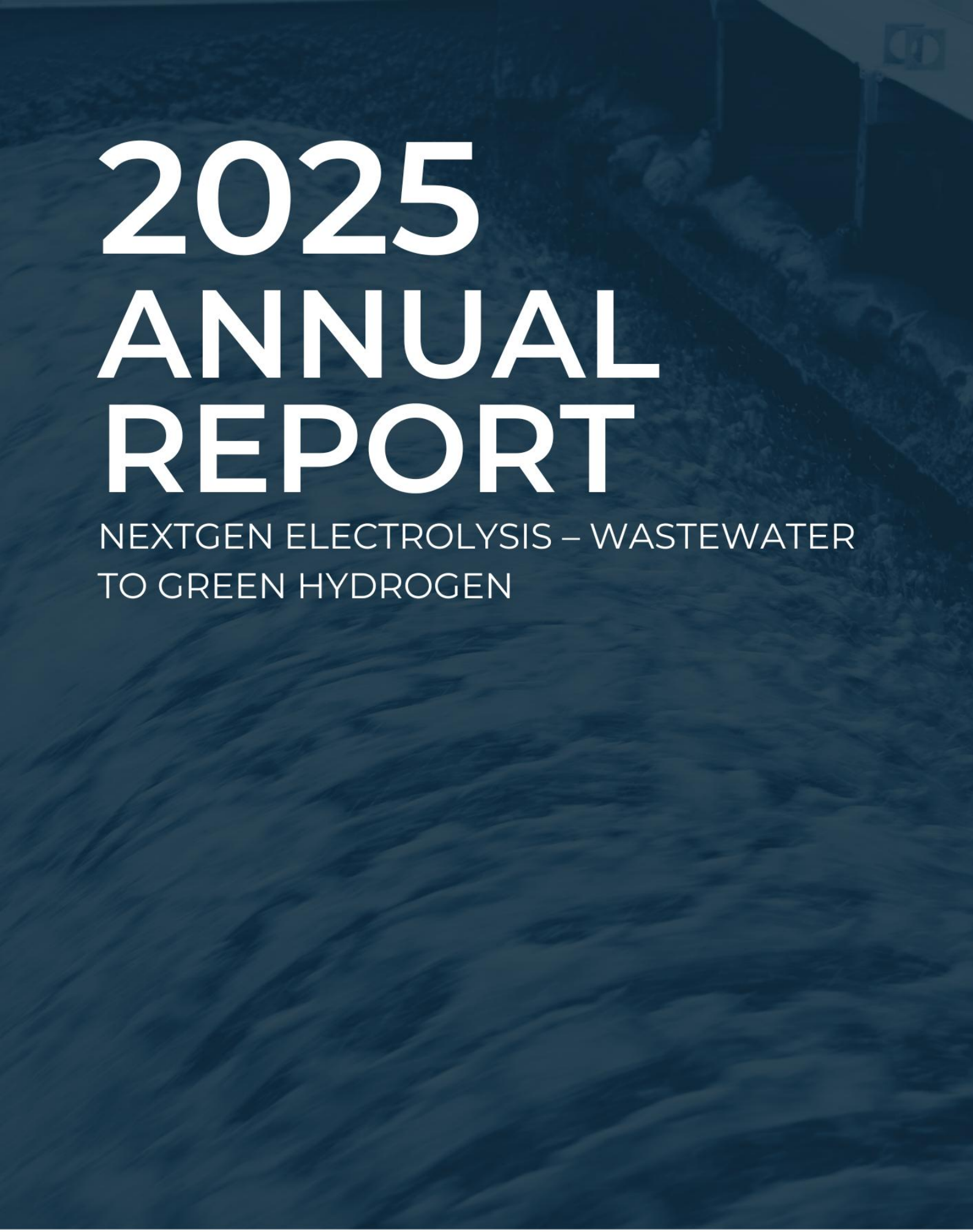
2025 ANNUAL REPORT

NEXTGEN ELECTROLYSIS – WASTEWATER TO GREEN HYDROGEN



HYDRO

WALES&WEST UTILITIES

nationalgrid

Dŵr Cymru Welsh Water

Yeo Valley ORGANIC

Beta Project Annual Report 2025		
PROJECT NAME: NextGen Electrolysis – Wastewater to Green Hydrogen		
CONTACT: Innovation@wwutilities.co.uk	START DATE: 01/09/2024	END DATE: 31/09/2028

Contents

1.0 Executive Summary

Overall, the project continues to deliver in line with Ofgem's expectations, advancing a technology that can support resilient, low cost and environmentally sustainable hydrogen production across the UK energy system.

The NextGen Electrolysis: Wastewater to Green Hydrogen project, funded under Ofgem's Strategic Innovation Fund (SIF) Beta Phase, aims to strengthen the resilience and robustness of the UK energy system by enabling low cost, flexible and water efficient hydrogen production. Led by Wales & West Utilities (WWU) with partners HydroStar Europe Ltd, Welsh Water, National Grid Electricity Distribution (NGED) and Yeo Valley, the project is demonstrating an innovative membraneless electrolyser that can produce hydrogen directly from wastewater, with the aim of reducing costs and environmental impacts, that can then be directly used onsite, blended into the network or transported directly at 100% with a future network transition.

Across the reporting period, the project has progressed in technical development, safety and regulatory assurance, user benefits, knowledge dissemination, commercialisation, network integration and value for money.

Technical progress in the first year has demonstrated strong movement against the interim Beta Phase objectives. Hydrogen purity has increased from 94 % in alpha phase to 97.89 %, confirming that the technology is on track to achieve the 98 % threshold required for network injection. This improvement has resulted from targeted optimisation of the electrolyte composition, outlet geometry and control system. Together, these developments validate the core concept that combustion-grade hydrogen can be produced directly from wastewater without membranes or water purification.

These achievements provide a solid foundation for the next stage of delivery, including the design and integration of the two 250 kW demonstration units. Progress to date gives confidence that the technology can meet the performance, stability and reliability requirements needed for future network integration and develop useful practical learning on blending and for 100 % hydrogen applications in an energy system transition. Overall, the system continues to perform in line with Beta Phase expectations, providing a route to low cost and flexible hydrogen production that supports decarbonisation and wider energy-system resilience.

Customer and network benefits have been strengthened throughout the year, directly aligning with Ofgem's priority focus on user outcomes by looking at how Hydrostar's technology integrates with industrial customers that are currently connected to WWU's network and their existing processes. In addition the technology has implications for how domestic & commercial customers transition to 100% hydrogen for heating could look, and how the technology and gas distribution network could integrate together in the transition towards blending and 100% hydrogen.

Safety, regulatory and standards development has progressed during the reporting period. The Welsh Water hazard and operability study (HAZOP) is nearing its latter phases, with documentation and actions currently being finalised. Preparatory safety and regulatory work for the Yeo Valley industrial site is under way, ensuring emerging designs remain aligned with HSE and wider regulatory frameworks.

Knowledge sharing and dissemination activities have remained strong, with development of a centralised showcase hub, multi partner engagement, and ongoing interaction with other SIF and innovation programmes. These activities ensure learning is openly shared and supports the wider sector.

Commercialisation and route to market work have advanced through collaboration with project and industrial partners, with clear planning toward 250 kW and 2 MW future demonstrators. Engagement with defence and utility partners reinforces scalability and cross sector opportunity.

Risks and issues have been proactively managed. Procurement delays related to hydrogen grid entry unit equipment will lead to a schedule adjustment via a Project Direction Change Request but have not affected technical progress.

Costs and value for money have remained within expected tolerances, with some reductions in early expenditure due to schedule shifts. HydroStar has committed additional contributions in kind to offset material inflation, maintaining strong value for the funding received. WWU has also committed to increase their contribution, in the form of shareholder funding, towards the hydrogen grid entry unit.

2.0 Project Summary

The NextGen Electrolysis project directly addresses the Ofgem SIF Innovation Challenge of improving system resilience and robustness by enabling hydrogen production that is less resource intensive, less infrastructure dependent and more adaptable to local conditions. The core innovation, a membraneless electrolyser capable of operating directly on wastewater, removes major barriers associated with conventional electrolysis, including the need for ultrapure water, rare materials and large centralised installations. This should reduce costs and environmental impacts of hydrogen production, increasing the scale and pace of uptake of the technology across a range of potential applications along with establishing practical learnings on the potential for hydrogen within gas networks.

During the first year, the project has delivered technical progress that supports both future users and network objectives. The technology has advanced from laboratory proof of concept to a validated 1 kW prototype using a refined concentric “ring in ring” electrode design. This configuration has demonstrated combustion grade hydrogen purity (97.89 %), confirming effective gas separation without membranes or pre-treatment. These results provide confidence for progressing to the next stage, to the two planned 250 kW demonstration systems.

Detailed modelling and optimisation work this year have strengthened the project’s progression toward full-scale testing. The team has developed a digital model of the electrolyser that lets us see how the system behaves under real conditions, including how water flows through it and how gas bubbles form and separate. This helps us understand the effects on hydrogen quality and overall performance. Insights from this modelling directly informs the design and control approach for the 250 kW units at Yeo Valley and Welsh Water, ensuring that the scaled systems are optimised for stable, efficient and predictable performance.

Safety and regulatory work have progressed in parallel, in which a significant milestone has been the near completion of the HAZID and HAZOP processes for the Welsh Water demonstration site. These assessments reviewed hydrogen production within a wastewater treatment environment, including control measures, venting arrangements, integration with existing plant, installation of mitigations for the hydrogen boiler and the requirements for new gas transportation pipelines. Preparatory work for the Yeo Valley

assessment is under way, with a focus on the hydrogen grid entry unit infrastructure for future network integration and hydrogen usage in an existing industrial setting.

Throughout the project, the link between technical progress and user benefits has been strengthened. The ability to generate hydrogen from wastewater offers clear value for industrial & commercial users by reducing treatment burdens and supporting early onsite decarbonisation. For domestic users, long term hydrogen affordability is supported through lower operational costs and reduced reliance on water purification. Gas networks benefit from distributed hydrogen production that supports network and energy resilience, blending and future 100 % hydrogen scenarios with the ability to sectorise the network in the energy transition. Electricity networks benefit from new opportunities to utilise curtailed renewable power and relieve rural grid constraints. Water networks benefit from circular resource use, reduced aeration demand and lower operational pressures. This combination of direct and indirect user benefits demonstrate how the project's technical progress directly meets the needs of customers, networks and cross sector stakeholders.

As the project moves into the next phase, the team will focus on optimising and calibrating the existing detailed design for the 250 kW demonstrators. The core design will be refined using learning from modelling, prototype testing and safety assessments to ensure the systems perform reliably under operating conditions. The testing phase will provide the evidence required for commercial-scale deployment, including the planned 2 MW installation, and will support future network regulatory and business-as-usual adoption pathways. Through this focused refinement, the NextGen project continues to demonstrate how wastewater-driven hydrogen production can deliver cost, carbon and resilience benefits across the wider UK energy system.

3.0 Knowledge creation and dissemination

The project has generated useful learning during this reporting period, both through technical development and through the coordination of a multi-partner innovation programme. The knowledge developed to date spans electrolyser design, operational control, site integration and safety management, and is helping to refine the technology and delivery approach as the project progresses.

From a technical perspective, the key insights developed have been the relationship between electrolyser design, gas flow behaviour and hydrogen purity. The Beta Phase work has confirmed that small variations in outlet geometry, electrode configuration and electrolyte concentration can have positive effects on increasing purity and efficiency. These insights have helped to refine the most effective system configuration that will be carried forward into the larger scale designs.

Operational lessons learnt, the project has highlighted the need for clear governance and communication frameworks in multi-partner innovation programmes. The complexity of coordinating industrial, utility and academic partners, each with differing internal processes and risk thresholds, required the consortium to develop more structured decision-making procedures and to allocate sufficient time within the project plan for individual partner approval procedures.

From a customer perspective, the project has highlighted the challenges that could be faced by a variety of customers when looking at blending into the existing network. The Yeo Valley boilers were identified as ideal candidates for a 20% blend, however, the boilers had been modified to accept kerosene as a back-up fuel and as such will require burner upgrades in order to accept the 20% blend. A valuable insight and

consideration when exploring the potential blending opportunities across the network and linked to the WWU sensitive users NIA project.

4.0 Intellectual Property Rights Generation

During the Beta Phase, the project has identified potential intellectual property relating to the electrolyte mixing process developed for use within the NextGen Electrolyser. Preliminary assessment we believe indicates that this process may represent a novel and patentable aspect of the technology. HydroStar is leading the intellectual property review for this area. A detailed prior art assessment is currently under way in consultation with HydroStar's patent lawyer to confirm originality and to define the potential scope of protection.

At this stage, no formal intellectual property filings have been made, and no foreground IPR has been classified as exempt from Ofgem's sharing requirements. The consortium, led by Wales & West Utilities, will continue to review the findings of the assessment and provide updates to Ofgem as the work progresses.

5.0 Data Access Details

During this initial reporting period, the primary dataset produced by the project relates to the measurement of hydrogen purity from the NextGen Electrolyser. HydroStar has carried out controlled testing of the system and recorded purity readings to evaluate the effect of electrode configuration, outlet geometry and electrolyte concentration on gas quality. These measurements form the basis of the project's performance evidence to date and have been central to optimisation activities. Testing has demonstrated progressive improvement in gas quality, with the highest recorded purity reaching 97.89 per cent. This data has provided a clear understanding of how design parameters influence hydrogen output and has guided refinements to both the electrolyte formulation and overall cell configuration.

Data for this project and all other projects funded under the Strategic Innovation Fund (SIF) or the Network Innovation Allowance (NIA) can be found or requested via either:

- WWU's Innovation website: https://www.wwutilities.co.uk/about-us/our-responsibilities/innovation/innovation-got-a-project-idea/ or
- WWU's managed mailbox: innovation@wwutilities.co.uk

6.0 Route to Market/ Business as usual

The Nextgen project is designed to look at how future technologies could integrate into network integration business-as-usual (BAU) practices, ensuring long-term sustainability and minimal disruption. Multiple dedicated workstreams, are working towards preparing WWU for BAU and whole network analysis for a future transition of 100% and up to 20% (by volume) blend, along with the design for the future integration of the blending equipment within the network.

During the first year of the Beta Phase, the Project team began to engage WWU internal stakeholders to align project goals with existing business objectives, facilitating further buy-in and support. Additional communication channels have been established to keep staff informed and prepared for any new processes or learnings. By embedding change management strategies and fostering a culture of continuous learning, we aim to drive efficiency and innovation in line with the Project's scope.

At the end of the Beta Phase, the Project will outline benefits and practical learnings for future network transitions to 100% and 20% blend by volume of Hydrogen (see section 9) along with how WWU could connect multiple hydrogen production plants around the network to achieve future hydrogen network resilience with less customer interruption in a transition. In addition, the technology's low requirement for water purification and electrical infrastructure means it could support earlier and more flexible blending, depending on the implementation of the Government's decision in principle, to support hydrogen blending in Gas Distribution networks. The pathways to further deployment on the network after the Beta phase will currently depend on upcoming government decisions around hydrogen and the change in network regulations regarding network entry for hydrogen.

The pathway to commercial deployment as a whole, has been mapped to ensure a structured progression from demonstration to large-scale operation. The next stage, following the Beta Phase, will focus on replicating and scaling the 250 kW demonstration systems for early industrial & commercial customers, before moving toward a 2 MW demonstrator. This current Beta phase installation will validate the technology under network conditions and enable the evaluation of regulatory mechanisms such as network entry agreements. Together, these steps mark the transition from validated prototype to commercially deployable system, advancing the technology to CRL 6-7. The location for the 2 MW site will be selected in early 2027 in line with the design phase. The project anticipates that integration with renewable energy sources such as wind will be central to this next phase, requiring a higher duty cycle for the electrolyser. The timeline for achieving these goals extends to May 2029 including both the technical development pathway and relevant policy milestones. The successful proof of concept achieved during the Beta Phase is expected to enable private finance participation in the 2 MW demonstrator.

HydroStar's commercialisation pathway continues to be supported by a structured financing approach and growing partnerships. Engagements with financial partners have led to a model that separates business growth from project delivery. Business finance will support the expansion of HydroStar's manufacturing capacity and supply chain, while project finance will fund future site installations through joint ventures and private investment vehicles. Based on the successful delivery of the current beta phase project, these steps will continue to support the technology's progression from pre-commercial deployment to market maturity.

A key partnership has been established with Babcock International and the Ministry of Defence, focusing on the deployment of the technology within defence and maritime operations, which would use learning from the Beta phase project. Work at Babcock's Devonport site has progressed through detailed DSEAR assessments to ensure full compliance with operational and safety standards. The collaboration has already received recognition through the MOD Sanctuary Award for innovation in sustainable energy derived from wastewater, and HydroStar and WWU have been invited to present the project at Babcock's forthcoming Hydrogen Safety Day. Further work is under way to define future joint venture arrangements and map hydrogen supply and demand within the defence estate.

In parallel, HydroStar has expanded its partnerships across the utilities and environmental sectors, including collaboration with Welsh Water, the University of South Wales, the Coal Authority, and Caerphilly Council. These partnerships are exploring applications such as circular wastewater-to-hydrogen systems and the use of mine water as a feedstock for hydrogen production. Together, they highlight the wider applicability of the technology beyond the gas network and strengthen its commercial pathway by providing new demonstration opportunities and routes to deployment across multiple sectors.

To facilitate wider commercial readiness, the consortium is developing a Centralised Showcase Hub to act as a dedicated facility for stakeholder engagement, demonstration, and knowledge exchange. This hub will

provide a platform for regulators, investors, and industrial partners to view the technology in operation and understand its integration with network and renewable infrastructure.

The likelihood of large-scale deployment is considered high, subject to successful validation of the 2 MW system and alignment with the evolving hydrogen regulatory framework. The technology's low infrastructure requirements and ability to use wastewater as feedstock make it well suited to widespread deployment across both the UK and international markets. Continued collaboration between Wales & West Utilities, HydroStar, and industry partners will support refinement of procurement frameworks to enable efficient adoption by other gas and utility networks.

7.0 Policy, Regulatory and Standard Barriers

At present, hydrogen is treated as a "gas" under the Gas Act 1986. This represents a low regulatory risk to the project, especially given the range of industry wide activity which is facilitating the development of appropriate regulation and standards for blended and 100% hydrogen, with multiple program work streams being carried out in collaboration with Gas distribution networks, Health and Safety Executive (HSE), The Institution of Gas Engineers and Managers (IGEM) and Department for Energy Security and Net Zero (DEZNZ).

No derogations or exemptions for the Gas network are expected to be required for the Beta Phase, since the demonstrator systems will be installed behind the meter. We will aim to carry on working with IGEM and HSE to produce the relevant quantitative risk assessments needed for the project.

More significant barriers will be experienced in post project if hydrogen is introduced into the existing network in a business-as-usual manner. This is currently limited to 0.1% (by volume) blending into the natural gas network under the Gas Safety (Management) Regulations 1996. However, the government has taken a strategic policy decision to support blending of up to 20% hydrogen by volume into GB gas distribution networks[1] and the industry is working on the implementation of these changes, developing evidence which is subject to further assessment by the Government and HSE. Up to approximately 5% blend is expected to have no effect on gas settlement; however, blending above this level will require changes to gas settlement arrangements and the Gas (Calculation of) Thermal Energy Regulations.

There are several separately funded projects that are seeking to address regulatory barriers to the injection of up to 20% hydrogen into the gas network. These projects are due to operate alongside the Beta phase, with the technical information gained from blending within the NextGen Beta phase having the potential to inform these other blending projects for example the hydrogen blending implementation plan. Link to the project can be seen in the link here; Hydrogen Blending Implementation Plan | ENA Innovation Portal

The requirements and steps to be put in place will be addressed within WP8 , and the project will aim to influence regulatory decision making by proving the viability of hydrogen injection into the grid. It will also demonstrate a 100% hydrogen use case, as well as the safety of doing so through a proof-of-concept demonstration.

[1] Hydrogen blending in GB distribution networks: strategic decision - GOV.UK

The hydrogen grid entry unit for the Yeo Valley site while not operating on the WWUs network, will be designed in line with the Functional Specification: Hydrogen Blending Infrastructure and appraised and approved in line with the IGE/GL/5 process. This will ensure compliance with network standards in readiness for the future blending applications.

8.0 User Needs

The NextGen project looks at how we can further our understanding for multiple key users across the utilities sectors. Currently networks require a better practical understanding on the potential for hydrogen across the energy landscape, which is influenced by the nature and cost of hydrogen production.

The current energy landscape has a number of challenges for networks to overcome with future energy resilience and robustness playing a key part in how we move forward to reach NetZero goals in the UK.

Gas networks require a better practical understanding on the potential of hydrogen across the network. The Nextgen electrolysis project considers how the future of green hydrogen will enter the network to establish energy resilience for when customers on the network need energy the most. By reducing costs and environmental impacts, it could widen the uptake of green hydrogen and the locations available for production, which has implications for future network planning. Other learning could influence hydrogen standards for networks , network entry agreement standards, network analysis around future gas usage and training and competence requirements for employees .

Establishing multiple injection points around the network could help increase the pace of the transition to clean energy for gas users. Producing hydrogen with a lower environmental impact, at facilities with a small physical footprint, increases the locations at which it could sited, with co-benefits including supporting wastewater treatment from industrial and other processes.

Electricity networks also require a better understanding on the potential that hydrogen demand might impose on their networks. Nextgen Electrolysis will establish a better practical understanding on how fluctuating renewables can be used directly with hydrogen production and how best to utilise solar and wind energy to lower costs and restraint on electricity networks.

Green hydrogen production techniques are currently constrained to consistent electrical power connections, purified water, limited adaptability and the use of rare metals within the system. The project looks to establish a new technology that can remove these constraints by using wastewaters within the system, removing the need for water purification. A redesign of the electrodes establishes the ability to remove rare metals by using recycled stainless steel and the control system helps to reduce and manage electrical power from fluctuating renewables.

9.0 Impacts and Benefits

The first year of the Beta phase project continued to look at how we can bring more benefits and impacts to the project.

During the first year we have not identified any additional negative impacts on the benefits outlined below.

During the first year of the project one critical impact has been encountered, in relation to our hydrogen blended test site at Yeo Valley, and their ability for their existing boilers to accept the hydrogen. Whilst Yeo Valleys existing steam raising boiler shells are confirmed to be able to accept a hydrogen blend, due to the

nature of their existing burners acquiring the ability to use kerosene and natural gas, it was found the existing burners would not have been of an acceptable standard to be considered for use, for hydrogen blends. To mitigate this Yeo Valley will be changing the existing burners with new ones to bring them up to standard.

These learnings will be beneficial for future network customers GB wide in a network transition.

The NextGen project looks to produce benefits to multiple key users across the utilities sectors from gas networks, electrical networks and water distribution networks along with providing future benefits to future industrial and domestic customers either directly or indirectly.

9.1 Industrial and commercial customers

For industrial and commercial customers, the introduction of this technology has the potential for the following benefits:

- Many customers have their own process water that must be treated or disposed of in the correct manner. This comes with a cost. If the technology is used onsite, it has the ability to be able to utilise the customers wastewater sources to produce energy needed on site at a lower cost compared to conventional electrolysis which lowers the LCOH (levelised cost of hydrogen)
- The project removes the need for the electrical demand usually associated with water purification.
- Hydrogen produced on a customer site can then be injected into the gas network.
- Learnings on how existing industrial customer gas boilers react and perform under different hydrogen blend scenarios.

9.2 Domestic customers

For Domestic customers, the requirement for new hydrogen production technologies like this is critical. With this technology the main benefit will be the long-term cost of hydrogen prices in the future transition of the energy landscape. The ability to use wastewater sources within production also means domestic customers will potentially have indirect cost savings to water bills as the technology removes future pressure on water networks that are already currently constrained in parts of the UK.

9.3 Gas Networks

For gas networks , the introduction of this technology has the potential for the following benefits.

- The project is showcasing the possibility of a distributed hydrogen production models which reduces the operational barriers for smaller scale hydrogen production. This could be beneficial especially for operators of more rural network areas, including WWU, as a source of low carbon gas. Despite this technology being tested within WWU's network area it will be a model that can be adapted to all networks in the future.
- The demonstration phase will develop practical learning on the potential for hydrogen and this technology to reduce emissions from industrial energy users, both through blended and dedicated hydrogen provision for on-site processes, heating and hot water.
- The distributed production around industrial sites will be modelled and excess hydrogen has the potential to be blended into the local gas network in the future which will show how we can establish energy and network resilience for all customers. This can also be shared with other networks to be considered for future roll outs.
- The project will look at how we can reduce the cost of hydrogen through colocation and use of the waste heat and O2 produced on customers sites.

- We will establish learnings around potential hydrogen standards for networks business as usual operations employee's, ready for a future transition of the network, as well as the potential to inform future standards and regulations.
- WWU and the wider industry will gain learnings around potential network analysis and gas usage for hydrogen regarding future planning for hydrogen blending on the Yeo Valley site and 100% hydrogen usage at the Welsh water site which can then be shared with other networks.

9.4 Electrical Networks

For electrical networks , the introduction of this technology has the potential for the following benefits.

- Maximising the often curtailed solar and wind energy across the WWU geographical area to produce green hydrogen which can be used as a basis for the rest of the UK.
- Distributed hydrogen production has the potential to remove constraint on the electrical grids in rural areas.

9.5 Water Networks

For water networks, the project directly addresses the increasing demand for sustainable and integrated resource management. Water utilities face growing challenges associated with energy consumption, treatment costs and wastewater reuse. The NextGen system enables wastewater to be used as a productive feedstock, reducing treatment requirements while generating clean hydrogen for use within water operations.

This approach supports a more circular model of resource use, where energy recovery becomes part of the wastewater-treatment process. In addition, the system's oxygen by-product can be utilised within aeration and treatment stages, offering potential to decrease operating costs by reducing the need for externally supplied oxygen.

Input from Welsh Water and other partners has helped refine the design requirements to ensure compatibility with existing treatment infrastructure and regulatory frameworks. Insights from this collaboration are informing the development of safe operating standards and control interfaces for future integration. By aligning with water network operations and avoiding the need for additional water-purification processes, the technology minimises the operational burden on utilities while contributing to overall cost and emissions reductions.

9.6 Hydrogen Producers

For hydrogen producers, the technology provides a pathway to generate hydrogen more efficiently and sustainably. Conventional producers rely on high-purity water and complex purification systems, which increase cost and restrict site selection. The NextGen system removes this dependency, enabling production from a wider range of feedstocks and locations. Its off-grid electrical capability further reduces reliance on existing infrastructure, supporting flexible and decentralised deployment.

As we move through the project we will continue to establish more user needs and priorities from each customer and stakeholder across our network.

10.0 Risks, issues and constraints

During the Beta Phase, the most significant constraint has been the procurement and approval of the Hydrogen grid entry unit required for hydrogen injection at the Yeo Valley demonstration site. The cost of this specialist component was higher than initially budgeted, requiring Wales & West Utilities to undertake an internal approval process to allocate additional direct shareholder investment providing additional funding in the form of a monetary contribution. This unplanned step resulted in delays to the site schedule and to the overall project schedule, as the design and safety documentation for Yeo Valley could not be finalised until the supplier's detailed specification was confirmed.

As the Hydrogen grid entry unit design defines the downstream hydrogen handling and control systems, HAZID and HAZOP reviews could not proceed until all supplier data were available. This dependency temporarily delayed certain safety-assessment activities, although preparatory work such as node identification, layout design and documentation drafting has continued to ensure rapid completion once final information is received.

A minor delay was also encountered at the Welsh Water site due to extended contract negotiation and approval processes, however this did not affect the technical progress of the project. These contractual challenges have reinforced the importance of beginning legal and commercial engagement as early as possible in future phases to maintain alignment between partners.

The consortium has actively managed these risks through regular meetings, risk reviews and a Project Direction Change Request (PDCR) will be submitted to Ofgem following our first stage gate meeting in October 2025 , allowing formal recognition of the revised schedule and mitigation strategy. The PDCR outlines updated delivery milestones, a re-sequenced testing plan, and continued progress across unaffected workstreams, ensuring that technical learning continues while procurement and approval issues are resolved.

Ofgem & UKRI have supported the removal of these barriers by maintaining open dialogue with WWU and HydroStar, reviewing proposed adjustments, and providing flexibility through project processes. This collaborative approach has enabled the project to remain on track in terms of overall objectives, without compromising quality, safety, or delivery scope.

11.0 Working in the Open

Transparency and active stakeholder engagement have been central to the delivery of the Beta Phase so far. The project team has maintained an open approach to communication and collaboration, ensuring that progress, learning and challenges are shared regularly with Ofgem, the SIF team, and external stakeholders. The consortium works closely with the Funding Party and Ofgem to ensure alignment between project objectives and national decarbonisation priorities. Quarterly progress reviews have been held with the funding body, with HydroStar and WWU jointly presenting technical and commercial updates. These sessions provide an open forum for review and challenge, allowing the consortium to refine its technical focus and ensure that learning remains relevant to both regulatory and industry needs.

In parallel, the team has engaged with other SIF projects and wider industry stakeholders to promote knowledge sharing and avoid duplication of effort. Meetings have been held with National Gas' FutureGrid project and SSE's Sea Change project to exchange insights on system integration, safety, and regulatory considerations. These discussions have helped confirm that the work undertaken within this project remains novel and complementary to other ongoing innovation programmes, while also informing the development of shared best practices across the sector.

To date, a news release was shared announcing the project with a video produced by WWU capturing all project partners. This was also shared on social media and has continued to resurface for key industry events i.e. Hydrogen Week. The next phase of the project will be sharing the render designs, which will be done on social media, as well as an internal piece for WWU with a reminder of the project aims.

As the project progresses, the aim is to do a further video piece, with a detailed explanation of the project partner roles and aims of the project - as well as what this means for the sector. There is no set deadline on this, but ideally should be completed either in-line with UKRI deadline requirements OR when there is equipment on site which will serve as a backdrop.

Once the site has been completed, a news release and accompanying social media will follow. The launch day will include photography and Voxpops style videos capturing the success of the launch.

The key milestones are below:

- 3D renders (social media & WWU Pipeline channel)
- Breaking ground photos (social media)
- Arrival of equipment to site (social media)
- Completion of installation (social media & WWU internal piece)
- Launch of project / commissioning (news release, regional & local press pitch, social media, Voxpops)
- Dissemination of testing results (social media, regional & local press pitch, news release)

Members of WWU's project team have attended a variety of events to disseminate, and otherwise present on or discuss, the NextGen Electrolysis Beta project. The Senior Project Sponsor, WWU's Head of Net Zero & Sustainability Matthew Hindle, featured the project in speeches at the IGEM Policy Conference in June 2025, the Hydrogen Cymru event in July 2025, and the Hydrogen South West Showcase in September 2025. Members of WWU's Innovation Team presented the NextGen Electrolysis Beta project as a case study for discussion at the April 2025 Innovation Zero event, as well as the South West Business Council in September 2025.

12.0 Costs and Value for Money

The Nextgen project is delivering value for money by accounting for the user benefits outlined in section 8.

Wales and West Utilities has seen reduced costs versus forecast for the first year of the project. Due to the delay in the procurement process for the Hydrogen grid entry unit which has also moved the delivery and installation period.

	Planned Cost	Actual Costs	Under/Overspend
Hydrogen Grid Entry Unit (HGEU)	£356,000	£0	-£356,000
Connections and Pipework	£250,000	£0	-£250,000
Installation of HGEU	£74,000	£0	-£74,000

Hydrostar Europe (HSE) experienced significant increases in the cost of materials due to delays in signing the final contracts, the increases were predominantly due to increased tariffs on imports and inflation. These costs (£318k) will be borne by HSE as contributions in kind.

Welsh Water has seen costs for installation of the boiler move into Year two.

NGED have reduced costs for year one, due to internal movement of personnel and into the team.

Project Partner name	SIF funding requested (to date)	Total actual project spend	Total project contribution made (incl. contributions in kind)
WALES & WEST UTILITIES LIMITED	£ 986,502	£ 294,326	£ 29,433
HYDROSTAR EUROPE LTD	£ 3,391,175	£ 3,709,674	£ 827,175
DWR CYMRU CYFYNGEDIG	£ 59,199	£ 45,033	£ 4,503
NATIONAL GRID ELECTRICITY DISTRIBUTION PLC	£ 9,828	£ 6,150	£ 615

13.0 Special Conditions

The Funding Party and Project Partners have taken the following steps to address the requirements of the project specific conditions, as set out in the Project Direction:

Condition 1 – The Funding Party must not spend any SIF Funding until contracts are signed with the Project Partners named in Table 1 (Ref Project direction document) for the purpose of completing the Project.

- No SIF Funding was spent until contracts were signed
- As evidenced, there were delays with getting contracts signed at the start of the projects; the partners worked at risk until the contracts were signed, and they could be paid

Condition 2 – Financial Contribution - The Funding Party must report on the financial contributions made to the Project as set out in its Application. Any financial contributions made over and above that stated in its Application should also be reported and included within the Project costs template.

- The Project Team has reported on financial contributions made to the project as set out in its Application at each of the quarterly review meetings (QRM) to the Monitoring Officer and Innovation Lead (UKRI) as directed.
- Baseline forecasted total spend across all partners at the close of year 1 was expected to total £4,446,705; the actual figure was £4,055,183, meaning a variance of £391,522 (-8.8%)
- Further detail is available under the "Costs and Value for Money" section

Condition 3 – Meeting arrangements - The Funding Party must participate in all meetings related to the Project that they are invited to by OFGEM, UKRI and DESNZ during the Beta Phase.

- The Funding Party have participated in all meetings related to the Project that they have been invited to by OFGEM, UKRI and DESNZ during the Beta Phase to date

Condition 4 – Stage gate scoping - The Funding Party must, with support from Innovate UK/UKRI and, where applicable OFGEM, scope the requirements and success criteria for each stage gate, as set out in the project management plan within a Project at the quarterly review meetings ahead of any stage gate. These will be used to determine what criteria a Project must meet in order to pass a stage gate, and whether any additional information, such as a report, must be produced as part of the stage gate.

- The Funding Party and Project Partners worked with UKRI to scope the requirements for the first stage gate of the Project, which took place in October 2025

Condition 5 – Impact monitoring - As part of the end of Project Phase report, the Funding Party must produce a Project Impact Monitoring and Evaluation Plan. This plan must outline how the Project plans to monitor and evaluate the delivery of benefits outlined in the Beta Phase Application following the end of the Beta Phase. The plan must also include the methodology that will be utilised for quantifying and qualifying benefits realisation and how the Funding Party plans to report this to OFGEM 1, 3, 5 and 10 years post-Beta Phase completion. Further details on how to approach the development of this plan may be provided by OFGEM or IUK.

- The Project is not yet at the end of the Phase
- The Project Team acknowledges this condition

Condition 6 – SIF Community Forums - The Funding Party and all Project Partners must make reasonable attempts to attend, participate and/or contribute at SIF Community Forum events during the Project delivery.

- WWU and HydroStar attended the SIF Community Forum in March 2025
- The Project Team have received notification of the date and location of the 2026 Community Forum and will be sending attendees from the Funding Party and partners

Condition 7 – Policy, Regulatory and Standards barriers - The Funding Party must provide verbal updates at each quarterly meeting on any regulatory, policy and standards barriers and any change requirements which may impact delivery of the Beta Phase activities. The Funding Party must also include as an attachment to each of its annual progress report an update on any regulatory, policy and standards barriers which may require derogations and articulation of any proposed regulatory, policy and standards changes which would be necessary in deployment. The Funding Party must also provide an as an attachment to its end of Project Phase report a summary of the Project's findings on regulatory, policy and standards barriers, including any considerations for future work, and where applicable, where specific regulatory, policy and standards changes would be required for deployment.

- Verbal and written updates on regulatory, policy and standards barriers have been provided at each of the quarterly review meetings to the Monitoring Officer and Innovation Lead
- An appendix to this report is included, detailing the Project's findings on regulatory, policy and standards barriers, including any considerations for future work, and where applicable, where specific regulatory, policy and standards changes would be required for deployment

Condition 8 – Updated 60-second videos - The Funding Party must provide within the first three months of signing contracts with its Project Partners an updated 60-second video. If the Project is greater than two years (longer than 24 months) in length, an updated video must also be provided at the Project's mid-point meeting. All Projects must also provide an updated 60-second video as part of their end of Project phase report.

- A 60-second video was provided within the first three months of signing contracts between the Funding Party and the Project Partners
- Since the NextGen Electrolysis Beta project is greater than two years long, an updated video will be provided at the Project's midpoint meeting
- A final updated 60-second video will be provided as part of the End of Project Phase report

Condition 9 – Post-Beta Phase Roadmap - The Funding Party must provide to the monitoring officer within six months of it signing contracts its Project Partners a roadmap for activities post-Beta Phase. This can

build on the Project's Application question (question 11) and must focus on how and when the proposed solution will become business as usual within your network and across the other GB gas or electricity networks.

As part of this, the Funding Party must include consideration for:

a) any steps the Project will take to ensure its innovation has suitable business as usual adoption;
b) the Funding Party's strategy for adoption of the innovation or proposed solution, giving consideration to potential investment, ongoing costs and third-party involvement and;
c) any early indication of interest from other networks in adopting the innovation. The Funding Party must provide an update on all the above at every two quarterly monitoring meetings (i.e. every six months) and must include a final update of this roadmap as attachment to its end of Project Phase report.

- The Funding Party provided to the Monitoring Officer and Innovation Lead an updated Post-Beta Phase Roadmap at both the 2nd QRM (six months into the project) and the 4th QRM (twelve months into the project)
- The Funding Party will include a final update of this roadmap as an attachment to its End of Phase report

Condition 10 – Commercialisation Strategy - The Funding Party must provide at every second quarterly monitoring meeting (i.e. every six months) an update on its commercialisation strategy. This can build on the Project's Application question (question 12) and must focus on what considerations have the Project consortium made for the commercialisation of the proposed solution or innovation, and how the Project provides support for non-network partners to move towards commercialisation. As part of this, the Funding Party may wish to include consideration for:

a) who the primary customer segment is beyond the Funding Party; the customer value proposition;
b) if identified, the outline of the route to market and potential new partnerships;
c) any additional Project Partner capital requirements in order to commercialize the innovation and;
d) how this product, process or service could be scaled across the GB network and taken to new markets.

The Funding Party must also include a final update of its strategy as an attachment to its end of Project Phase report.

- The Funding Party provided to the Monitoring Officer and Innovation Lead an updated Commercialisation Strategy at both the 2nd QRM (six months into the project) and the 4th QRM (twelve months into the project)
- The Funding Party will include a final update of the Commercialisation Strategy as an attachment to its End of Phase report

Condition 11 – Data Best Practice and Digital Strategy and Action Plan Guidance alignment - The Funding Party must provide at its second monitoring meeting (i.e. quarter one) a summary of how it intends to comply with Ofgem's Data Best Practice Guidance, and Digitalisation Strategy and Action Plan Guidance. Additionally, a part of its year 1 annual progress report, the Funding Party must provide a written update to the monitoring officer on its incorporation and application of data best practices to date in the Project, including its presumed open data policies, and data triaging methodology.

- At the first QRM meeting, the Monitoring Officer confirmed to the Funding Party and Project Partners that this project specific condition was not fit for the nature of the Project
- As such, this condition will be disregarded from future annual reports, QRMs, and other meetings/documents pertaining to project specific conditions.

Condition 12 - As part of the Kick Off Meeting, the Project must suggest a suitable timeline for an additional stage gate to be added related to the functional performance of the electrolyser as there is an inherent technical risk due to the novelty of the electrolyser.

As part of the kick off meeting we established a new stage gate in the plan 3a & 3b - Testing period midway point. This was to address the functional performance during testing.

14.0 Material Changes

There has been no material changes submitted within the current reporting period, however there will shortly be a material change request submitted to extend the original project plan.

The material change will look to extend the project timeline by 9 months due to delays within the contract/ collaboration agreement phase and delays to the procurement process of the hydrogen grid entry unit for Yeo Valley.

APPENDIX A – LESSONS LOG		
PROJECT NAME: NextGen Electrolysis – Wastewater to Green Hydrogen		
CONTACT: Innovation@wwutilities.co.uk	START DATE: 01/09/2024	END DATE: 31/09/2028

Lesson ID	Date raised	Lesson Type	Lesson Background	Outcome/Change
LL001	31/10/2024	Legal	The original project delivery plan had allowed for three months of legal negotiation to get contracts signed and in place between the project partners. The process has taken more than twice as long.	Factor in more time for contract negotiations/start these sooner where possible on other major projects or SIF Beta phases.
LL002	31/10/2024	Resource and time tracking	No internal resource was budgeted/planned for in the Beta phase application. Due to the overrun in time allowed, the legal budget has been exhausted, and we have had to include time for internal resource in the NextGen Beta time tracker, where there was no forecasted spend for them.	Include internal time/resource in future applications for internal legal support. Even if we use an external legal firm for contracts, we will inevitably use some of our internal legal resource for reviewing and signature.
LL003	31/10/2024	Governance	The Project team did not appreciate how legal delays could impact Condition 1 of our project direction which stipulates that no project funding can be spent until we have signed contracts between project partners. This has meant that the first two quarters of project work have been undertaken at risk for all partners. Furthermore, it was then necessary for WWU to use our internal legal team's cost centre to pay for the external legal fees (to be paid back later when funds are released on contract signature).	Be aware of all project conditions. Ensure that all partners are aware that no funding can be released until contracts are signed, meaning any work planned in this period must be done at risk.
LL004	31/10/2024	Finance	When we input our payment milestones into IFS as part of our application, these didn't actually tie into any project deliverables or milestones. We then had to re-profile these payment milestones for each project partner to be input into the contracts.	The process has changed for future applications (TBC). Nonetheless, we should be mindful that different project partners will have different deliverables and payment milestones and that these will need to be traceable in order for us to safely pay invoices.
LL005	31/10/2024	Procurement	Despite engaging Procurement early on, we did not understand that an Expression of Interest (EOI) would be required to establish how many suppliers were likely to bid for the work to supply the blending tee for use at YeoValley. We then had to have the PQQ and ITT run concurrently to try and mitigate against lost time against the project plan, meaning that despite having 5 EOIs, we only had 2 ITT responses, and only one supplier completed the PQQ.	We need to be very clear with Procurement what activities we intend to undertake and when, when we're in the process of writing the application, to confirm that these timeframes are reasonable. We should endeavour to have enough time for different activities to run in sequence, rather than in parallel.
LL006	16/01/2025	Meetings	We need to demonstrate our 10% contribution at our Quarterly Review Meetings (QRM).	We did not previously know this, as this has not been necessary for previous Discovery and Alpha phases. We need to evidence how our 10% contribution was made, but don't need to demonstrate this through IFS.
LL007	08/04/2025	Finance	We need to consider how we will capture capex vs opex spend when it comes to the spend profile and the 10% contributions.	We haven't previously considered how we will track the two types of expenditure or demonstrate them back to the MOs at QRMs.

APPENDIX B – Beta Project Policy, Regulatory and Standards Barriers Report		
PROJECT NAME: NextGen Electrolysis – Wastewater to Green Hydrogen		
CONTACT: Innovation@wwutilities.co.uk	START DATE: 01/09/2024	END DATE: 31/09/2028

At the conclusion of Year One of the NextGen Electrolysis – Wastewater to Green Hydrogen Beta phase project, the Project Team report no known policy, regulatory, or standards barriers to the project.

Future work packages throughout the project will explore policy, regulatory, and standards barriers, and future project reporting is anticipated to provide commentary on any barriers in greater depth.