Appendices

Appendix A. Assumptions and Methodology

The methodology followed for this study consisted of both extensive stakeholder engagement and a high-level literature review and desktop analysis. As part of the stakeholder engagement, experts from over 35 different companies, organisations, government departments, and universities were interviewed. The output from these meetings, including expert opinions, research data, and analysis results were compiled and analysed. Much of the data is as yet unpublished (academic work in preparation or under review), or commercially sensitive and not publicly available and has been shared in confidence. As such there is a limit to the level of supporting information that can be detailed within this report and its appendices. For example, a short analysis on potential hydrogen demand from SAF production was provided to HyEnergy by Dr. Stephen Dooley and his team from Trinity College Dublin to inform estimates for hydrogen demand for clean fuels production. This analysis is currently not published academic work. The pathways and estimates developed are based on this wide array of data compiled and is informed by the opinions shared by relevant experts, as well as existing internal HyEnergy expertise and analysis. As such the work outlines three potential pragmatic pathways or scenarios for hydrogen demand whilst accounting for the considerable uncertainty that surrounds hydrogen in Ireland and the energy transition more broadly.

A1. Zero Emissions Snapshot

The Zero Emissions Snapshot for the Irish economy was developed based on existing publicly available analysis and research as well as unpublished work and data provided to HyEnergy by industry and academia. The findings of the extensive market engagement exercise (see Appendix B) also informed the final estimates. As mentioned in the main report, the Snapshot is positioned broadly in the mid-century timeframe, without specifying a particular year. It aims to estimate the quantities of hydrogen required in this zero emissions Ireland. The sources used to make estimates for each sector are detailed below.

Power

Estimates for hydrogen demand in the power sector for the Zero Emissions Snapshot are based on the following sources:

- Government of Ireland. National Hydrogen Strategy. 2023
- EirGrid and SONI. Tomorrow's Energy Scenarios. 2023
- Sustainable Energy Authority of Ireland. National Heat Study. 2022
- Electricity Association of Ireland. Our Zero Emission Future. 2021
- Industry source: internal Irish energy system modelling
- Moran, C. Challenges and opportunities in future hydrogen supply chain design and operation: A techno-economic analysis. University of Galway. 2024

Industry

Estimates for industrial hydrogen demand are based on the following sources:

- Government of Ireland. National Hydrogen Strategy. 2023
- Sustainable Energy Authority of Ireland. National Heat Study. 2022
- Industry source: current gas demand data
- Industry sources: current gas consumption estimates for specific sites
- Moran, C. Challenges and opportunities in future hydrogen supply chain design and operation: A techno-economic analysis. University of Galway. 2024

Clean Fuels

Estimates for hydrogen demand for clean fuels production are based on the following sources:

- Government of Ireland. National Hydrogen Strategy. 2023
- Trinity College Dublin. SAF Hydrogen Demand Forecast (unpublished)
- Internal calculations: based on EU mandates (REFuelEU Aviation, FuelEU Maritime) and KPI projections for leading clean fuel production technology (industry source)

- Moran, C. Challenges and opportunities in future hydrogen supply chain design and operation: A techno-economic analysis. University of Galway. 2024

Mobility

Estimates for hydrogen demand in hydrogen mobility applications are based on the following sources:

- Government of Ireland. National Hydrogen Strategy. 2023
- Moran, C. Challenges and opportunities in future hydrogen supply chain design and operation: A techno-economic analysis. University of Galway. 2024
- Aryanpur, V., Rogan, F. Decarbonising road freight transport: The role of zero-emission trucks and intangible costs. *Sci Rep* 14, 2113. 2024

A2. Pathway Assumptions and Methodology

A description of the general assumptions and methodologies followed for each pathway and sector is given below. Estimates have been made based on data compiled from multiple analyses (see reference list) as well as industry sources. Demand estimates for 2025 are the same for all pathways. For a visual breakdown of demand by sector, compared across the three pathways, see Appendix C. Unless otherwise stated the following margins of error are used to calculate the lower and higher range estimates to account for uncertainty.

2025	2030	2035	2040	2050
5%	7%	10%	30%	50%

A2.1 Insufficient Progress

<u>Power</u>

Hydrogen demand in the power sector in 2025 is estimated based on the consumption of two stationary on-site power generation units deployed in various settings over the year. By 2030 it is assumed that that multiple permanent units have been deployed and more or longer trial operating periods leads to approximately a four times increase in demand. By 2035, power demand has grown due to some increase in consumption in stationary power units but predominantly from a 5% hydrogen blending trial (by volume) at one large generating unit (~500 Mwe combined cycle gas turbine (CCGT)). The trial is carried out for the equivalent of 20 full days over the course of a year. By 2040, this blending has increased to 20% hydrogen for the same generating unit. By 2050, demand has grown to four times 2040 demand. This is the equivalent of one small 100% hydrogen power plant or increased blending across multiple power plants. The higher range estimate for 2050 assumes hydrogen demand is equivalent to one medium-large sized 100% hydrogen-fired peaking plant in operation.

<u>Clean Fuels</u>

There is no clean fuels production in Ireland in 2025. Approximately 5 MW of electrolysis capacity provides hydrogen for diesel and/or biofuel upgrading by 2030. There is no further scale up by 2035. By 2040 demand for electrolytic hydrogen for biofuels and diesel upgrading increases to an equivalent of a 20 MW electrolyser. By 2050 this has increased to 80 MW.

Other Industry

Hydrogen demand from 'Other Industry' consists primarily of existing fossil hydrogen consumption in refining and hydrogen for electronics manufacturing and power plant cooling. There is a slight reduction (~10%) in the use of fossil hydrogen by 2050 but this occurs after 2040. The remaining merchant hydrogen market is assumed to increase with average population growth out to 2050. There is also some demand for hydrogen for co-firing in cement kilns and other high temperature industrial processes, that cannot be electrified, in 2040 and demand in this sector approximately doubles by 2050. Despite this, hydrogen's share of industrial energy demand is minimal.

Mobility

Initial mobility demand in 2025 is estimated based on the current usage pattern of the three existing units within Bus Éireann's fleet. This increases slightly in 2030 due to increased utilisation of these units, alongside introduction of a handful of other vehicles as part of the SH2AMROCK project. The period from 2030-2035, alongside scaling of bus fleets, sees the first introductions of hydrogen-powered coaches and trucks. At this stage, deployments are still seen as geographically pioneering. The following 5-year period sees the first commercial-scale deployments of units, with city buses and trucks (portion of which could be based overseas but utilise IE refuelling infrastructure) scaling significantly by a factor of five, coaches only scale by a factor of two due to reduced advancements and availability of vehicle units. Out to 2050, hydrogen bus and coach deployment increases with expected population growth, however, truck deployment surpasses this rate as a result of improved unit availability stemming from growth in the UK market and a wider network of HRSs. In this scenario there is no demand for hydrogen from off-road & construction, light-duty, or rail vehicles. By 2050, total hydrogen demand from the mobility market segment reaches between 0.05-0.15 TWh.

A2.2 Delayed Growth

Power

Demand for hydrogen for power generation increases by 8 times by 2030 from a small base. This is driven by hydrogen consumption for stationary on-site power in a variety of applications, following on from the success of early deployments from the mid-2020s. By 2032, there is a further 4 times increase from such applications as well as a trial of a 5% hydrogen blend by volume in one large-scale power generating unit (~500 MWe CCGT) which runs for the equivalent of 20 days at full load over the course of the year. By 2035 the blend at this unit has increased to 20%. By 2037 both generating units at one large power station (~1 GW CCGT) run on a blend of 20% hydrogen. One small-medium sized 100% hydrogen-fired power plant comes online between 2037 (higher range estimate) and 2040. By 2050, hydrogen demand for power generation applications grows to between 1.35 and 4 TWh.

Clean Fuels

Approximately 5 MW of electrolysis capacity provides hydrogen for diesel and/or biofuel upgrading by 2030, scaling to 10 MW by 2032, and 20 MW by 2035. A 1 MW e-fuels pilot plant is in operation by 2035. By 2040 a commercial scale e-fuels plant is operational in Ireland and ~50 MW of electrolysis provides hydrogen for fuels upgrading. Hydrogen demand for fuels upgrading doubles by 2050, equivalent to 100 MW of electrolysis, and the e-fuels plant has scaled to a 'world-scale' plant, requiring 5 times as much hydrogen.

Other Industry

Consumption of fossil hydrogen is steady through to the late 2030s but drops ~20% by 2040 due to decreased fossil fuel demand. Trials of hydrogen co-firing in a cement kiln occur by 2030. Demand for hydrogen in cement increases by 30% by 2035 and then triples by 2040. By 2040 there is also some uptake of hydrogen for high temperature industrial heat outside of cement and this demand triples by 2050 from 2040 levels, while demand in cement increases by 50% over the same period. The merchant hydrogen market for applications such as electronics is assumed to increase in line with projected population growth. Fossil hydrogen consumption drops to ~60% of 2025 levels by 2050.

Mobility

Scaling by 2030 is dominated by the activities of several hub projects which co-locate production & mobility demands, alongside a number of pioneering vehicle fleets led by truck deployments. City buses also capitalise on initial knowhow to realise first commercially sized fleet and initial coach deployments. Growth to 2040 is modest across coaches and trucks due to limited availability of units. Growth of city buses, however, continues with replication across more locations doubling by 2035, plus the first use of off-grid vehicles is seen, led by quarries. In 2040, availability of all unit types improves due to increased manufacturing capacities and maturity. Significant scaling occurs thereafter enabling fleet sizes of hundreds of units across trucks, buses and coaches, whilst off-grid & construction continue to scale after initialisation activities. From this point, with all technologies proven domestically, vehicles are introduced at a penetration rate based on: applicability of hydrogen in the market segment, year-on-year fleet turnover, and population increase. As such, buses & coaches see steady growth constantly over this period across estimate ranges. The deployment of trucks, off-grid & construction vehicles, however, is slightly less certain, with lower uptake trajectories due to a number of factors which include reduced long-term sector certainty and competition to acquire units with the UK potentially impacting domestic deployment. By 2050, total hydrogen demand from the mobility market segment reaches between 0.45 - 1.8 TWh.

A2.3 Committed Action

Power

Demand from stationary power applications increases by a factor of 10 from 2025 to 2030 as industry moves from trials and pilot projects to consistent operations for niche applications such as events and tv and film production. There is also a trial of a 20% hydrogen blend by volume in one large-scale power generating unit (~500 MWe CCGT) which runs for the equivalent of 20 days at full load over the course of the year. By 2032 this blend trial increases operations to the equivalent of 80 days full load per year. A small-medium scale 100% hydrogen CCGT plant is operational sometime between 2032 (higher range estimate) and 2035. By 2037, demand for hydrogen in power generation applications reaches up to 2 TWh with increased blending and/or another small-medium sized hydrogen power plant. This figure grows to between 0.9 and 4 TWh by 2040 as the Irish power system achieves zero or net-zero emissions. Due to increased electricity demand out to 2050 total hydrogen demand for power generation applications reaches between 4 and 12 TWh by 2050, accounting for uncertainty in final electricity demand and the size of hydrogen's role.

Clean Fuels

Approximately 20 MW of electrolysis capacity provides hydrogen for diesel and/or biofuel upgrading by 2030, scaling to 40 MW by 2035, and 50 MW by 2037. A 1 MW e-fuels pilot plant is in operation by 2030, with 1 to 2 small to medium scale commercial plants operational by 2035. By 2040, there are 1-2 large or 3-4 small-medium scale commercial e-fuels plants producing predominantly fuels for aviation but some for maritime. There is now approximately 100 MW of electrolysis providing hydrogen for fuels upgrading. This increases to 500 MW by 2050, and 3-5 'world-scale' e-fuels plants are operational, resulting in an increase of between 3 and 6 times 2040 demand.

Other Industry

Hydrogen is used in small blends for co-firing with solid refuse fuel in cement kilns at one site by 2030, with increasing hydrogen blend percentages to 2035. There is some use of hydrogen for high temperature industry, other than cement, that cannot be electrified, primarily on a trial or small scale basis. Traditional fossil fuel hydrogen consumption drops by approximately 20% by 2037 due to decrease in demand for fossil fuels. Demand for cement and other high temperature industrial applications doubles from 2030 to 2037. Fossil hydrogen consumption drops to 50% of 2025 levels by 2040, again due to decreasing fossil fuel demand, and hydrogen for industrial applications scales by an order of magnitude including full fuel replacement through co-firing with SRF for one cement plant. By 2050, fossil hydrogen consumption is now around 10% of 2025 levels. Hydrogen, co-fired with SRF, has helped to eliminate fuel emissions from two cement plants and is also used to decarbonise the last emissions from major high-temperature emissions sites (totalling 2 TWh). The small scale existing merchant market is assumed to scale with population growth.

Mobility

In 2030, significant deployments of hydrogen fuelled trucks occur with multiple fleets initialised across hub projects and connected to AFIR-compliant infrastructure. City buses realise first commercial-size bus fleet and initial trial fleet of coach deployments. The first off-grid vehicles, as well as some high-value LDV applications, are also realised in this timeline. Strong hydrogen certainty leads to scaling across all areas out to 2040 – Buses and coaches grow significantly from 2030-2035 due to earlier technical maturity. Demand between 2035-2040 is then spearheaded by trucks (high penetration across medium-to-large scale fleets), and off-grid & construction (quarries lead with construction compounding growth). Within this period, LDV and public service vehicle fleets with high availability requirements also see some increased penetration of hydrogen but is small in comparison. In 2050, demand has increased significantly across all areas based on year-on-year sector-specific penetration rates. Trucks dominate overall market with ~80% of total sector demand with a total HDV fleet penetration of 5-15% across estimates. By 2050, total hydrogen demand from the mobility market segment reaches between 0.94 - 2.8 TWh.

Appendix B. Supplementary Figures and Data

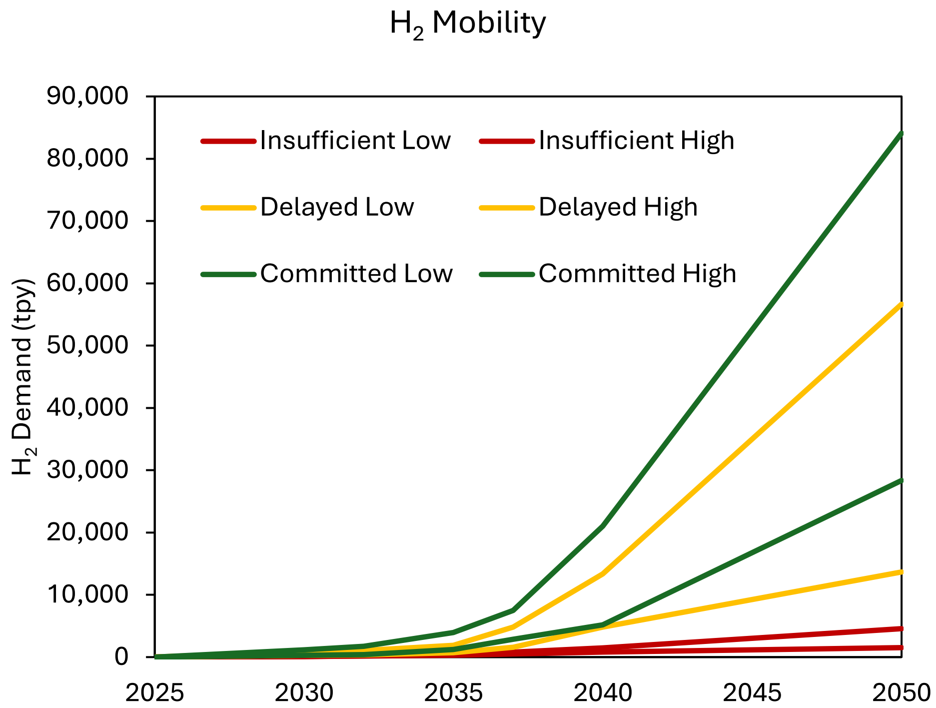

Figure 1: Hydrogen demand in hydrogen mobility applications by pathway (low and high estimates) from 2025 to 2050.

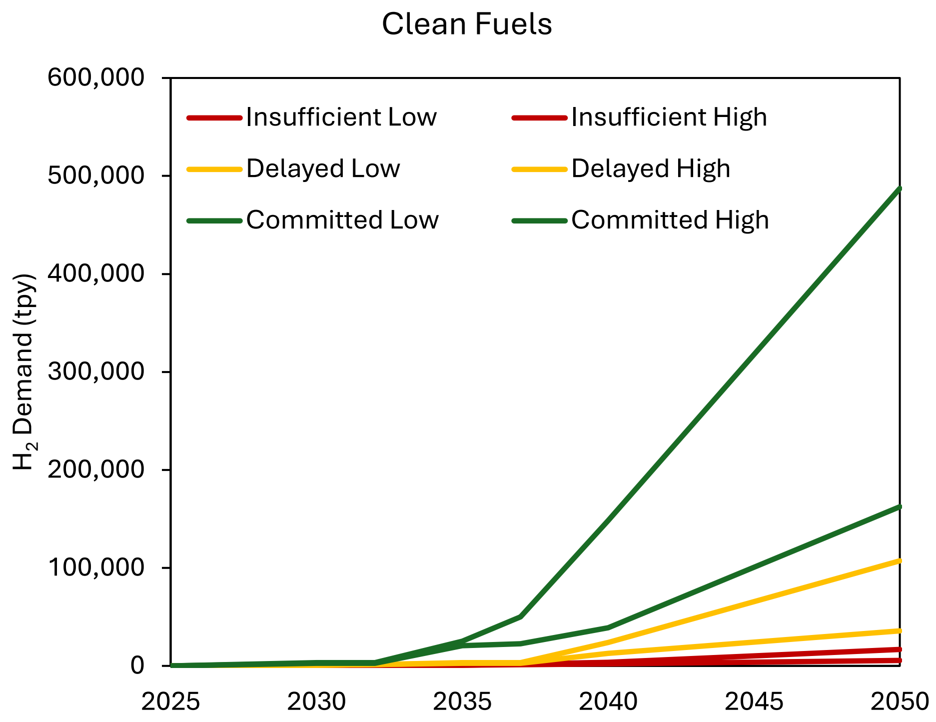

Figure 2: Hydrogen demand in clean fuels production by pathway (low and high estimates) from 2025 to 2050.

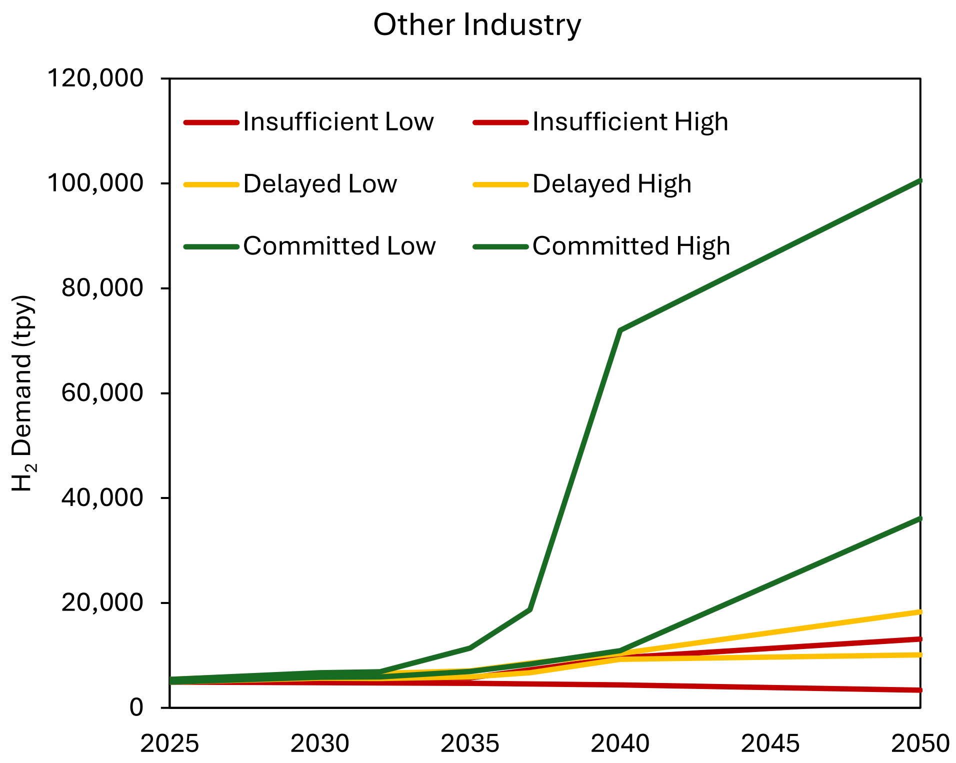

Figure 3: Hydrogen demand for other industrial applications (non-clean fuels and power) by pathway (low and high estimates) from 2025 to 2050.

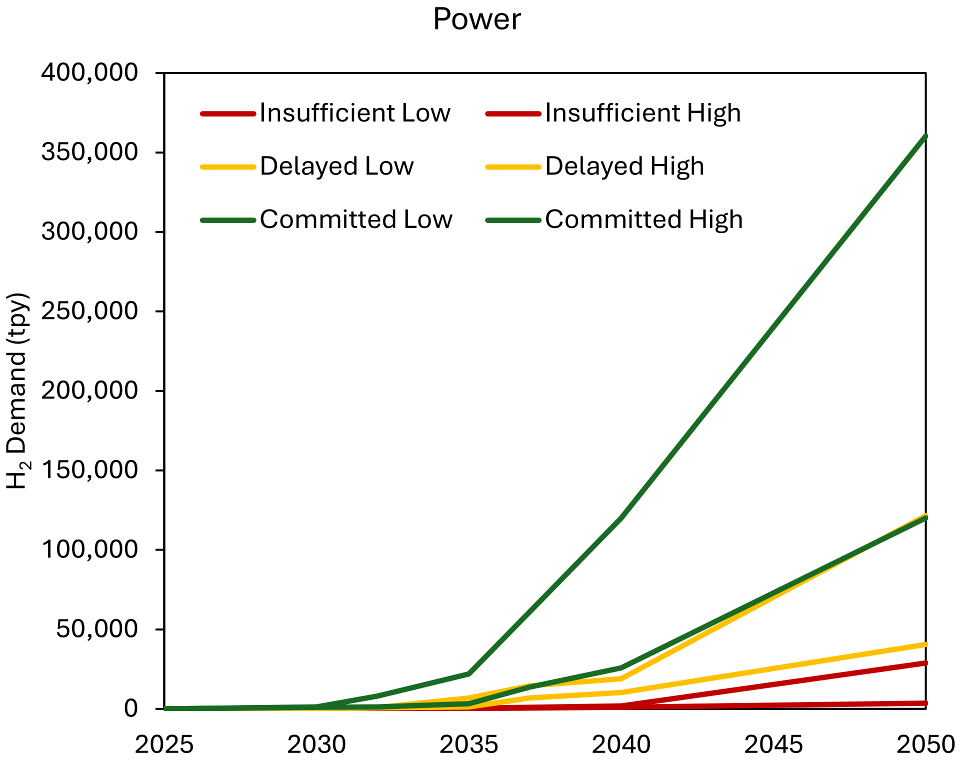

Figure 4: Hydrogen demand for power applications by pathway (low and high estimates) from 2025 to 2050.

Table 1: Hydrogen demand by pathway from 2025 to 2050 in TWh .

Pathway		*2025*	*2030*	*2035*	*2040*	*2050*
Insufficient	Low	0.16	0.19	0.20	0.27	0.47
	High	0.18	0.22	0.24	0.55	0.99
Delayed	Low	0.16	0.22	0.35	1.24	3.33
	High	0.18	0.28	0.64	2.22	10.12
Committed	Low	0.16	0.33	1.06	2.69	11.55
	High	0.18	0.41	2.08	12.03	34.37

Table 2: Delayed Progress Pathway Hydrogen Demand in TWh (including 2032 and 2037 estimates).

	2025	**2030**	**2032**	**2035**	**2037**	**2040**	**2050**
Low	0.16	0.22	0.26	0.35	0.59	1.24	3.33
High	0.18	0.28	0.33	0.64	1.04	2.22	10.12

Table 3: Committed Action Pathway Hydrogen Demand in TWh (including 2032 and 2037 estimates).

	2025	**2030**	**2032**	**2035**	**2037**	**2040**	**2050**
Low	0.16	0.33	0.34	1.06	1.58	2.69	11.55
High	0.18	0.41	0.66	2.08	4.58	12.03	34.37

Appendix C. Market Engagement Summary Report

Market Engagement Summary Report

HyEnergy® Consultancy

An Roinn Fiontar, Trádála agus Fostaíochta
Department of Enterprise, Trade and Employment

7th November 2025

Contents

Executive Summary

The Market Engagement Summary Report is the second deliverable of HyEnergy's *Sectoral analysis of future hydrogen demand and end-uses in Ireland* carried out for the Department of Enterprise, Tourism, and Employment. The purpose of which is to summarise the views of the market with respect to the current position & readiness of the Irish hydrogen market, its expected future development trajectory, and key enablers & barriers. Insights gathered will play a crucial role in the development of assumptions and scenarios for final sectoral demand modelling. This includes the following findings:

Current hydrogen use in Ireland remains limited, centred mainly at the Whitegate Refinery and small-scale industrial applications, but momentum is growing through complete value chain projects such as SH2AMROCK Hydrogen Valley, ESB's Lighthouse Project, the Celtic Hydrogen Cluster, and Mannok Cement's decarbonisation initiative.

Stakeholders expressed strong interest in hydrogen as a pathway to support energy security, complement electrification, and decarbonise hard-to-abate sectors such as transport, cement, and refining. However, the market faces key challenges: high production costs, limited domestic supply and demand, and a lack of supportive policy frameworks.

Early complete value chain demonstration projects using onshore renewables and clear financial support mechanisms will be crucial to building confidence and stimulating investment. These projects will also be critical in developing demand pathways in anticipation of the build-out of offshore wind resources, a proportion of which are likely to utilise molecular routes to market.

Project Introduction and Deliverable Overview

The objective of this study is to assess future hydrogen demand across the Irish economy, identifying industries that will require hydrogen to decarbonise their operations. The work leverages the key stakeholders across industry, government, and academia, and builds on existing work and policy such as the National Hydrogen Strategy and Powering Prosperity – Ireland's Offshore Wind Industrial Strategy. As such this study aligns with the Hydrogen Strategy Implementation Plan and Hydrogen Taskforce, led by DCEE. This Market Engagement Summary Report, the second deliverable of the project, summarises the findings from Work Package 2 – Market Engagement Execution.

Methodology and Stakeholder List

Using HyEnergy's extensive hydrogen and Irish sector networks, a target list of key industry stakeholders relevant to the domestic hydrogen sector was developed. This exercise was designed to capture input from the full value chain of potential hydrogen actors including producers, storage & distribution operators, as well as end-users and industry associations across sectors of critical importance (e.g. mobility, power, industry, ports & maritime, aviation, data centres). The primary objectives of these engagements were to gain insights into market perspectives on hydrogen and renewable energy development in Ireland, gather stakeholder feedback on the project scope, and leverage their sector-specific expertise to validate key project assumptions. A wide-ranging questionnaire was developed touching all aspects of the value chain, to ensure that assumptions and conclusions were effectively captured and uniformly tested. The companies that were invited to participate and are listed below, were individually contacted by the team and all interactions were completed on a confidential, one-to-one basis, over Teams or in person.

Table 4: List of stakeholders engaged.

Company	Interview Complete
BOC	☑
Energia	☑
Mannok	☑
CIE	☑
Colas	☑
Road Haulage Association	☑
Lagan Energy	☑
SH2AMROCK	☑
HyDEA	☑
Hydrogen Ireland	☑
Hydrogen Mobility Ireland	☑
ESB	☑
Irish Road Haulage Association	☑
Freight Transport Association of Ireland	☑
Erin Research Group - University of Galway	☑
Dublin City University - Hydrogen Research	☑
Gas Networks Ireland	☑
BnM	☑
University College Cork	☑
University College Dublin	☑
Enterprise Ireland	☑
DCEE	☑
SEAI	☑
Aughinish Alumina	☑
Premier Periclase	☑
Mullan Grid	☑
Irving Oil	☑
WEI	☑
IDA	☑
Shannon Airport	☑
Trinity College Dublin	☑
Kirby Engineering	☑
dCarbonX	☑
Bus Éireann	☑
Indaver	☑
Údarás na Gaeltachta	☑
Marine Institute	☑
Net Zero Energy	☑

Key Findings: The State of Play

Current Hydrogen Demand

The vast majority of hydrogen production and consumption in Ireland today takes place at the Whitegate Oil Refinery in Cork. This hydrogen is primarily used for desulphurisation in the production of diesel is also used for hydrogenation of bio-feedstocks in the production of hydrotreated vegetable oil (HVO). Policies and associated targets such as EU's Fit-for-55 package, RED III, and Ireland's Renewable Transport Fuel Obligation (RTFO) are driving emissions reductions plans at Whitegate, with Irving Oil a key partner in the Celtic Hydrogen Cluster, and the Cork based GLEANNCELT Hydrogen Valley proposal.

Outside of oil refining, industrial use of hydrogen in Ireland is limited with smaller quantities of hydrogen being used in electronics manufacturing by companies such as Intel and Analog Devices, and for power plant cooling at natural gas power plants in multiple locations around the country. This demand is supplied by BOC gases via their 500kW grid-powered electrolyser in Dublin, and supplemented by tube trailers from the UK, as well as via liquid hydrogen imports (ex Rotterdam) from Air Products.

More recently, some green hydrogen has been used in fuel cells to supply stationary power to events and an off-grid military base trial via ESB's partnership with GeoPura. Their Hydrogen Power Units (HPUs) have supplied power to events such as the Irish Open (golf) and film productions, using green hydrogen produced by GeoPura in the UK, with plans to use green hydrogen from ESB's 1MW Lighthouse Project in Cork to meet future demand.

In mobility, Bus Éireann currently operates 3 double-decker hydrogen city buses in Dublin from their Broadstone depot. The first-generation prototypes from Wrightbus, in Ballymena, Northern Ireland, have been operational since 2021.

Key Projects in Development

There are a number of hydrogen projects in development in Ireland. The following list showcases those which will play an important role in the initialisation of Ireland's hydrogen sector out to 2030. Representatives from the key projects outlined have been interviewed as part of the market engagement process for this study.

SH2AMROCK Hydrogen Valley

Status – Planning granted, FID yet to be taken.

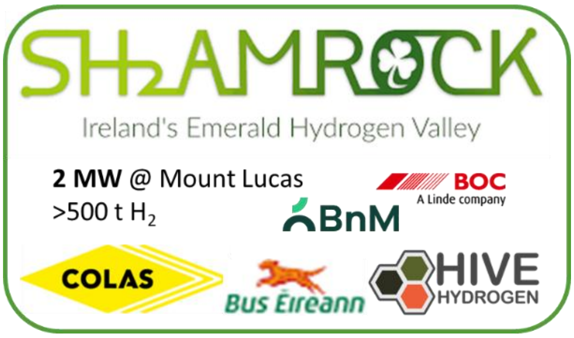

Figure 5: SH2AMROCK Project

The SH2AMROCK Project is Ireland's first EU-funded hydrogen valley. Coordinated by the University of Galway, the project will connect hydrogen production from wind power at Mount Lucas wind farm in the Midlands to multiple end-uses in Galway, centred around the port. The 2MW electrolyser at Mount Lucas is a joint venture between BnM and BOC, with BOC distributing the hydrogen to the port. Colas will serve as the baseload industrial demand, using hydrogen in their industrial burners for heating bitumen, whilst BOC will also build a hydrogen refuelling station

(HRS) to supply hydrogen to 10 coaches, 5 trucks and 4 vans which are planned to be deployed by Bus Éireann and HIVE Hydrogen. The project aims to be operational by end of 2027. The HRS has the potential to meet the urban node HRS requirements of the Alternative Fuels Infrastructure Regulation (AFIR) for Galway.

ESB's Hydrogen Ambitions

Status – GeoPura on-site power deployments ongoing. Lighthouse project conditional planning granted. H2FUELS in pre-planning and seeking funding.

Semi-state energy utility company ESB are showing considerable leadership in the nascent Irish hydrogen market through a variety of projects underway or in planning. Through their collaboration with GeoPura they have supplied clean on-site power through fuel cell power units to a number of events and off-grid applications in Ireland. There are plans to continue to grow this market and supply clean hydrogen from ESB's Lighthouse Project which will deploy a 1MW electrolyser in the Cork lower harbour area. Some of this supply is earmarked for the H2FUELS project, a collaboration with Zero Petroleum and academic partners including Trinity College Dublin. The project aims to pilot e-fuels technology, with plans for scaling to larger plants in Phase II and III to maximise value from Ireland's offshore wind to produce e-fuels for aviation.

Figure 6: ESB Hydrogen Projects

Collaborative Cluster-Focused Approaches in Cork

Status – Pre-planning – Celtic Hydrogen Cluster & Kestrel projects both assessing European funding opportunities.

Wider hydrogen centric industrial collaboration in the Cork region under development that includes Irving Oil, Bord Gais, GNI, ESB, Simply Blue and the Port of Cork. The GLEANNCELT project is a Hydrogen Valley concept, which involves a wider group of hydrogen interested organisations with the cluster partners at its centre. Currently it is on the reserve list for Clean Hydrogen Partnership funding. The project aims to develop a cluster of hydrogen production, storage, and demand based on the strong nearby offshore wind resource, potential for hydrogen demand in industry and power, and the potential for geological storage off the coast as part of the Kestrel Project. Kestrel – a joint venture between ESB, Bord Gaís (owned by Centrica), and dCarbonX (50% owned by SNAM) – is investigating the redevelopment of the Kinsale gas field for natural gas with plans to transition to hydrogen when the need and market develop. It is estimated that the Kestrel Project could hold 4 TWh of usable hydrogen gas once operational.

Figure 7: GLEANCELT Project Map

Mannok Cement

Status – Pre-planning - Assessing European & national funding opportunities.

Located on the Cavan-Fermanagh border, Mannok, formerly Quinn Cement, has developed an energy valley concept centred around the use of hydrogen, in combination with other technologies, to reduce emissions from their operations. They plan to deploy a 10MW electrolyser to produce hydrogen from a local wind farm that experiences curtailment of up to 30%. The hydrogen will be used to decarbonise their distribution fleet and quarry trucks as well as for testing hydrogen co-firing with solid refuse fuel (SRF) in their cement kilns.

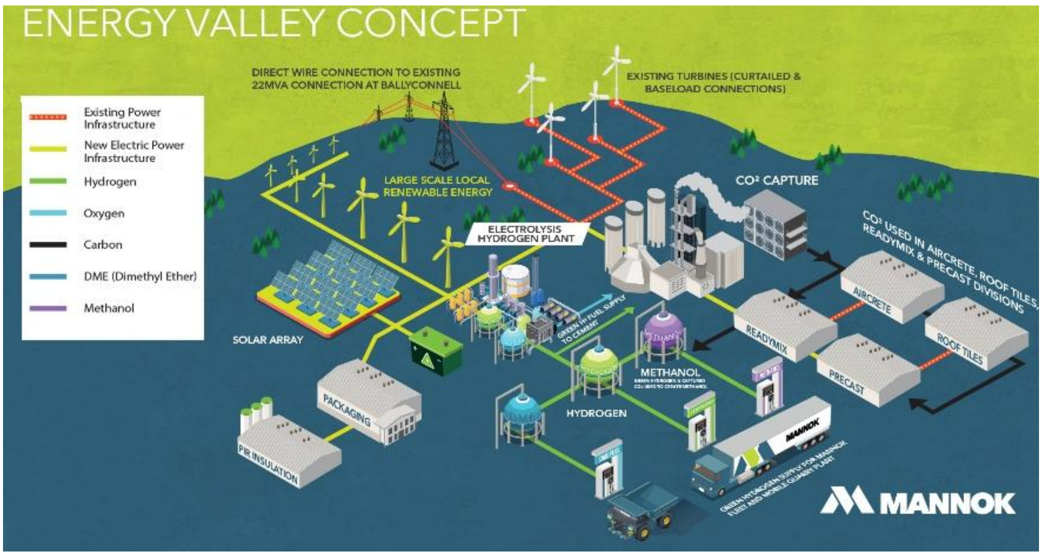

Figure 8: MANNOK Energy Valley Concept

Indaver

Status – Planning permission granted.

Indaver, a waste management specialist, have had a non-recyclable waste treatment centre based in Duleek, County Meath, since 2011. The company, as part of their strategy to minimise potential long-term curtailment experienced from their waste-to-energy process, have been investigating opportunities to couple hydrogen production to their existing facilities. Waste-to-hydrogen pathways provide greater supply certainty than intermittent renewables as they can achieve reliable, 24-hours-a-day operation. Indaver have subsequently submitted and been awarded planning permission for a 10MW electrolysis plant adjacent to their existing location. This planning permission also includes a HRS, 2 tonnes of hydrogen storage, and an above ground installation AGI) point to facilitate on-site blending.

Figure 9: Current view of Meath plant with proposed hydrogen facility location outlined.

Other Projects

There are multiple other hydrogen projects at various stages of development in Ireland, some further along than others. Galetech received planning permission in October 2025 for their e-fuels pilot and test facility in county Cavan, which includes a 1MW electrolyser. Net Zero Energy are looking to develop multiple hydrogen projects across Ireland for long-duration energy storage, whilst Constant Energy have planning permission (June 2025) to develop a hydrogen production and power generation site in Bellacorrick, County Mayo, that includes nine gas engines capable of generation 106MW of power. Vermillion Energy, who own the Corrib Gas field in Co. Mayo have plans to develop large-scale renewable hydrogen production in the region to maximise the value of existing gas infrastructure, starting with a 1 MW proof of concept electrolyser project.

Key Findings: Stakeholder Opinions

A snapshot of findings from engagement with stakeholders over the project development is covered below.

Hydrogen Desired & Needed

Despite a slight downturn in sector activity, desire for hydrogen-based solutions is still strong across the economy. This includes:

Renewable Developers – Hydrogen provides potential alternative route to market for dispatch down. Hydrogen is currently a leading consideration for some, but this is entirely dependent on demand; developers are increasingly uncomfortable with demand risk as they are used to having bankable renewable contracts.

Mobility – H2 powertrains provide operational similarity to diesel. Many fleet operators (public transport & haulage) have identified the need for non-BEV solutions for at least a proportion of vehicle units based on operational profiles. Long-term infrastructure requirements for widespread electrification, particularly in the haulage sector, are not well understood at this point. Multiple examples of energy access issues delaying or even preventing transitions to zero/lower carbon solutions.

Power – Cost-effective full/nearly-full decarbonisation of the power system will require hydrogen coupling. This principally provides long-duration energy storage enabling seasonal energy matching, coupled to batteries over short durations. Power system will not require 37GW to cost-effectively decarbonise representing an opportunity for additional generation capacity to be used for hydrogen production.

Existing industry – Several sectors in Ireland have the opportunity to utilise hydrogen within their existing businesses. Forerunners include green hydrogen use within refineries to produce HVO, as well as cement to complement use of SRF in order to achieve a 100% decarbonised position.

New industries – Several stakeholders engaged are involved in initiatives developing pilot projects around new industries which require hydrogen as a feedstock. SAF, e-SAF, and other sustainable fuels, are leading consideration in this area due to RED III obligations. Development of large-scale industries around these technologies, and others (fertilizer production, precision fermentation etc.) is dependent on the offshore wind pathway.

Across stakeholders, the increased international focus on energy security was seen as a key enabler for the domestic hydrogen sector. Most agreed that initial sector development should be focused on domestic end-uses rather than prioritising international value chains.

Sector Maturity and Progression

It was noted numerous times that for Ireland to develop a full hydrogen value chain will be extremely challenging from its current near-zero baseline position. Replicating successful international approaches within the Irish context will require a significant investment in education, skills development, and institutional capacity building to establish the necessary governance, planning, legal, safety, and maintenance frameworks essential for achieving operational autonomy. In terms of hydrogen supply, there are limited production locations based on the island of Ireland with those present being fully committed to and imbedded within specific organisations' existing processes. There are merchant supply points on the island, but import also plays a significant role due to the current scale of those sites. With limited local supply, prices are high from low economies of scale and lack of competition and multiple projects are required to change that position.

However, new supply projects are completely dependent on development of domestic demand. Currently, this is a critical barrier to realising supply investment, which in turn has a knock-on effect on demand development. For this reason, stakeholders have highlighted the need for a combined approach to sector initialisation which optimises infrastructure sizing and deployment locations to lower value chain operational costs as much as possible. Stakeholders have also repeatedly mentioned the importance of a wide array of policy measures – carbon taxes, mandates etc. - in driving development of demand.

While the initial focus is on scaling both supply and demand, achieving long-term ambitions will require substantial investment in storage and distribution infrastructure to support offshore wind integration and seasonal energy storage. Pipelines and underground storage are regarded as critical enablers; however, the development of these assets at sufficient scale will take time. Interim measures, such as blending, were mentioned on several occasions but are not currently considered politically acceptable solutions

Each area of the value chain has noted a need for streamlined planning and processes to hasten deployment of infrastructure. Furthermore, companies whose remit includes strategic hydrogen infrastructure, state there is a specific need to engage now on planning for such key national/regional cornerstone energy investments.

Offshore vs. Onshore

Stakeholders agree that large-scale renewables, particularly offshore wind development, is critical to the development of a wider hydrogen industry in Ireland. Long-term ambitions for 37GW by 2050 are significantly larger than the requirements of a nearly and fully net-zero power system. This means there will be considerable renewables oversupply providing significant opportunities for alternative routes-to-market including hydrogen, batteries (etc.).

However, confidence in the expected build-out timelines is low with multiple stakeholders across sectoral areas expecting delays to announced targets. This is largely due to slow planning permission processes, lack of readiness in key offshore infrastructure areas as well as scepticism over the ability to sufficiently increase grid availability within required timeframes.

Whilst waiting for offshore capacity to be developed, several stakeholders noted the importance in delivering early adopter projects. These should utilise onshore resources (wind & solar) to develop local knowhow and confidence with key opportunities noted involving both centralised cluster and decentralised network approaches in size ranges from 5 - 25MW. These projects are likely to be the only viable pathway to IE achieving RED III targets.

With a high level of existing curtailment, there may be a significant business case opportunity for developing such projects, under the right sector and policy conditions. However, the additionality clause required by the Renewable Hydrogen Directive is causing uncertainty locally as to the long-term viability of this model, with utilisation of curtailed energy from existing assets currently not allowed (from 2027).

Hydrogen Costs

The high level of interest in, and desire for, hydrogen within the Irish market is currently not being converted into project development locally. One of the premier reasons for this stated by the market is lack of long-term cost certainty of hydrogen.

This has been raised by project developers and industry who need to ensure that there is a return on investment present for capital-heavy endeavours. Fleet operators and trade associations, on the other hand, have stressed the need to bring costs as close to diesel as possible due to low operational margins in the sector due to high levels of competition.

Therefore, the opportunity to develop initial projects, is largely dependent on willingness-to-pay by potential first-mover organisations. Various stakeholders are open to short-term operational trials across mobility, industrial switching, and data centre power, but there is limited appetite for permanent solutions due to high and, uncertainty around long term hydrogen pricing.

Stakeholders within Ireland are keen to identify funding streams which can alleviate some of this first-mover risk. However, it was noted that the limited number of support frameworks at national level has delayed expected roll-out timelines for initialisation projects. Whilst those that are present – such as the Zero-Emission Vehicle scheme (Heavy Duty & recharging infrastructure) - is not seen as sufficiently supportive. For instance, with the current total grant limits per organisation, the scheme extends hydrogen-interested organisations only to 1-2 FC-powered HGVs alongside temporary refuelling solutions, therefore the support is not sufficient for any meaningful trailing of hydrogen solutions.

As such, Irish stakeholders are seeking European funds to support initialisation projects, most commonly via either hydrogen valley pathways, or, for larger long-term initiatives, Innovation Fund, European Hydrogen Bank, or Projects of Common Interest routes.

Stakeholders highlighted that there is a need for both CAPEX and OPEX support to accelerate development of the Irish sector. To maximise the impact of such funding, however, it was noted that a significant proportion of the funding be placed towards the end-user as a means of incentivising the development of demand locally.

Conclusions

Ireland is at a pivotal stage in the development of its hydrogen economy. The initial findings of this study confirm that there is substantial interest amongst Irish stakeholders to deploy hydrogen technologies across multiple sectors. However, realising this potential requires concerted and coordinated action to overcome systemic challenges and to de-risk early investment.

A core conclusion is that domestic demand creation must be prioritised to anchor early hydrogen production and build local market confidence. This includes incentivising industrial fuel-switching, supporting hydrogen mobility pilots, and developing decentralised hydrogen hubs linked to onshore renewables. The optimisation of production and consumption will be critical to minimising costs during the sector's early phase.

At the same time, policy and regulatory frameworks must evolve to provide long-term cost certainty and project bankability. This could include targeted CAPEX and OPEX support mechanisms, demand-side incentives, and planning reform to accelerate infrastructure deployment. Collaboration with European funding initiatives such as the Clean Hydrogen Partnership, Innovation Fund, and European Hydrogen Bank can further catalyse early-stage development.

Offshore wind remains the cornerstone of Ireland's long-term hydrogen strategy, but to build sector confidence, early progress depends on near-term delivery of smaller, onshore-based demonstration projects to establish technical, commercial, and regulatory foundations.

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