing demand for Capex at this stage for some respondents.

The different responses on the need for Capex appear to correlate with a company's stage in hydrogen development.[22] Those who were more established in the industry, such as with previous plant development projects elsewhere, or secured investors, were less likely to seek Capex than those with less available capital or ones who are more recently entering the electrolytic hydrogen market. While the former group, largely those looking only for the HPBM funding, saw little to no need for Capex, many of those who did apply for both said Capex was crucial for their project. This suggests that, at this stage, the availability of Capex support may be a valuable component in promoting open competition and developing a wider pool of electrolytic hydrogen producers.

[17] https://energy.ec.europa.eu/system/files/2023-03/COM_2023_156_1_EN_ACT_part1_v6.pdf

[18] https://www.h2-global.de/project/h2g-mechanism

[19] https://english.rvo.nl/subsidies-programmes/sde

[20] https://www.gov.scot/policies/renewable-and-low-carbon-energy/emerging-energy-technologies-fund/

[21] https://www.bridgend.gov.uk/news/council-signs-partnership-agreement-with-marubeni-for-new-5mw-class-hydrogen-energy-project/

[22] Some examples of stages of company electrolytic hydrogen work include: level of private investment secured or internal investment able to be allocated to capital expenses for project at time of application, previous electrolytic hydrogen production projects executed, has existing projects but is entering new geography, electrolytic hydrogen as a new company venture, etc.

3.3.5 Views on eligibility criteria

While the clarity on eligibility criteria and its respective effects on applications and interest have been communicated in section 3.2.4 above, it is important to bring out the key elements of the criteria that were seen as potential barriers to HAR1 application. Criteria that became actualised barriers for non-applicants are presented in section 3.3.6 below.

- *COD by end of 2025*: As with the initial market engagement feedback, concerns over the COD by end date of 2025 were made by at least a third of the applicants and about half of the non-applicants. Issues with this eligibility were around the supply-chain lead times being too far out, and the scope and ambition of work not being manageable within the timeline. Several applicants stated that they adjusted the scope of their project work and lowered ambitions to fit this timeline.

  It was noted that the Government released an update on this criterion, stating that the deployment of HAR1 projects may be extended to 2026. Those who raised this concern and were aware of the change stated that this shift was welcome and appeared more appropriate for the projects. However, several pointed out that the lateness in communication had effects on internal decision-making (e.g., strain or shift in original scope of projects and resources used during application start to fit initial criteria) and created some confusion in the parallel timelines.

- *Clarity of 5 MW capacity*: The clarity around the 5MW capacity criteria was noted as a difficulty by two applicants and proved to be an actual barrier by several non-applicants, as explained in section 3.2.4.

- *Lack of continuity with Transport and Storage (T&S):* While this point is noted in additional design considerations above (3.2.2), it was noted as a potential barrier and high concern among projects. As with the overall hydrogen production, the cost is very high for T&S too and materialises in off-taker agreements. Several applicants recommended consideration of inclusion of some T&S cost as an eligibility within the Capex funding. In addition, one applicant noted a strain in the timeline to the DfT's RTFO application being very close to the HAR1 window, straining resources to apply to both, pointing to room for more synergy in timelines between related bids across departments.

3.3.6 Reasons why some eligible projects in the pipeline did not apply

When assessing the reasons why some companies chose to apply, while other eligible ones did not, it is important to address some characteristic differences of the applicants and non-applicants. Applicants largely consisted of facility developers for hydrogen or other energy production, several manufacturers using hydrogen, one CCUS company, and one developer also classifying as an electrolyser producer. The non-applicant (with and without EOI) pool also had several hydrogen and energy facility developers, but included more electrolyser innovators and several hydrogen fuel cell producers. An energy provider company was present in each interviewee pool (applicant, non-applicant with EOI, and non-applicant with no EOI). More applicants also spoke of extended familiarity with the hydrogen production sector than did the non-applicants. However, there were several non-applicants (both with EOIs and without), who mentioned decades of experience within the sector.

Most applicants are already working in or have strategic plans to develop electrolytic hydrogen. Several applicants stated they already had a project lined up, which fit well with the scheme. Some had conducted feasibility studies or were in a development process and found HPBM support to be critical for progression. The non-applicant contenders were more

commonly in earlier stages of project development, though some did have plans in the pipeline.

Several themes emerged on why interested and eligible contenders did not submit an application after completing an EOI:

- *Application level of detail*: The most common reason quoted as a deterrent to going through with an application was the level of detail asked for in the application. The three rationales for the level of detail being too high were: 1) it is seen as inappropriate in view of the nascency of the market, 2) potentially qualifying projects are in too early of a stage to provide some details (e.g., letters of support from potential off-takers; more work needed to develop mitigations for project barriers, such as grid issues in project area), and 3) company resource constraints for delivering strong applications based on size and demand of applications. It is important to note that multiple applicants, too, had concerns over the level of effort and detail needed for the application (*see more on this in Section 4.1*).

- *Timeframe of application*: In conjunction with both the resource constraint and project phase issues, some noted that a longer window of time for the application may have allowed them to pull together more resources and gather the necessary information.

- *Stage of project*: Similar to the above, some noted it would have been helpful to have earlier clarity on what phase of a project was being considered. The arguments made were that many of the application asks required more in-depth project planning, such as an established relationship and plan with a more experienced partner or easily accessible letters of support from other partners.

- *The COD timeframe by 2025:* As for applicants, this timeline was seen as too ambitious by a number of the non-applicants. One non-applicant explicitly quoted the COD timeframe as the main reason they chose not to move forward with the bid. Despite the eventual potential timeline extension to 2026, the delay in communication of this change impacted the ability to apply of those companies that may have otherwise considered to apply for HAR1 with an extended deployment date.

- *Clarity and communication issues on eligibility*: Several non-applicants noted some communication aspects created a barrier to their ability to apply. This was mainly due to either initial understanding of a project being eligible, but a later clarification stating otherwise. Several noted this for the 5MW capacity, where plans were made to have joint production facilities to reach this threshold, but discovered they could only use one facility at too late of a stage to shift plans. In another instance, a company stated they were well prepared for the bid, with a team and consultants, but were surprised to hear they not eligible at EOI stage, and yet continued to receive notifications to apply.

- One potential applicant decided not to continue with the bid due to their foreign investor seeing the UK as, "*becoming increasingly unstable, particularly regarding interest rates*." This suggests some external actors may be perceiving the UK market as less than attractive for certain investment ventures, potentially increasing the difficulty of companies to secure private investment for their electrolytic hydrogen projects within the UK.

The findings around these barriers point to there being room for some adjustments to eligibility and/or clarity and timeliness of communications. Particularly important is addressing the barriers that eligible or near eligible companies faced, including technological scope and high

application demands, in order to promote a more competitive environment in the electrolytic hydrogen market. This would support variety within an allocation round, encourage wider participation, help avoid future technological lock-in. If other competitions, such as additional allocation rounds of NZHF Strands 1&2 are deemed more appropriate for the smaller companies or less-developed competitive technologies, considerations should be made of increasing communications and marketing of those competitions.

3.3.7 Alternative Funding

The majority of applicants indicated supporting streams of funding that have been secured or are being considered for their projects. In order of commonality, these include: private investment, other UK programmes that may arise (including future HARs), external (non-UK) competitions, and UK Infrastructure Bank loans through the Green Financing Framework. Most applicants either did not discuss NZHF Strands 1&2 or were not seeking to apply to them, largely due to commercial readiness levels of their projects.

Of the three HAR1 applicants who had also applied to one of the earlier NZHF streams, none noted issues in timing of the applications. However, one applicant stated their team did not have the resources to apply to both HAR1 and NZFH Stream 1 or 2, and therefore prioritised HAR1. Considerations of NZHF streams 1 & 2 showed that most were either aware and not eligible or not interested, while others noted they had missed the opportunity to apply due to lack of awareness.

Around a third of the non-applicant respondents indicated interest or plans to apply to the next round of HAR, expecting to be more prepared at that time, with a more developed project, more available supporting information for the application, and/or more supporting investment. In terms of private investment, two non-applicants stated they were in conversation with investors, while another shared that they had already received private funding. Several noted they have amended projects plans for these other funding sources, with one forming quite different plans from those outlined in the DESNZ business plan. However, at least two other non-applicants stated that they will not have access to other funding for their intended projects.

Several non-applicants stated that they are now looking to funding outside of the UK to conduct their work in electrolytic hydrogen. One of these, identifying as having more innovative technology, expressed their concern that the UK Government was not supporting new electrolytic hydrogen technologies sufficiently, particularly in terms of technological scope. However, this view motivates some companies to apply for grant funding outside of the UK, where there are perceived to be more favourable policies for support, with wider innovation scope. A recommendation was made for the UK to conduct a cross-comparison of their funding with those across the EU and beyond. This may not only align the UK with the wider green hydrogen sector, but help identify differences in the terms and conditions of the competing programmes, potentially enabling the UK to become more attractive in this international market.

Those who did not submit an EOI did state that they had been looking for funding at the time, but factors like the COD and level of detail in the application, as explained above, prevented them from moving forward with HAR1.

4. Application process

This section addresses the following high-level evaluation questions as set out in Table 3:

5. To what extent did the application support and handling enable successful applications?

6. To what extent was the assessment process effective and fair? What future lessons can be learned from HAR1?

4.1 Application requirements

4.1.1 Expression of interest (EOI)

The application process commenced with the submission of an EOI which granted prospective applicants access to the HAR1 submission portal. Applicants could submit their EOIs between July and September 2022. The EOI was not used to sift projects, but rather to gauge the potential number of applications, and according to DESNZ officials, upwards of 80 unique EOIs were received.

Considered in isolation, most interviewees found the EOI process appropriate with respect to the amount of detail required and ease of the submission process. However, looking at the application process as a whole, several interviewees found the jump from the EOI process to the formal application form too severe. They suggested that the overall process could be more front-loaded, with some shortlisting of projects taking place before starting the final application form. Further details about front-loading and earlier shortlisting are provided in the sections below.

4.1.2 Guidance and opportunities for clarification

Applicants were supplied with detailed application guidance via an online submission portal. There was also a formal clarification process to address any queries about EOI and application requirements. The clarification process ran alongside the application window and provided publicly available feedback on all questions submitted through a number of channels.

Interviewees differed in their opinions of the guidance and clarification process. While they generally agreed that it was highly professional and fair with good turnaround time, and appreciated the availability of an ongoing forum to have their questions answered, certain sub-groups emerged:

- Those who found the guidance sufficient, with little need for further correspondence. These were typically organisations with prior experience of similar competitions, or large organisations with the resources to recruit external consultants to interpret the guidance for them.
- Most applicants agreed that the guidance on scoring applications was clear and useful for focussing their effort. This was particularly important given the application form's resource-intensive nature.
- Some organisations would have preferred the addition of bilateral clarification opportunities with DESNZ. This would have made the process more efficient, given the amount of duplication and low-quality questions submitted. Moreover, it would have offered protection of competitive advantage, as certain project-specific clarification was required but the public communication of answers strategically prevented them

requesting this. This group admitted it could be a challenge to ensure fairness in the case of bilateral clarification opportunities.

- Several applicants found the volume of feedback received throughout the application window overwhelming, and in some cases, too late with respect to the application deadline. The number of updates had a material effect on applicants' applications, as these updates often served to distract or divert resources. In some cases, it led to fundamental changes in the understanding of the initial guidance, which in turn impacted the development of project plans. This was equally true of updates communicated only days before the deadline. Applicants with prior funding experience noted that the volume of information required to complete the application exceeded the norm. DESNZ officials also noted that the volume of questions was correspondingly large, with several repeated questions (as noted above).

- A handful of applicants found the guidance and clarifications vague or too broad in scope. This is reflected in comments from some DESNZ officials, who believed applicants were confused about what was required in some sections, noting large variations in applicant responses and a resulting provision of superfluous amounts of supporting evidence (hundreds of pages, in extreme cases).

4.1.3 Application form completion and the submission portal

The application window opened in July 2022 and remained open for 12 weeks. Project application forms were available via an online submission portal. Applicants could register multiple users per project; a feature which was appreciated by applicants with several team members dedicated to application completion.

Regarding the application form, applicants and non-applicants with EOI submissions agreed that the form was both long and highly detailed. As was the case for the guidance and clarifications process, sub-groups emerged within the pool of interviewees:

- Those who had little trouble completing the application form within the given window were often organisations with mature projects and organisations that were highly embedded in the hydrogen industry or had strong existing relationships with DESNZ. They were also more likely to have had the resources to hire technical consultants for the finer details required by the form, or the network power to obtain signed and legal letters of intent from their suppliers and off-takers. DESNZ officials agreed, observing that applicants with mature projects were more likely to cope well with the application form as they already had the necessary information at hand. However, these applicants also noted that the scope of the application may be deterring to companies with a narrower sight of the bid (i.e., only at time of market engagement) and/or with fewer resources.

- The majority of applicants interviewed questioned the appropriateness of the level of detail required given the nascent stage of electrolytic hydrogen and their projects in general. These applicants had to dedicate a large amount of time and resources to driving their business models forward enough to be able to complete all sections of the form.

  This was exacerbated by the application window coinciding with the summer period when many of their team members were on annual leave. In some cases, both applicants and non-applicants considered the cost of internal and external resources needed to complete the form, which was very large in comparison to the expected value of participation (the chance of being shortlisted and uncertainty of funds

allocation). Several DESNZ officials who were close to the assessment process shared the view that the form was too long, as it resulted in a highly resource-intensive marking process on their side. This was further corroborated by the large, experienced firms, who questioned whether SMEs would be able to complete the application form at all. Lastly, a handful of applicants with prior funding application experience noted that other competitions' application forms, like those of the UKRI, are shorter than those used in HAR1.

- Several applicants appreciated the format of the form, noting that it was an improvement on the survey format used in other competitions. They also appreciated that the form could be uploaded as one file, which is more efficient than doing so in sections. In contrast, a small number of applicants had trouble with certain technicalities of the form, such as the word limit or the format of various spreadsheets, such as those for job creation or for the entry of UK grid electricity data. Applicants felt that the word limit was restrictive in some cases and did not allow elaboration of qualitative ideas without sacrificing the quality of their answers.

4.1.4 Project shortlisting within the application process

Applicants noted the large increase in effort required between the EOI and the formal application form. Considering that the eligibility checks and shortlisting occurred only after application submission, they were concerned about the potential sunk cost of completing the submission without certainty that their projects are in fact eligible. For this reason, a number of applicants suggested front-loading the application process. A typical sequence proposed by applicants is as follows:

- A light-touch EOI like the one used for HAR1, which could be used to gauge interest.
- A more in-depth EOI / mini application / interview process focused solely on eligibility and leading to elimination of projects that do not meet criteria.
- A final application which includes finer details and models. The application could be lighter than that of HAR1 given that projects have already shown eligibility.

This approach would benefit both applicants and assessors. For applicants, an earlier shortlisting round before opening the application window would provide additional certainty about the direction of their projects and could reduce the burden of the final application form if it is consequently shortened. Based on assessor feedback regarding the volume and size of applications that were processed, reducing the number of applicants at an early stage could reduce the clarifications process as well as the assessment process.

4.1.5 Nascent industry and competition

HAR1 is the first of its kind, and the green electrolytic hydrogen industry at large is still in its infancy. Both applicants and DESNZ officials acknowledged that the allocation round is on unfamiliar ground, and that frames of reference are still being established. It is reasonable to expect uncertainty about what a good project application looks like, though applicants and officials alike suggested that subsequent allocation rounds could draw on the best examples from HAR1 to inform and guide future applicants.

4.2 Assessment Process

The assessment of projects in the first electrolytic allocation round has been guided by the six criteria below, with respective evaluation weightings:

1. **Deliverability** (35%) – The level of confidence Government has in the delivery plan put forward by a project and the date at which the project can, credibly, be operational by.
2. **Costs** (20%) - Whether the project will deliver cost-effective hydrogen.
3. **Economic Benefits** (20%)– The contribution the hydrogen plant will make to the economy.
4. **Carbon Emissions and Environmental Factors** (10%) – The extent to which the project uses the lowest carbon and most efficient production pathways and considers and mitigates wider environmental impacts resulting from the production of hydrogen.
5. **Market Development and Learning** (10%) – The extent to which the project offers growth and learning opportunities in the production and usage of hydrogen.
6. **Additionality of Electricity Security** (5%)– Whether the project's low carbon electricity source is met by new low carbon generation and does not divert low carbon electricity from other users to avoid negative impacts on wider decarbonisation.

Sections below address the views of all interviewee groups on the effectiveness and appropriateness of the assessment criteria.

4.2.2 Assessment process structure

The assessment process for HAR1 applications began with assessors completing an eligibility check following submission of applications to confirm applications met the defined eligibility criteria. Those that were considered to meet the eligibility criteria proceeded to a full eligibility assessment. During this DESNZ and the technical advisors performed additional checks on the credibility of the evidence provided and the robustness of any calculations involved. Where projects failed to provide sufficient evidence in respect of their satisfaction of the eligibility criteria, DESNZ considered these to have failed the eligibility check and they did not progress further in the evaluation process.

Applications which met the eligibility criteria and a minimum deliverability score were then assessed against the full set of defined evaluation criteria and sub-criteria (see Table 6). These criteria assess the costs and wider benefits of each project. Based on the assessment of the relevant evidence against the scoring criteria, projects were allocated a score against each of the criteria, considering their respective weightings. At the end of this stage, projects had a total weighted score, with highest scoring projects ranked first.

4.2.2 Design and quality of application

Assessors note that the quality of application varied, with a wide range of level and evidence provided. It was considered that company size and their level of internal resources played an important part in how they could meet the requirements.

The quality of applications was thought to be influenced by the detailed information provided by DESNZ during market engagement events. Assessors highlighted the usefulness of the additional engagement sessions that were held for applicants to support their queries. It is likely that sufficient information was provided to applicants, given that only two supplementary questions were submitted.

The application process was designed to obtain a sufficient level of evidence, whilst allowing for a wide scope of documents to be submitted. Assessors noted the process purposefully did not indicate any specific types of documents expected from applicants, in order to allow companies

to use different ways of showing the required information. However, the wide scope was linked to the wide range of quality in the information and levels of evidence provided from the applicants' perspective, putting pressure on the assessors when trying to score compliance in a relative manner, that is, justifying the differentiation between scores' ranges (i.e., 1-2 and 3-4).

Since most applicants submitted more documentation than necessary to support their claims, the majority of assessors remarked that applicants could have benefited from more guidance regarding the reasoning and purpose of the questions, thus reducing pressure on assessors' timelines. They suggested this could be improved in future rounds, for example, by specifying the format of quantitative information required (i.e., specific format for cost breakdowns).

4.2.3 Assessment criteria

The six assessment criteria were developed to provide specific weighting values that align with HAR1 strategic objectives. Each criterion was further broken down into sub-criteria, which in turn were linked to a specific section of the application process and detailed explanation was given to identify the evidence provided by applicants. Table 6 below sets out the weightings allocated to each of the Electrolytic Allocation Round's assessment criteria for new build hydrogen Projects. The final weightings reflect feedback gathered via the Market Engagement exercise.

Table 6. Scoring framework criteria and sub-criteria

Criteria		**Weight (%)**
1. Deliverability		**35%**
1.1	Organisation and Governance	
1.2	Financial & Commercial	
1.3	Project Deliverability	
1.4	Technical Deliverability	
2. Carbon Emissions and Environmental Factors		**10%**
2.1	Carbon Emissions (Hydrogen calculator)	
2.2	Environmental considerations	
3. Costs		**20%**
4. Economic benefits		**20%**
4.1	Number and quality of jobs	
4.2	Transparency of supply chains procurement process	
4.3	Investment in hydrogen skills	
4.4	Wider economic benefits	
5. Market Development and Learning		**10%**
5.1	Hydrogen market development	
5.2	Cost reduction, replicability, and innovation	
5.3	Knowledge sharing plan	
6. Additionality of electricity source		**5%**

Weightings

There were different views among assessors on the weighting of criteria. While some assessors remarked that the weightings assigned for each criterion aligned well with HAR1 strategic objectives, others suggested that weightings could be reviewed.

Scoring and tools

Projects were allocated a score against each of the criteria according to the weightings explained above. Scores were allocated based on the assessment of the relevant evidence.

All assessor participating in the HPBM and NZHF attended mandatory training sessions on competition eligibility and assessment criteria before completing their assessments. Some assessors remarked that having recordings of the training sessions and having access to a query mailbox were very useful.

The HAR1 Application Guidance document sets out the assessment scoring method and refers to scoring according to ranges (1-2, 3-4, etc.) rather than discreet numbers. Many assessors suggested that it would provide further clarity if the document were supplemented with examples of what each range represented.

4.2.4 Scoring process in DESNZ

Most assessors found the process to have clear communication channels and defined processes. Considering future due diligence for applications, assessors remarked that assessing both HPBM and NZHF at the same time could be challenging, but most assessors agreed that they do not expect to face issues moving onto the 'Agreeing an Offer' phase. However, risks experienced during the assessment period that need to be considered, included:

- Potential for significant change during the assessment period regarding costs, particularly considering current pressures on supply chains.
- Potential for significant change with regards to the electricity set-up, including prices and sources variations.

4.2.5 Actor perspectives

Assessors were responsible for reviewing the information provided in submissions and supporting evidence and identifying supplementary questions (SQs). Many of the assessors interviewed remarked that DESNZ's governance and structure was very well defined and aligned with the strategic objectives, responsibilities were clear and thought through, and communications channels between assessors were set in place.

However, many assessors commented that the compressed assessment timeline tested the resilience of the governance set in place and resulted in extra pressure from the assessors' perspective.

Some applicants noted that the timeline of the process was too long, and not timely enough, and especially for smaller companies with less control over their supplier and price control, as the development of their project might change during the assessment period.

Conclusions and Recommendations

This section sets out the main conclusions from the process evaluation of the HAR1 and recommendations for future allocation rounds, including on design and eligibility, application demands, clarity and efficiency of communications, and assessment process on the side of DESNZ and technical advisor. Based on the evidence and analysis presented in the preceding sections, the sections below summarise our current assessment of each key HAR1 process. Recommendations from both the interviewees and Technopolis have been made for HAR2 and future rounds.

5.1 Design and Eligibility Criteria

HAR1 is overwhelmingly welcomed by the industry and seen as crucial for the development of the electrolytic hydrogen market. The HPBM support is clearly regarded as a necessary tool for decreasing off-taker cost, de-risking and propelling projects, and securing investment. Capex was seen as necessary by half of the applicants and 66% of the interested non-applicants, aiding many to decrease project costs and get them off the ground with improved VfM.

There were several areas that stood out for improvement. Numerous applicants and non-applicants noted a design gap with other aspects of hydrogen production, particularly the exclusion of transport and storage costs, more policy initiatives to increase off-taker demand, and closer alignment to other programmes such as RTFO.

There is clear interest in participation by more in industry than those that applied. However, barriers for more nascent projects and smaller teams, such as level of detail or effort on the application and specific technological scope within the call, have deterred a number of eligible applicants from continuing with the application. The 2025 COD deadline was also regarded by some as too narrow for project completion, forcing some applicants to lower the scope of their intended projects to fit the criteria and deterring other potentially eligible projects from applying altogether.

Table 7. Recommendations - Design and Eligibility Criteria

Recommendations – Design and Eligibility Criteria
• Earlier clarifications of details of technological scope, such as in market engagement meetings or an earlier timeline for EOIs. • Increased competition scope to encourage wider market and technological participation, e.g., second-generation electrolysers. Alternatively, increase in marketing and engagement of the other streams of support for electrolytic hydrogen (NZHF 1&2) with more novel technologies, including continued provision of such support alongside future HARs. • More streamlined or decreased scope of applications, in order to meet the resource capacity of smaller eligible companies. Alternatively, potential segregation of application requirements based on company resources and/or stage of project. • More rigorous market engagement for pre-allocation round eligibility feedback, such as on COD, to align with company expectations (e.g., not having to lower project scope), to provide VfM through the allocation round. • Clarification of T&S level of support included.

Based on industry (applicant and non-applicant, with and without EOIs) responses around the prompt of electrolytic hydrogen production barriers and whether HAR1 appropriately addresses these, wider policy considerations have also been pulled out.

Table 8. Wider Policy Considerations

Wider Policy Considerations
• Consideration for demand-side policy support, whether through incentives or campaigns, to further assure potential off-takers of the market's move towards electrolytic hydrogen. • Consideration of inclusion of T&S costs in Capex support, which are noted to remain very high for many to handle without support. • Consideration of decreased scope of or more streamlined applications, to meet the resource capacity of smaller eligible companies. Alternatively, potential segregation of application requirements based on company resources and/or stage of project. • Closer alignment with other UK hydrogen policies, such as RTFO, to develop market and policy synergies and agreed definitions of green hydrogen. • Review of wider green hydrogen market development and subsidy policies, within EU and beyond, to better incentivise UK-based industry actors to develop projects and adjacent supply-chain in-country rather than move abroad, enabling the UK to retain the wider economic and energy security benefits.

5.2 Communications and Application Process

HAR1's communications and application process successfully attracted over 80 EOIs and over 40 applications. The key findings from the evaluation of these aspects of the programme are presented below.

The amount of interest generated by HAR1 is evidence of an effective publication strategy; information about the launch of HAR1 travelled well through Government structures and established networks within the hydrogen industry. However, newcomers were less likely to learn about it timeously, which may have excluded or disadvantaged novel projects.

Stakeholder feedback indicated a number of areas for improvement. For example, the period between HAR1's launch (and the availability of eligibility criteria) and the application window was too short. Applicants needed more time to develop their projects and align them with allocation round requirements. It was also mentioned that the jump in effort between the EOI and the formal application was very large, with no project elimination in the interim. This places a heavy sunk cost on applicants who completed the process only to learn their project is not eligible. It also back-loads the process and contributes to an already resource intensive application form. Future rounds could reduce the number of applicants based on eligibility prior to opening the final application window, such as through an earlier shortlisting process, and consequently reduce the requirements for the application form. This would also allow for ineligible projects to conserve resources during the greater part of the application period, and focus their efforts on similar or future electrolytic hydrogen bids for which they may be eligible.

Additionally, applicants and officials alike indicated that the application process was resource intensive, especially for smaller firms lacking dedicated funding functions or with limited capacity to take on external consultants. This was exacerbated by the application window's

coincidence with the summer period, when team members were on annual leave. Lastly, the terminology used by HAR1 was not always aligned with that of the hydrogen industry, leading to some confusion about capacity thresholds among applicants and in some cases materially affecting their eligibility.

Based on the findings above, the following recommendations can be made for HAR2 and future allocation rounds:

Table 9. Recommendations – Communications and Application Process

Recommendations – Communications and Application Process
• Release of information about eligibility criteria and expected timelines for future allocation rounds earlier to allow better planning for application candidates. • Introduction of earlier elimination of ineligible projects (before opening the application window) to streamline the application process and reduce sunk costs for ineligible candidates. • Alignment of technical terminology with industry norms to clarify eligibility criteria. • Exploration of additional channels of publication about the launch of future allocation rounds to enable participation by potentially novel projects.

5.3 Assessment Process

The application was designed to obtain a sufficient level of evidence from the applicants, whilst allowing for a wide scope of documents to be submitted. Assessors noted the process relayed on having no specifications on the type of documents expected from applicants, therefore making it easier for companies to comply with different ways of showing the required information. The specificity of the requirements and the volume of documentation provided by applicants were linked to a wide variety of evidence provided and the quality of applications.

The feedback from assessors pointed to some process factors that could be improved. While some assessors remarked that the weightings assigned for each criterion aligned well with HAR1 strategic objectives, others suggested that weightings could be reviewed. Some also commented that a positive improvement could be providing detailed information and specifications of elements to look for in a good submission and examples of ranges within relative scores.

Regarding further steps in the process, many interviewees agreed that the 'Requests for information' (RFI) and 'Negotiations' steps were going to be particularly relevant. Referring to the structure of the assessment, some assessors considered that not being able to engage back and forth with projects and DESNZ officials was a challenge. However, others referred to the structure as being more appropriate to keep the communication unilateral at this stage, considering elements of fairness and transparency, indicating that a two-way communication system had been implemented for the RFI section.

Based on the findings above, the following recommendations can be made for HAR2 and future allocation rounds:

Table 10. Recommendations – Assessment Process

Recommendations – Assessment Process
• Potential review of the weighting percentages of assessment criteria for future allocation rounds. • Enhancement of the HAR1 Guidance document by supplementing it with examples of what each scoring range represents. • Optimisation of assessment time by further improving internal communication among assessors on project eligibility, ensuring projects deemed ineligible for one criterion do not continue to be assessed for another, thus optimising assessment time. • Provision of more guidance to projects on type of evidence most useful for specific criteria and request evidence referencing within application, to alleviate work for both projects and assessors. However, it is important to keep the guidance open enough to accommodate the different stages of projects and capacities of companies.

5.4 Concluding remarks

HAR1's support is overwhelmingly regarded as crucial for the progression of the electrolytic hydrogen market.

In particular, HPBM is unanimously deemed necessary for the development of robust green hydrogen business models, lower costs for off-takers, and de-risking projects for investments. Capex remains an important element for some companies, allowing for a wider participation of eligible competitors.

However, factors like COD by 2025, lack of T&S funding eligibility, technological scope, and significant application demand create barriers for some actors in relevant sectors. Considerations of best approaches to increased competition should be reviewed for future rounds. Recommendations were also made to increase policy initiatives to increase off-taken demand to meet production initiatives.

Overall, the communications and applications processes were sufficient to attract interest and maintain engagement through to the submission of project applications. Still, the programme would benefit from an earlier start to communications with respect to the final submission so that candidates are sufficiently prepared for what is otherwise a highly resource intensive process.

The assessment process itself could benefit from automatising time consuming processes, revising the scoring criteria regarding relative scores and potentially reviewing criteria weightings.

With these improvements made, and consideration of other amendments with the development of the electrolytic hydrogen market progresses (i.e., potential removal of Capex as more investment becomes available at such projects become more de-risked), future rounds of HAR are likely to continue attracting strong candidates for electrolytic hydrogen production. Other related factors, such as electricity grad balancing, additionality measures, and LCHS need to continue to advance and adapt alongside the public support. In unison, this support will not only develop an electrolytic hydrogen business plan and take forward projects that would otherwise not be possible, but that will contribute to the UK's goals of reaching Net Zero by 2050.

A1. Topic Guides

A1.1 Interview Topic Guide – Applicants

HAR1 Process Evaluation Topic Guide - Applicants

Name	
Interviewee name	
Organisation	
Project title	
Interviewer	
Interview date/time	

Instructions for interviewers

The interviewee has been selected as they have made an application for HAR1 – the 2022 first joint Hydrogen Business Model (HBM) / Net Zero Hydrogen Fund (NZHF) Electrolytic Allocation Round.

Prior to each interview, familiarise yourself with the overview detail below, relevant project documentation, the process evaluation's scope and planning (and including reviewing the HAR1 process map that has been developed as part of this process evaluation), as well as any relevant/available application form documentation and briefly with the applicant's firm.

Background to the research to be shared as appropriate and within the limitations of time available with the interviewee

This interview will feed into a process evaluation of the first joint electrolytic hydrogen allocation round (HAR1).

The overall aim of the process evaluation is to understand and describe the experiences of officials involved in HAR1 at the Department for Energy Security and Net Zero (DESNZ) (formerly BEIS), as well as technical advisers and firms that have applied for support and firms that could potentially have benefitted from the allocation round but ultimately decided not to apply.

More specifically, the process evaluation will look at:

- the experiences of DESNZ officials/delivery partners and including:
  - the design and delivery of the HAR1 allocation round.
  - aspects that have more/less successful and why.
  - any improvements or lessons learned that could be implemented in the future.
- **the motivations of firms for choosing to apply, to gain insight into why they have applied and their experiences with the application and assessment process (i.e., whether the design and delivery characteristics were appropriate given the NZHF and HBM objectives). This would also include:**
  - **why they did/did not apply for CAPEX alongside HPBM support.**

- any improvements that could be made to similar processes in the future.

- the motivations of firms for choosing to not apply (i.e., firms that have been identified as potential applicants (in the pipeline and/or through an Expression of Interest) but who did not end up submitting an application. his would also include:
  - Non-applicants' thoughts about the process.
  - Barriers or reasons for not applying.
  - Thoughts on how the allocation process could be improved.
- identifying unintended consequences (positive or negative) of the delivery and any improvements that could be made to the next application and assessment round (HAR2, timing tbc but likely to launch in Autumn 2023) to enable enhancements to delivery.
- gaining an early understanding of some of the outputs (number of businesses supported, private sector match-funding received, etc.)

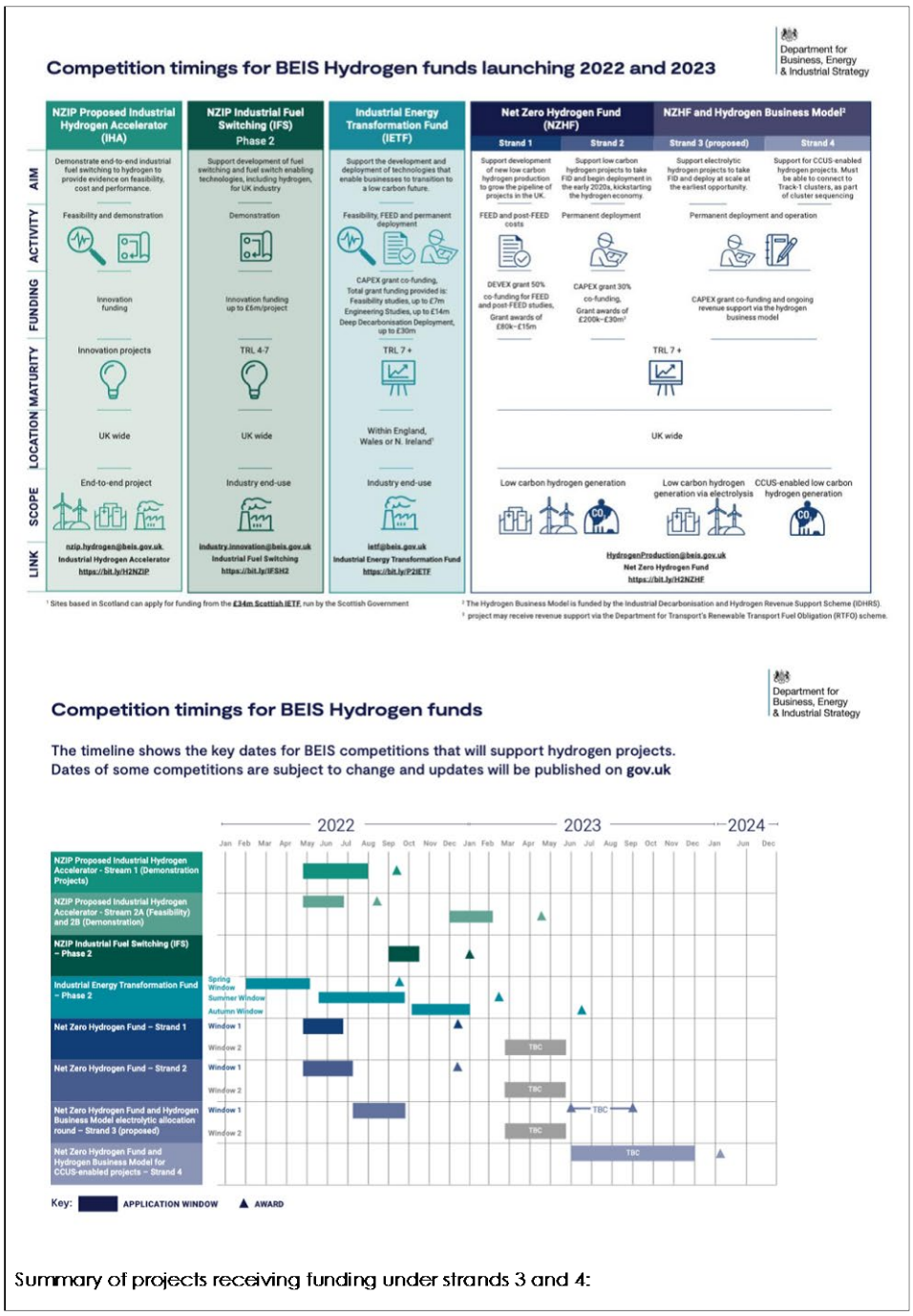
A final evaluation report will be developed to provide a detailed review of the application process and to provide feedback to DESNZ on the delivery of HAR1 and to support DESNZ in making any further improvements (where possible and necessary) for the implementation of the next application round for both applicants and BIES officials/delivery partners.

*

For HAR1 – the 2022 first joint Hydrogen Business Model (HBM) / Net Zero Hydrogen Fund (NZHF) Electrolytic Allocation Round, DESNZ have proposed that projects can apply for HBM revenue support only, or they could apply for joint HBM revenue support and CAPEX support through the Net Zero Hydrogen Fund (NZHF).

The figure below gives an overview of DESNZ hydrogen fund competition timings for 2022/2023.

2



Summary of projects receiving funding under strands 3 and 4:

3

- While the first two NZHF strands will target projects that are not tied to the HBM process, Strands 3 and 4 will be for those projects that explicitly require an HBM (Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) funding) to be viable.
- Strand 3 projects will consist of electrolytic projects that require an HBM, while Strand 4 consists of CCUS-enabled projects that require an HBM and furthermore rely on critical carbon T&S networks and other ICC cluster-enabled infrastructure financed by the CCUS programme and/or CIF.
- Importantly, none of the Strand 3 projects would be viable without IDHRS support.
- Some individual Strand 3 projects would also not be viable unless they receive funding from both NZHF and IDHRS, whereas some Strand 3 projects would be viable with just IDHRS support.
- None of the Strand 4 projects would be viable without joint IDHRS and CCUS programme/CIF support, with the latter supporting the development of a carbon T&S network and other relevant infrastructure critical for Strand 4 projects to go ahead. However, NZHF support is not critical for Strand 4 projects to go ahead.
- NZHF Capex support is provided to (some) Strand 3 and (all) 4 projects that would be viable in the absence of NZHF CAPEX support because offering CAPEX support reduces the overall cost to the exchequer.

Consent & Introduction

Thank you for agreeing to take part in this interview.

DESNZ have commissioned Technopolis to conduct a process evaluation of HAR1 – the first joint Hydrogen Business Model (HBM) / Net Zero Hydrogen Fund (NZHF) Electrolytic Allocation Round.

The overall aim of the process evaluation is to understand and describe the experiences of the firms that have applied for support, firms that could potentially have benefitted from the allocation round but decided not to apply, and the HAR1 DESNZ design & delivery team. You have been selected for this interview, as your input on your experience as an applicant and motivation for applying to HAR1 is invaluable to understanding the success of the process and lessons that can be drawn for future allocation rounds.

This interview should run for around 45 minutes.

Your participation in this interview is voluntary and you can change your mind at any time. The information that you provide will be treated in confidence by the evaluation team.

We would like to use your inputs and request your permission for the following:

1. To use the feedback you provide, together with any additional information you choose to disclose ("Information") for the evaluation study.
2. We will provide an anonymised version of this information including transcripts and any analysis we carry out as part of the evaluation study with DESNZ, for its own internal purposes only.
3. DESNZ expect to publish aggregate, unattributed results of the analysis of information from these interviews.

4

We would like to record the discussion for analysis purposes, which will be used to help us accurately collect findings for the research. Note The recordings/transcripts will be securely stored and retained by us and destroyed after the completion of this evaluation study.

Are you happy for us to proceed?

1.1 Introduction

1. Please could you tell me your role and the nature of your involvement with HAR1?

2. Did you apply for joint Hydrogen Business Model (HBM) revenue support and CAPEX support through the Net Zero Hydrogen Fund (NZHF), or just HBM revenue support?

3. Why did you apply for both / OR Why did you only apply for HBM revenue support and not CAPEX support?

1.2 Programme Design

4. What do you think are the main barriers within the electrolytic hydrogen production sector? Do you think HAR1 addresses these barriers?
   Probe for: Whether the activities of the project were appropriate to meet the needs of the sector? Were there any activities that weren't relevant for meeting the needs of the sector?

5. Are you aware of any competitions or programmes similar to HAR1?
   Probe for:
   Probe for: Any key similarities and differences between other programmes and HAR1, including internationally;
   Any specific features of the other programmes that were important or beneficial for meeting outcomes

1.3 Pre-application

6. How did you hear about HAR1?
   a. How well was it publicised?
   b. Was there anything that the delivery partners could have improved on to promote the competition to relevant organisations?
   c. What were your perceptions of the competition at this point/before applying?

7. Why did you decide to apply for HAR1?
   Probe for: Previous experience in the sector;
   Any particular elements that made it attractive to apply

8. Did you receive any pre-application support?
   a. If yes, what type of support? was it useful? How could it be improved?
   b. What was your perception of it? (e.g., didn't know it was available, aware of it but didn't need it)
   c. did you need any external support?

9. What was your perception of the possibility of obtaining clarifications and the associated timeframe?

1.4 Application Processes

10. How clear was your understanding of the needs and objectives of the application?

6

11. Were you provided with sufficient time to prepare your submission and form a consortium (if relevant)?

12. What factors affected your ability to produce a high-quality application?
    a. Probe on clarity of templates/guides.
    b. Could applicants provide all the information they wanted/needed to, particularly through the templates?
    c. Policy uncertainty?

13. Were the details of the programme communicated effectively?
    Probe for:
    a. *Details on the different application strands and windows/timings*
    b. *Eligibility and assessment criteria*
    c. *Details on the different types of funding under the joint allocation round*
    d. *Ability to obtain clarifications*
    e. *Templates / guidance relating to eligibility of costs*

14. Did you find the EOI and overall application process appropriate?

15. Did you find the process fair and transparent?

16. Do you feel you have clarity in understanding how applicants will be chosen for funding?

17. Were there any features or aspects of the application process which were particularly challenging or burdensome?

7

18. Were there any features or aspects of the application process which were particularly effective or useful?

19. Did you apply or did you want to apply to different strands for support (NZHF 1 &/or 2 Industrial Hydrogen, etc)?
    a. Did the windows/timings between the strands allow you to submit application(s) to the level of quality you wanted?

20. What plans, if any, do you have for future funding outside of government funding?

1.5 Closing and thank you

8

A1.2 Interview Topic Guide – Potential applicants who submitted an EOI

1 HAR1 Process Evaluation Topic Guide – Non-applicants (submitted EOI)

Name	
Interviewee name	
Organisation	
Project title	
Interviewer	
Interview date/time	

Instructions for interviewers

The interviewee has been selected as they have showed interest in accessing HAR1 funding (they submitted an EOI but did not submit an application).

Prior to each interview, briefly familiarise yourself with the interviewee's firm and any Expression of Interest detail (as available). As well as with the overview detail below and the process evaluation's scope and planning (and including reviewing the HAR1 process map that has been developed as part of this process evaluation).

Background to the research to be shared with the interviewee

The interviewee has been selected as they did not apply to access HAR1 funding, but did submit an Expression of Interest.

This interview forms part of an independent process evaluation of the first joint electrolytic hydrogen allocation round (HAR 1). Your comments in this interview will provide valuable insights to feed into a Department for Energy Security and Net Zero (DESNZ) (formerly, BEIS) evaluation of hydrogen support and have the potential to shape future Government policy in this space.

Background to the research to be shared as appropriate and within the limitations of time available with the interviewee

This interview will feed into a process evaluation of the first electrolytic hydrogen allocation round (HAR1).

The overall aim of the process evaluation is to understand and describe the experiences of officials involved in HAR1 at DESNZ, as well as technical advisers and firms that have applied for support and firms that could potentially have benefitted from the allocation round but ultimately decided not to apply.

More specifically, the process evaluation will look at:

- the experiences of DESNZ officials/delivery partners and including:
  - the design and delivery of the HAR1 allocation round.

1

- aspects that have more/less successful and why.
- any improvements or lessons learned that could be implemented in the future.

- the motivations of firms for choosing to apply, to gain insight into why they have applied and their experiences with the application and assessment process (i.e., whether the design and delivery characteristics were appropriate given the NZHF and HBM objectives). This would also include:
  - why they did/did not apply for CAPEX alongside HPBM support.
  - any improvements that could be made to similar processes in the future.
- **the motivations of firms for choosing to not apply (i.e., firms that have been identified as potential applicants (in the pipeline and/or through an Expression of Interest) but who did not end up submitting an application. his would also include:**
  - **Non-applicants' thoughts about the process.**
  - **Barriers or reasons for not applying.**
  - **Thoughts on how the allocation process could be improved.**
- identifying unintended consequences (positive or negative) of the delivery and any improvements that could be made to the next application and assessment round (HAR2, timing tbc but likely to launch in Autumn 2023) to enable enhancements to delivery.
- gaining an early understanding of some of the outputs (number of businesses supported, private sector match-funding received, etc.)

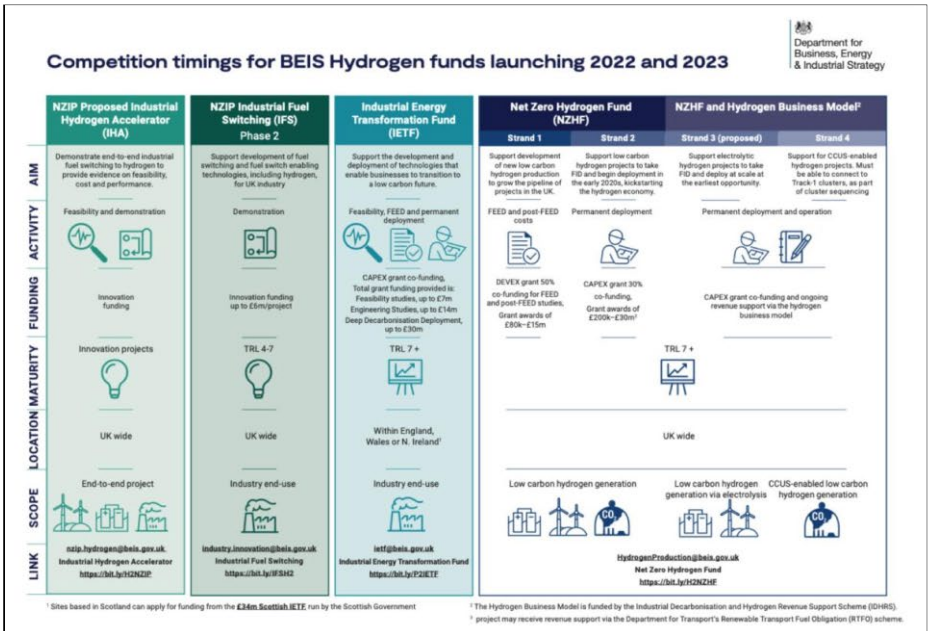
A final evaluation report will be developed to provide a detailed review of the application process and to provide feedback to DESNZ on the delivery of HAR1 and to support DESNZ in making any further improvements (where possible and necessary) for the implementation of the next application round for both applicants and BIES officials/delivery partners.

*

For HAR1 – the 2022 first joint Hydrogen Business Model (HBM) / Net Zero Hydrogen Fund (NZHF) Electrolytic Allocation Round, DESNZ have proposed that projects can apply for HBM revenue support only, or they could apply for joint HBM revenue support and CAPEX support through the Net Zero Hydrogen Fund (NZHF).

The figure below gives an overview of DESNZ hydrogen fund competition timings for 2022/2023.

2



Summary of projects receiving funding under strands 3 and 4:

- While the first two NZHF strands will target projects that are not tied to the HBM process, Strands 3 and 4 will be for those projects that explicitly require an HBM (Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) funding) to be viable.
- Strand 3 projects will consist of electrolytic projects that require an HBM, while Strand 4 consists of CCUS-enabled projects that require an HBM and furthermore rely on critical carbon T&S networks and other ICC cluster-enabled infrastructure financed by the CCUS programme and/or CIF.
- Importantly, none of the Strand 3 projects would be viable without IDHRS support.
- Some individual Strand 3 projects would also not be viable unless they receive funding from both NZHF and IDHRS, whereas some Strand 3 projects would be viable with just IDHRS support.
- None of the Strand 4 projects would be viable without joint IDHRS and CCUS programme/CIF support, with the latter supporting the development of a carbon T&S network and other relevant infrastructure critical for Strand 4 projects to go ahead. However, NZHF support is not critical for Strand 4 projects to go ahead.
- NZHF Capex support is provided to (some) Strand 3 and (all) 4 projects that would be viable in the absence of NZHF CAPEX support because offering CAPEX support reduces the overall cost to the exchequer.

Consent

Thank you for agreeing to take part in this interview. DESNZ have commissioned a Technopolis to conduct an evaluation of the first electrolytic hydrogen allocation round (HAR 1). This interview should last around 45-minutes. Your participation in this interview is voluntary and you can change your mind at any time. The information that you provide will be treated in confidence by the evaluation team.

We would like to use your inputs and request your permission for the following:

1. To use the feedback you provide, together with any additional information you choose to disclose ("Information") for the evaluation study.
2. We will provide **an anonymised version of this information including transcripts and** any analysis we carry out as part of the evaluation study with DESNZ, for its own internal purposes only. However, due to the small number of projects in these competitions, complete anonymity may not be possible.
3. DESNZ expect to publish **aggregate, unattributed results** of the analysis of information from these interviews.

We would like to record the discussion for analysis purposes, which will be used to help us accurately collect findings for the research. The recordings will be securely stored and retained by us and destroyed after the completion of the evaluation.

Are you happy for us to proceed?

1.1 Introduction

4

1. Please could you tell me your name, role, and the nature of your involvement with HAR1?

1.2 Programme Design

2. What do you think are the main barriers within the electrolytic hydrogen production sector? Do you think HAR1 addresses these barriers?
   Probe for:
   a. Whether the activities of the project were appropriate to meet the needs of the sector?
   b. Were there any activities that weren't relevant for meeting the needs of the sector?

3. Are you aware of any competitions or programmes similar to HAR1?
   Probe for:
   a. Key similarities and differences between other programmes and HAR1, including internationally
   b. Any specific features of the other programmes that were important or beneficial for meeting outcomes
   c. what aspects of those programmes made them attractive/accessible

1.3 Interest

4. How did you hear about the competition?
   a. Was there anything that the delivery partners could have done better to promote the competition to relevant organisations?

5. Why did you submit an Expression of Interest to the competition?
   Probe for:
   a. Have they had previous experience in the sector?
   b. Were there any particular elements that made it attractive to apply?
   c. Did you think the EOI process was appropriate?

6. When you submitted your Expression of Interest, did you want to apply for joint Hydrogen Business Model (HBM) revenue support and CAPEX support through the Net Zero Hydrogen Fund (NZHF), or just HBM revenue support?

7. Why did you want to apply for both / why did you only want to apply for HBM revenue support and not CAPEX support?

1.4 Pre-Application

8. Were you aware of the application process following the EOI?
   a. If no, would you have applied if you were aware?

9. Did you receive any pre-application support?
   a. If yes, was it useful? How could it be improved?
   b. If no, what was your perception of it? (e.g. did not know it was available, aware of it but did not need it)

10. Did you attempt an application (downloading it, any progress on it)?

11. What was your perception of the EOI and application process? Did you find the EOI process appropriate?

12. At what point and **why** did you decide to not submit an application to HAR1?
    a. Policy design
    b. Policy context of their Location / region
    c. Industry's state in their location/region (e.g., relevant clusters)
    d. Any other elements

6

13. What, if anything, could have been done differently to encourage you to submit an application?
    a. Was there anything you needed from the delivery partners in order to do so?

14. Prior to the application, were you provided with sufficient information to prepare a submission with appropriate levels of detail?

15. How clear was your understanding of the needs and objectives of the application?

16. Were you provided with sufficient time to prepare your submission and form your consortium (if relevant)?

17. Were the details of the programme communicated effectively?
    Probe for:
    a. Details on the different application strands and windows/timings
    b. Eligibility and assessment criteria
    c. Details on the different types of funding under the joint allocation round
    d. Ability to obtain clarifications
    e. Templates / guidance relating to eligibility of costs

18. Did want to apply to different strands (NZHF Strands 1 &/or 2)?
    a. Did the windows/timings allow you to apply to multiple strands?

7

b. Did the windows/timings allow you to submit an application to the level of quality you wanted?

19. Were there any features or aspects of the application process which were particularly challenging or burdensome?

20. Were there any features or aspects of the application process which were particularly effective or useful?

21. Have you or will access funding elsewhere for the intended project?

22. What features or adjustments, in terms of public support and their design, would you want to see in future programmes that would benefit companies in the electrolytic hydrogen sector and encourage them to apply?
    a. Probe for design specifics, e.g. phased, multiple strands, different support types (CAPEX/DEVEX/BM)

23. What could be done better in terms of engagement or support to enable companies in this sector to apply to this kind of funding programme in the future?

Closing and Thank you

8

A1.3 Interview Topic Guide – Potential applicants who did not submit an EOI

1 HAR1 Process Evaluation Topic Guide – Non-applicants (did not submit EOI)

Name	
Interviewee name	
Organisation	
Project title	
Interviewer	
Interview date/time	

Instructions for interviewers

The interviewee has been selected as they either may have shown an interest in accessing HAR1 funding OR could be considered as having a potential interest in accessing HAR1 funding (they did not submit an EOI or an application).

Prior to each interview, familiarise yourself with the overview detail below and briefly with the interviewee's firm (and any available detail on their interest in HAR1, if relevant), the process evaluation's scope and planning (and including reviewing the HAR1 process map that has been developed as part of this process evaluation).

Background to the research to be shared with the interviewee

The interviewee has been selected as they have not applied to access HAR1 funding but have been identified as a potential applicant for support.

This interview forms part of an independent process evaluation of the first electrolytic hydrogen allocation round (HAR 1). Your comments in this interview will provide valuable insights to feed into a Department for Energy Security and Net Zero (DESNZ) (formerly, BEIS) evaluation of hydrogen support and have the potential to shape future Government policy in this space.

Background to the research to be shared as appropriate and within the limitations of time available with the interviewee

This interview will feed into a process evaluation of the first joint electrolytic hydrogen allocation round (HAR1).

The overall aim of the process evaluation is to understand and describe the experiences of officials involved in HAR1 at DESNZ, as well as technical advisers and firms that have applied for support and firms that could potentially have benefitted from the allocation round but ultimately decided not to apply.

More specifically, the process evaluation will look at:

- the experiences of DESNZ officials/delivery partners and including:

- the design and delivery of the HAR1 allocation round.
- aspects that have more/less successful and why.
- any improvements or lessons learned that could be implemented in the future.

- the motivations of firms for choosing to apply, to gain insight into why they have applied and their experiences with the application and assessment process (i.e., whether the design and delivery characteristics were appropriate given the NZHF and HBM objectives). This would also include:
  - why they did/did not apply for CAPEX alongside HPBM support.
  - any improvements that could be made to similar processes in the future.
- **the motivations of firms for choosing to not apply (i.e., firms that have been identified as potential applicants (in the pipeline and/or through an Expression of Interest) but who did not end up submitting an application. his would also include:**
  - **Non-applicants' thoughts about the process.**
  - **Barriers or reasons for not applying.**
  - **Thoughts on how the allocation process could be improved.**
- identifying unintended consequences (positive or negative) of the delivery and any improvements that could be made to the next application and assessment round (HAR2, timing tbc but likely to launch in Autumn 2023) to enable enhancements to delivery.
- gaining an early understanding of some of the outputs (number of businesses supported, private sector match-funding received, etc.)

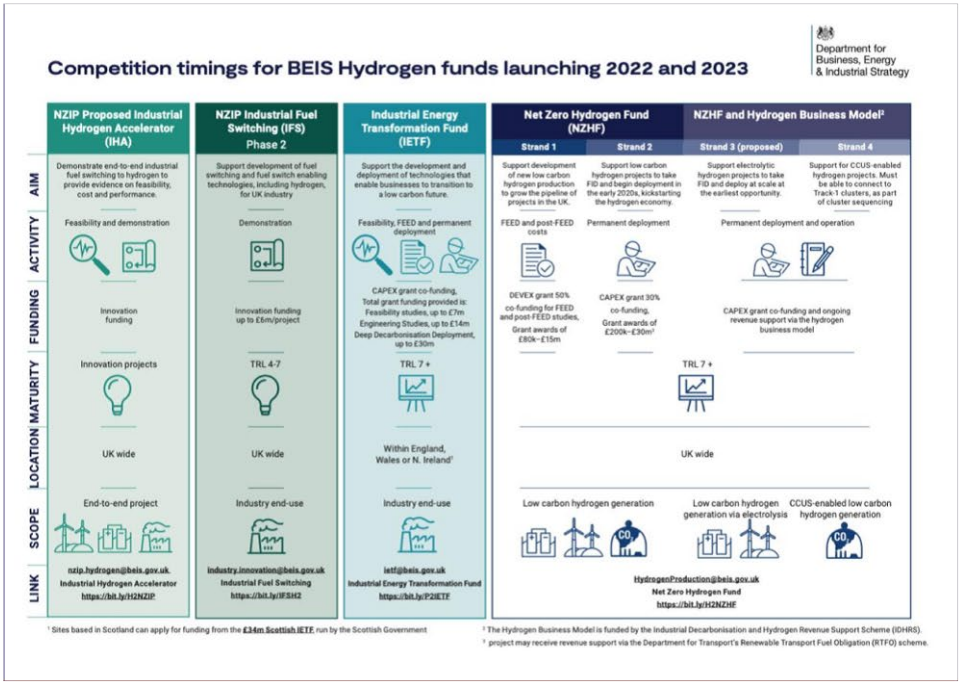
A final evaluation report will be developed to provide a detailed review of the application process and to provide feedback to DESNZ on the delivery of HAR1 and to support DESNZ in making any further improvements (where possible and necessary) for the implementation of the next application round for both applicants and BIES officials/delivery partners.

*

For HAR1 – the 2022 first joint Hydrogen Business Model (HBM) / Net Zero Hydrogen Fund (NZHF) Electrolytic Allocation Round, DESNZ have proposed that projects can apply for HBM revenue support only, or they could apply for joint HBM revenue support and CAPEX support through the Net Zero Hydrogen Fund (NZHF).

The figure below gives an overview of DESNZ hydrogen fund competition timings for 2022/2023.

2

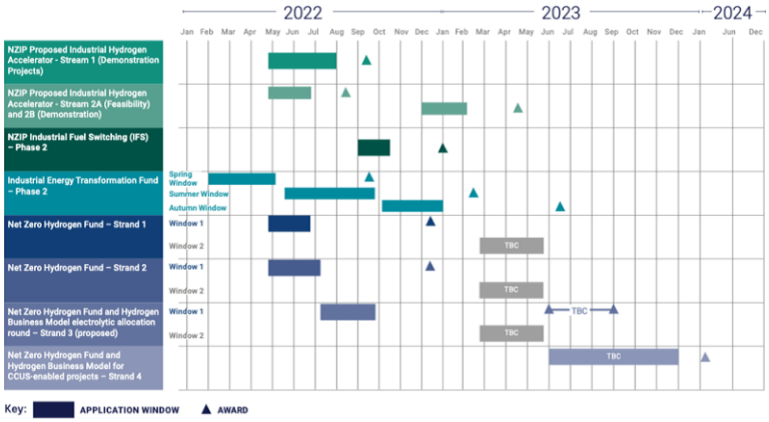

Competition timings for BEIS Hydrogen funds launching 2022 and 2023
Department for Business, Energy & Industrial Strategy
NZIP Proposed Industrial Hydrogen Accelerator (IHA)
NZIP Industrial Fuel Switching (IFS) Phase 2
Industrial Energy Transformation Fund (IETF)
Net Zero Hydrogen Fund (NZHF)
NZHF and Hydrogen Business Model²
Strand 1
Strand 2
Strand 3 (proposed)
Strand 4
AIM
ACTIVITY
FUNDING
LOCATION MATURITY
SCOPE
LINK
Demonstrate end-to-end industrial fuel switching to hydrogen to provide evidence on feasibility, cost and performance.
Support development of fuel switching and fuel switch enabling technologies, including hydrogen, for UK industry
Support the development and deployment of technologies that enable businesses to transition to a low carbon future.
Support development of new low carbon hydrogen production to grow the pipeline of projects in the UK.
Support low carbon hydrogen projects to take FID and begin deployment in the early 2020s, kickstarting the hydrogen economy.
Support electrolytic hydrogen projects to take FID and deploy at scale at the earliest opportunity.
Support for CCUS-enabled hydrogen projects. Must be able to connect to Track-1 clusters, as part of cluster sequencing
Feasibility and demonstration
Demonstration
Feasibility, FEED and permanent deployment
FEED and post-FEED costs
Permanent deployment
Permanent deployment and operation
Innovation funding
Innovation funding up to £6m/project
CAPEX grant co-funding, Total grant funding provided is: Feasibility studies, up to £7m Engineering Studies, up to £14m Deep Decarbonisation Deployment, up to £30m
DEVEX grant 50% co-funding for FEED and post-FEED studies, Grant awards of £80k–£15m
CAPEX grant 30% co-funding, Grant awards of £200k–£30m³
CAPEX grant co-funding and ongoing revenue support via the hydrogen business model
Innovation projects
TRL 4-7
TRL 7 +
TRL 7 +
UK wide
UK wide
Within England, Wales or N. Ireland¹
UK wide
End-to-end project
Industry end-use
Industry end-use
Low carbon hydrogen generation
Low carbon hydrogen generation via electrolysis
CCUS-enabled low carbon hydrogen generation
nzip.hydrogen@beis.gov.uk
Industrial Hydrogen Accelerator
https://bit.ly/H2NZIP
industry.innovation@beis.gov.uk
Industrial Fuel Switching
https://bit.ly/IFSH2
ietf@beis.gov.uk
Industrial Energy Transformation Fund
https://bit.ly/P2IETF
HydrogenProduction@beis.gov.uk
Net Zero Hydrogen Fund
https://bit.ly/H2NZHF
¹ Sites based in Scotland can apply for funding from the £34m Scottish IETF run by the Scottish Government
² The Hydrogen Business Model is funded by the Industrial Decarbonisation and Hydrogen Revenue Support Scheme (IDHRS).
³ project may receive revenue support via the Department for Transport's Renewable Transport Fuel Obligation (RTFO) scheme.

3

Competition timings for BEIS Hydrogen funds

Department for Business, Energy & Industrial Strategy

The timeline shows the key dates for BEIS competitions that will support hydrogen projects.
Dates of some competitions are subject to change and updates will be published on **gov.uk**



Summary of projects receiving funding under strands 3 and 4:

- While the first two NZHF strands will target projects that are not tied to the HBM process, Strands 3 and 4 will be for those projects that explicitly require an HBM (Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) funding) to be viable.
- Strand 3 projects will consist of electrolytic projects that require an HBM, while Strand 4 consists of CCUS-enabled projects that require an HBM and furthermore rely on critical carbon T&S networks and other ICC cluster-enabled infrastructure financed by the CCUS programme and/or CIF.
- Importantly, none of the Strand 3 projects would be viable without IDHRS support.
- Some individual Strand 3 projects would also not be viable unless they receive funding from both NZHF and IDHRS, whereas some Strand 3 projects would be viable with just IDHRS support.
- None of the Strand 4 projects would be viable without joint IDHRS and CCUS programme/CIF support, with the latter supporting the development of a carbon T&S network and other relevant infrastructure critical for Strand 4 projects to go ahead. However, NZHF support is not critical for Strand 4 projects to go ahead.
- NZHF Capex support is provided to (some) Strand 3 and (all) 4 projects that would be viable in the absence of NZHF CAPEX support because offering CAPEX support reduces the overall cost to the exchequer.

4

Consent

Thank you for agreeing to take part in this interview. DESNZ have commissioned a Technopolis to conduct an evaluation of the first electrolytic hydrogen allocation round (HAR 1). This interview should last around 45-minutes. Your participation in this interview is voluntary and you can change your mind at any time. The information that you provide will be treated in confidence by the evaluation team.

We would like to use your inputs and request your permission for the following:

1. To use the feedback you provide, together with any additional information you choose to disclose ("Information") for the evaluation study.
2. We will provide **an anonymised version of this information including transcripts and** any analysis we carry out as part of the evaluation study with DESNZ, for its own internal purposes only. However, due to the small number of projects in these competitions, complete anonymity may not be possible.
3. DESNZ expect to publish **aggregate, unattributed results** of the analysis of information from these interviews.

We would like to record the discussion for analysis purposes, which will be used to help us accurately collect findings for the research. The recordings will be securely stored and retained by us and destroyed after the completion of the evaluation.

Are you happy for us to proceed?

1.1 Introduction

1. Please could you tell me your name, role, and briefly about your firm's involvement in hydrogen?

2. Have you heard of HAR1? What do you know about it?

3. (BASED ON Q2) Did you consider applying for HAR1?
   a. Are there any particular elements of HAR1 which made it attractive/unattractive to apply to?
   b. Did you think your project was eligible to apply for funding?

5

---------- IF THOUGHT OF APPLYING. If not, skip to 'Programme Design', Q 11 ---------

1.2 Pre-Application

4. Were you interested in applying for the Hydrogen Business Model revenue support or both HBM AND CAPEX support?

5. Were the details of the programme communicated effectively?
   Probe for:
   a. Details on the different application strands and windows/timings
   b. Eligibility and assessment criteria
   c. Details on the different types of funding under the joint allocation round
   d. Ability to obtain clarifications
   e. Templates / guidance relating to eligibility of costs

6. Prior to the application, were you provided with sufficient information to prepare a submission with appropriate levels of detail?

7. Did you receive any support during this pre-application period?
   a. If yes, what type of support? was it useful? How could it be improved?
   b. If no, what was your perception of it? (e.g. did not know it was available, aware of it but did not need it)
   c. did you need any external support?

8. What was your perception of the EOI and application process? Did you find the EOI process appropriate? Did you feel your company was eligible to submit an EOI?

9. At what point did you decide not to apply to HAR1?
   a. Policy design
   b. Policy context of their Location / region
   c. Industry's state in their location/region (e.g., relevant clusters)
   d. Any other elements

6

10. What, if anything, could have been done differently to encourage you to submit an application?
    a. Was there anything you needed from the delivery partners in order to do so?

11. Were there any features or aspects of the application process which were particularly challenging or burdensome?

12. Were there any features or aspects of the application process which were particularly effective or useful?

---------- **CONTINUE FOR ALL** ----------

1.3 Programme Design

13. What do you think are the main barriers within the electrolytic hydrogen production sector?
    a. (if heard of HAR1) Do you think HAR1 addresses these barriers? Probe for:
    b. Whether the activities of the HAR1 were appropriate to meet the needs of the sector?
    c. Were there any activities that weren't relevant for meeting the needs of the sector?

14. (BASED ON Q2 - IF HEARD) How did you hear about the competition?
    a. Was there anything that the delivery partners could have done better to promote the competition to relevant organisations?

15. (BASED ON Q2 – IF DIDN'T HEAR) Would you have applied for this competition had you known about it?
    a. Would you have applied for Business Model Support or BM AND CAPEX funding?
    b. Probe for: Policy design, Policy context of their Location / region, Industry's state in their location/region (e.g., relevant clusters)

7

16. Do you feel that the options of Hydrogen Business Model revenue support or both Business Model AND CAPEX funding is appropriate support for electrolytic Hydrogen sector?

17. Are you aware of any competitions or programmes similar to HAR1 (such as NZHF Strand 1 & 2, Industrial Hydrogen Fund)?
    Probe for:
    a. Key similarities and differences between other programmes and HAR1, including internationally
    b. Any specific features of the other programmes that were important or beneficial for meeting outcomes
    c. what aspects of those programmes made them attractive/accessible?

18. Were you looking for funding at the time? (April – September 2022)

19. Have you or will you access funding elsewhere?

20. What features or adjustments, in terms of public support and their design, would you want to see in future programmes that would benefit companies in the electrolytic hydrogen sector and encourage them to apply?
    a. Probe for design specifics, e.g. phased, multiple strands, different support types (CAPEX/DEVEX/BM)

21. What could be done better in terms of publicizing and engagement to ensure companies such as yours are made aware of these kinds of funding programmes?

Closing and Thank you

8

HAR1 Process Evaluation Topic Guide – DESNZ/Arup

Interviewee* name	
Organisation	
Interviewer	
Interview date/time	

*Note we are calling these "Meetings" not interviews

Instructions for interviewers

The interviewee has been selected as they have had a role in HAR1 – the 2022 first joint Hydrogen Business Model (HBM) / Net Zero Hydrogen Fund (NZHF) Electrolytic Allocation Round.

The selected interviewee has had a role in HAR1 at the Department for Energy Security and Net Zero (DESNZ) (formerly BEIS) as well as providing external technical advice/support (i.e., in the case of Arup).

Prior to each interview, familiarise yourself with the overview detail below, relevant project documentation, the process evaluation's scope and planning and the interviewee's role in HAR1 (and including reviewing the HAR1 process map that has been developed as part of this process evaluation).

Background to the research to be shared as appropriate and within the limitations of time available with the interviewee

This interview will feed into a process evaluation of the first electrolytic hydrogen allocation round (HAR1).

The overall aim of the process evaluation is to understand and describe the experiences of the HAR1 DESNZ officials and firms that have applied for support as well as firms that could potentially have benefitted from the allocation round but ultimately decided not to apply.

More specifically, the process evaluation will look at:

- **the experiences of DESNZ officials/technical advisors and including:**
  - **the design and delivery of the HAR1 allocation round.**
  - **aspects that have more/less successful and why.**
  - **any improvements or lessons learned that could be implemented in the future.**
- the motivations of firms for choosing to apply, to gain insight into why they have applied and their experiences with the application and assessment process (i.e., whether the design and delivery characteristics were appropriate given the NZHF and HBM objectives). This would also include:
  - why they did/did not apply for CAPEX alongside HPBM support.
  - any improvements that could be made to similar processes in the future.
- the motivations of firms for choosing to not apply (i.e., firms that have been identified as potential applicants (in the pipeline and/or through an Expression of Interest) but who did not end up submitting an application. his would also include:

1

- Non-applicants' thoughts about the process.
- Barriers or reasons for not applying.
- Thoughts on how the allocation process could be improved.

- identifying unintended consequences (positive or negative) of the delivery and any improvements that could be made to the next application and assessment round (HAR2, timing tbc but likely to launch in Autumn 2023) to enable enhancements to delivery.
- gaining an early understanding of some of the outputs (number of businesses supported, private sector match-funding received, etc.)

A final evaluation report will be developed to provide a detailed review of the application process and to provide feedback to DESNZ on the delivery of HAR1 and to support DESNZ in making any further improvements (where possible and necessary) for the implementation of the next application round for both applicants and BIES officials/delivery partners.

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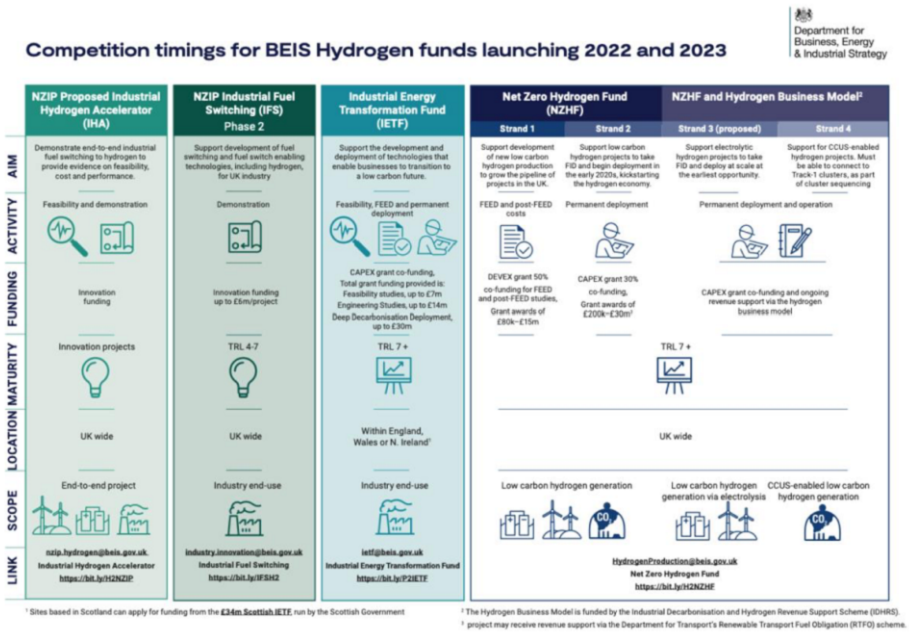

2

Competition timings for BEIS Hydrogen funds

Department for Business, Energy & Industrial Strategy

The timeline shows the key dates for BEIS competitions that will support hydrogen projects.
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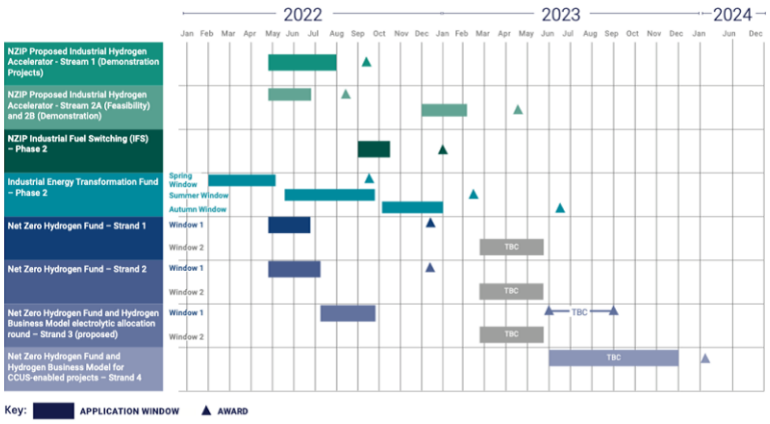

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- NZHF Capex support is provided to (some) Strand 3 and (all) 4 projects that would be viable in the absence of NZHF CAPEX support because offering CAPEX support reduces the overall cost to the exchequer.

Consent & Introduction

3

Thank you for agreeing to take part in this meeting.

DESNZ have commissioned Technopolis to conduct a process evaluation of HAR1 – the first joint Hydrogen Business Model (HBM) / Net Zero Hydrogen Fund (NZHF) Electrolytic Allocation Round.

To note, Technopolis is also undertaking a parallel study alongside this process evaluation to develop an electrolytic hydrogen (and non-CCUS) M&E Framework and an HAR1 M&E Plan, *[note whether interviewee will be or has been part of these interviews]*.

The overall aim of the process evaluation is to understand and describe the experiences of the DESNZ officials involved in HAR1, firms that have applied for support, and firms that could potentially have benefitted from the allocation round but decided not to apply. You have been selected for this meeting, as your input on your experience as part of the design and delivery team for HAR1 is invaluable to understanding the success of the process and lessons that can be drawn for future allocation rounds.

This interview should run for around 45 minutes.

Your participation in this interview is voluntary and you can change your mind at any time. The information that you provide will be treated in confidence by the evaluation team.

We would like to use your inputs and request your permission for the following:

1. To use the feedback you provide, together with any additional information you choose to disclose ("Information") for the evaluation study.
2. We will provide **an anonymised version of this information including transcripts and** any analysis we carry out as part of the evaluation study with DESNZ, for its own internal purposes only.
3. DESNZ expect to publish **aggregate, unattributed results** of the analysis of information from these interviews.

We would like to record the discussion for analysis purposes, which will be used to help us accurately collect findings for the research. Note The recordings/transcripts will be securely stored and retained by us and destroyed after the completion of this evaluation study.

Are you happy for us to proceed?

1.1 Introduction

1. Please could you tell me your name, role, and responsibilities in relation to your involvement with HAR1?
   a. What stages of HAR1 have you been involved in?

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b. Have you been involved with any previous hydrogen programmes / funding schemes?

1.2 HAR1 Design

2. What was the process involved in designing HAR1?
   Probe on engagement of industry & academia, policy synergies, consideration of learning from previous hydrogen programmes / funding schemes

3. What are your overall views on HAR1's design?
   Probe for anything that they would like to change about it

4. How effective do you think it has been to have a joint allocation round for different application strands (i.e., through either HBM or HBM/NZHF support)?

5. Do you think HAR1 has been coherent with other interventions?
   Probe for any significant similarities or differences

6. What changes, if any, have been made after HAR1's launch and why?
   Probe for any changes that may be planned for

7. Do you think these changes could have been made to HAR1's early design to mitigate any obstacles for applicants?

1.3 Pre-application

8. What market engagement activities have been undertaken to publicise HAR1?
   a. *Probe: which activities had the most engagement and what were the most effective/useful activities in your opinion?*

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9. *Do you feel these have been successful in engaging the desired number of potential applicants and if this produced any 'surprises' (i.e., firms who were expected to apply but didn't)*

10. What clarifications or queries were received during the pre-application stage?
    a. Were there any issues that were consistently queried?
    b. Were there regular queries on the different application strands? Anything specific?
    c. Was the window timeframe sufficient to revert?
    d. Any other perceptions from the projects in this stage?

11. Were there any administrative challenges and/or barriers in delivering pre-application support?

1.4 Application Processes

12. Do you think applicants were provided with sufficient time to prepare their submissions?

13. Do you think applicants were provided with sufficient information to prepare their submissions with an appropriate level of detail?

14. What factors do you think might have affected an applicants' ability to submit a high-quality application?

15. Do you know of any applicants that showed an interest in the EOI stage but did not proceed further? Do you know why?

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1.5 Assessment Processes

16. What is your view on the overall quality of applications received?

17. Do you think the applications have provided sufficient information to enable an effective assessment?

18. To what extent had the design of the application template and guidance been sufficient to get the desired detail/evidence that assessors require?
    a. What worked well and what could be improved?

19. Do you think the application assessment criteria/weighting has been appropriate to select applications and with an alignment to HAR1's strategic objectives?

20. Has sufficient guidance been provided to application assessors to facilitate their assessment of applications?

21. [to DESNZ officials] What has been your experience of working with the technical advisors/delivery partner?
    a. How effectively was work divided?
    b. Were the ways of working collaborative and coordinated?

22. How has a moderation process been undertaken?
    a. Do you think it had made the assessment fair and transparent?

23. Do you anticipate any potential issues with respect to due diligence following any of the applications' assessment?
    a. Do you expect the Request for Information to be helpful, or foresee any issues with the process?

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24. How well was the assessment process structured within BEIS? Was the governance effective?

25. What challenges have you experience during the assessment process? How could these be avoided in the future?

1.6 Early delivery (NZHF Strands 1 & 2)

26. Which parts of the NZHF Strands 1 and/or 2 delivery thus far have worked well?

27. What areas of the NZHF Strands 1 and/or 2 delivery thus far have required improvement?

28. What do these lessons from NZHF Strands 1 and/or 2 mean for the design and implementation for HAR2?

29. Has there been any positives or negatives experienced during any early delivery thus far of NZHF strand 1/2 that you think could be relevant for HAR1 – the first joint Hydrogen Business Model (HBM) / Net Zero Hydrogen Fund (NZHF) Electrolytic Allocation Round?
    a. Has there been anything unexpected?
    b. Has there been any contractual issues?
    c. Has there been any issues arising out of early planning for milestones or monitoring?

30. Do you think sufficient support and guidance is being provided for strand 1/2 thus far?
    a. Have there been any administrative issues?
    b. Has there been any capacity constraints?

31. (FOR ARUP) What have other governments done to reach similar policy objectives? Are there international comparisons?

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1.7 Closing and thank you

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A2. Mapping of Evaluation Questions Against Original Scope of Work Questions

EQ number	SoW Qs included	Question
1. To what extent is the design and governance of HAR1 consistent with its aims and objectives?		
1.1	1.1	Were the eligibility and assessment criteria adequate, i.e., did applicants understand them and find them simple to submit?
1.2	1.1	Did the eligibility and assessment criteria support the objectives of HAR1?
1.3	1.2	Was the timing and length of the application window (excluding full assessment and agreeing an offer/award process) adequate given HAR1's objectives?
1.4	1.3	Have any adaptations to HAR1 been made post-launch and, if yes, how successfully have those changes been communicated and implemented?
1.5	1.4	To what extent does the HAR1 design complement interventions by similar policies/funds?
1.6	1.5	Have any obstacles been identified in the delivery that could have been mitigated against in the design of HAR1 activities?
1.7	1.6	Did projects find it a fair and transparent process?
2. To what extent was HAR1 publicised effectively and was it successful in reaching the target audience?		
2.1	2.1	How effectively were HAR1 and its aims publicised?
2.2	2.2, 2.4	How high were awareness levels of HAR1 among eligible projects and how did eligible projects perceive HAR1 ahead of applying?
2.3	2.3	How did eligible projects hear about HAR1?
3. What were the main motivations for applying and which aspects of HAR1 acted as enablers or barriers to application?		
3.1	3.1	What were the main motivations of applicants for applying?
3.3	3.3	What were the main reasons why some projects applied for Capex and HPBM support, whilst others applied for just HPBM support?
4. What were the experiences and key barriers of those with eligible projects who did not apply to HAR1?		
4.1	3.2, 7.1.1, 7.1.2, 7.1.3, 7.1.4, 7.1.6	What were the reasons some eligible projects did not submit an EOI?
4.2	7.1.5, 7.2.7, 7.2.3, 7.2.4,	Did non-applicants find the EOI and application processes appropriate and effective?
4.3	7.1.7, 7.2.6	Did non-applicants pursue relevant electrolytic hydrogen projects? How were these funded?
4.4	3.2, 7.2.1, 7.2.2	What were the reasons some eligible projects submitted an EOI, but did not submit an application?
4.5	7.2.5	What else could have been done to encourage these non-applicants to apply?
5. To what extent did the application support and handling enable successful applications?		

5.1	4.1, 4.3, 4.4	Were details of HAR1 and the application process communicated effectively? (e.g., details different application strands and windows/timings, eligibility and assessment criteria, details on different types of funding)
5.2	4.2	For companies that wanted to apply for different strands, did the windows/timings allow them to do this and allow them to submit an application to the level of quality they wanted to?
5.3	4.5	How was pre-application support perceived by projects?
5.4	4.6	How was the application process perceived by projects? Which elements of the application were more or less challenging/burdensome?
5.5	4.7	How effective was the process of receiving communications and clarifications during the application process?
5.6	4.8, 4.9	Were the reporting templates and guidance clear, with respect to the ability of applicants to provide all information they wanted to or could provide, and eligibility of costs?
5.7	4.10	To what extent did the delivery partners meet objectives and expectations?
5.8	4.11	To what extent do HAR1 applicants understand why they were or were not chosen for funding?
6. To what extent was the assessment process effective and fair?		
6.1	5.1, 5.2	How well was the assessment process structured within DESNZ (formerly BEIS)? Were the governance and division of labour with technical advisors effective?
6.2	5.3	Did the design of the application templates aid in the assessment process? What worked well, what could be improved?
6.3	5.4	Was the level of evidence assessors received via the Request for Information process in line with expectations?
6.4	5.5	What were the particular challenges during the assessment process and how could they be avoided in future?
7. What future lessons can be learned from HAR1?		
7.1	6.1, 6.2	Which areas of delivery worked well and which areas of delivery require improvement?
7.2	6.3, 6.4	What can we learn from delivery of HAR1 and what does that mean for the design and implementation for HAR2? E.g., changes to activities, timings or eligibility / assessment criteria?
7.3	6.5	Was the method of delivery the most appropriate and efficient (i.e., admin burden minimised) for these interventions? What have other governments done to reach similar policy objectives? Are there international comparisons?
7.4	6.6	What are the implications of the process evaluation findings for the future of the UK hydrogen economy?
Included in M&E Plan	6.7	What lessons have been learnt for the M&E framework/plan work with regards to what reasonable/burdensome when it comes to data collection?
Included in M&E Plan	6.8	What lessons can be learned for the delivery and M&E of related policy programmes?

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