Hydrogen Ireland

Hydrogen: Securing Ireland's Pathway for Competitive Growth.

Houses of the Oireachtas

21st October 2026

The Association for Energy, Mobility, Industry & Community

Hydrogen Ireland

Garrett Monaghan



AGENDA

- Introduction
  - *Garrett Monaghan* Chair Hydrogen Ireland – Partner Pinsent Masons
- H_2 Background
  - H_2 Opportunity *Paul McCormack* CEO Hydrogen Ireland
- System need for Hydrogen
  - *Brian Mullins – Hydrogen Programme Director* Gas Networks Ireland
- What's happening in H_2 in Ireland at present
  - *Professor Rory Monaghan* Galway University
- Capturing all our renewables
  - *Niamh Callanan - Technical and Regulatory Strategy Irving Oil*
- Key Asks
  - *Philip Connolly - Energy Policy Manager* ESB GT
- Q&A



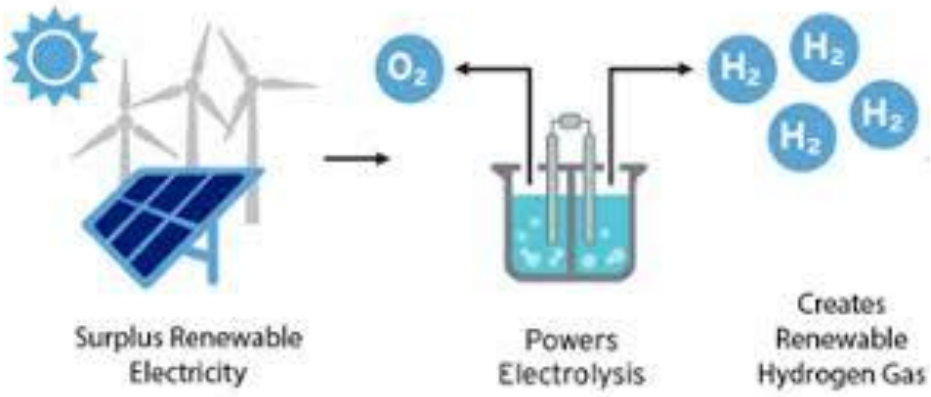
INTRODUCTION: IRELAND'S HYDROGEN MOMENT

- Ireland stands at a pivotal point in the global energy transition.
- Hydrogen offers a pathway to energy security, industrial competitiveness, and regional economic growth.
- This briefing outlines the opportunity, challenges, and strategic actions required to position hydrogen as a cornerstone of Ireland 4.0 — a resilient, digitally enabled, clean-energy economy.
- Hydrogen Ireland is committed to supporting Government and the Houses of the Oireachtas in shaping a coherent national pathway.



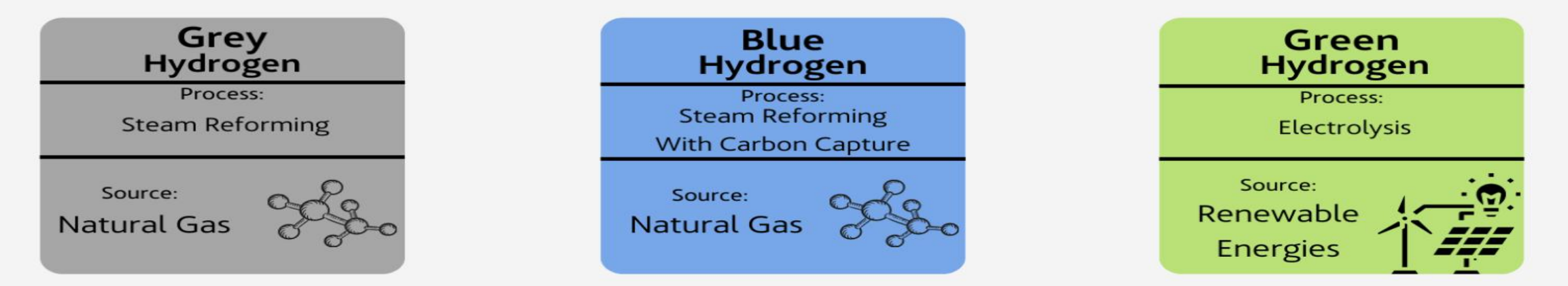
GETTING THE BASICS RIGHT….

- Hydrogen (H_2) is the most abundant and lightest element in the universe by far
- At normal conditions, hydrogen is a gas, composed of two hydrogen atoms, H_2.
- It is colourless, odourless and highly combustible
- Hydrogen is extracted in one of two main ways:
  - **Methane reforming:** methane from natural gas is heated (with steam as catalyst) to produce a mixture of carbon monoxide and hydrogen
  - **Electrolysis:** hydrogen produced by the extraction of hydrogen from water using electricity



Electrolysis Overview

HYDROGEN TODAY….



- Hydrogen is used today globally, mainly in the areas of oil refining, ammonia production (used for fertilisers) and methanol production
  - Areas like transport, storage, heating accounts for less than 1%
- Produced by burning of fossil fuels
  - Coal, oil and natural gas
- Vast majority (>80%) is “grey” hydrogen (no carbon capture)
- C. 100 million metric tons used globally
  - Very limited use in Ireland (2,000 tonnes)
- When hydrogen is burned or converted to electricity, the only product is water and heat or electricity

THE GLOBAL HYDROGEN CONTEXT

Why Hydrogen, Why Now

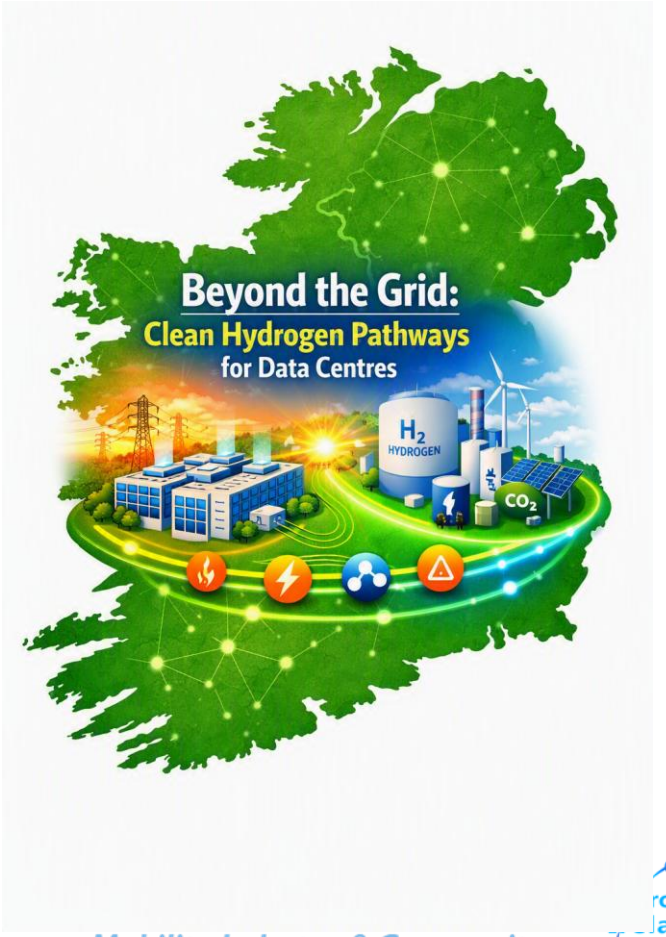
- Global investment in hydrogen is accelerating across Europe, Asia, and the US.
- Hydrogen valleys and industrial clusters are becoming the backbone of regional competitiveness.
- Ireland's natural advantages — wind resource, innovation capability, and strategic location — position the country to lead.
- Without action, Ireland risks falling behind peers who are already securing supply chains, skills, and industrial offtake.

Paul McCormack



IRELAND'S HYDROGEN OPPORTUNITY

- Hydrogen can anchor **Ireland's competitive growth strategy** across energy, industry, transport, and digitalisation.
- Key opportunity areas:
  - **Energy Security:** firm, dispatchable, indigenous energy.
  - **Industrial Competitiveness:** decarbonising heat, chemicals, logistics, and manufacturing.
  - **Regional Development:** hydrogen valleys driving investment and jobs.
  - **Export Potential:** green hydrogen and derivatives for EU markets.
- Hydrogen is a strategic enabler of **Ireland 4.0** — integrating clean energy, digital intelligence, and advanced manufacturing.



CHALLENGES TO ADDRESS

What Must Be Solved to Unlock the Opportunity

- **Policy Certainty:** clear national hydrogen strategy, permitting pathways, and regulatory alignment.
- **Infrastructure Gaps:** storage, transport, port readiness, and grid integration.
- **Demand Creation:** early industrial offtake, mobility corridors, and public procurement signals.
- **Investment Conditions:** bankability, risk-sharing mechanisms, and long-term contracts.
- **Skills & Workforce:** engineering, digital, and operational capability for hydrogen deployment.



STRATEGIC ACTIONS FOR GOVERNMENT



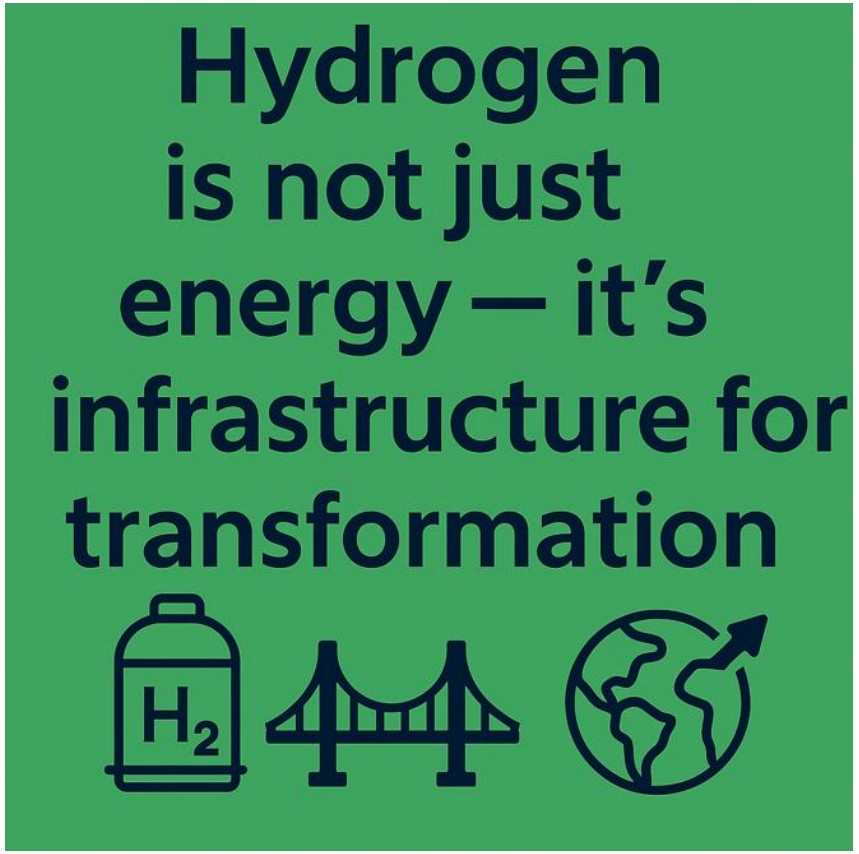
A Coherent National Pathway

- Establish a National Hydrogen Delivery Framework aligned with EU standards.
- Prioritise hydrogen valleys as regional innovation and deployment hubs.
- Introduce demand-side incentives for industry and mobility.
- Enable agile electrolysis and flexible hydrogen production through market design.
- Advance cross-border cooperation with the UK and EU for certification, infrastructure, and trade.
- Integrate hydrogen into Ireland 4.0 — linking energy, digitalisation, and industrial strategy.

CALL TO ACTION

Securing Ireland's Pathway for Competitive Growth

- Hydrogen is not a future technology — it is a present opportunity.
- Ireland must act decisively to secure its competitive position.
- Hydrogen Ireland stands ready to support Government in delivering a coordinated, evidence-based national pathway.
- Together, we can ensure hydrogen becomes a driver of **economic resilience**, **industrial strength**, and **sustainable national growth**.



System Need for Hydrogen



Brian Mullins

Gas Networks Ireland

WHY IT IS IMPORTANT TO DEVELOP A HYDROGEN ECONOMY FOR THE ENERGY SYSTEM?

Diversifying Energy Supplies

Security of Supply

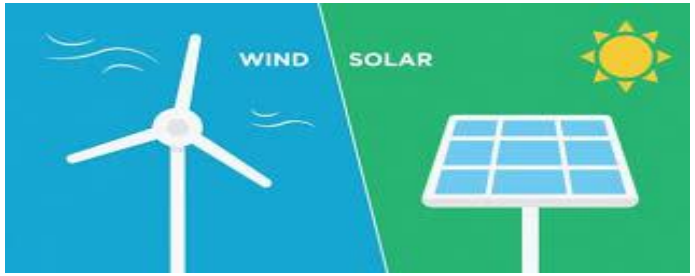


Energy Storage

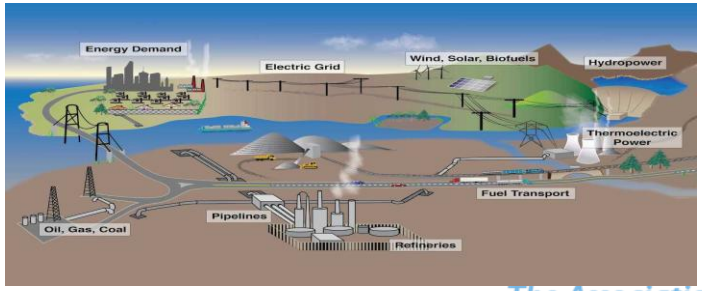


Maximising our renewable potential

Optimise Renewable Generation



Integrated Energy System



Meeting industrial needs

Hard to Abate Sectors

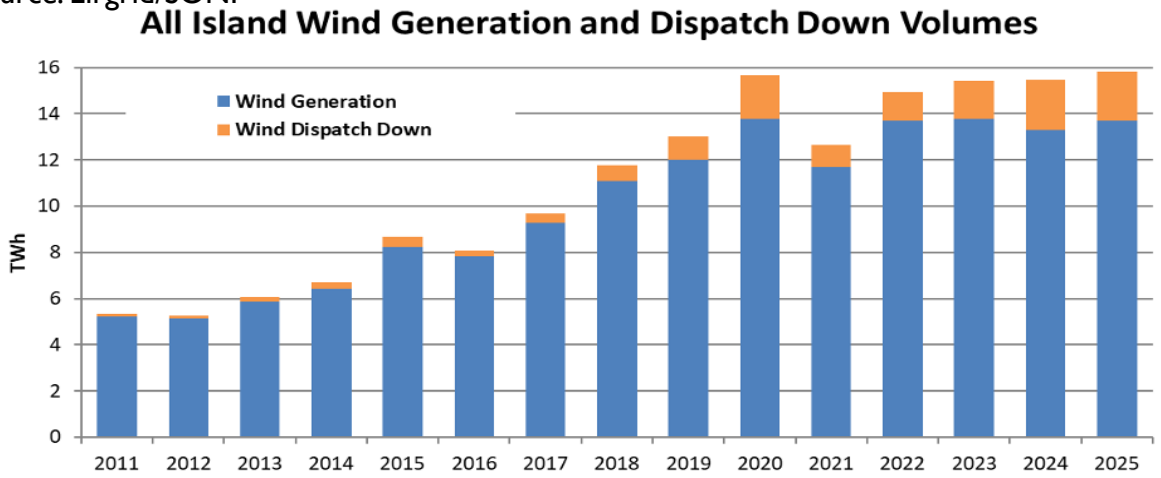


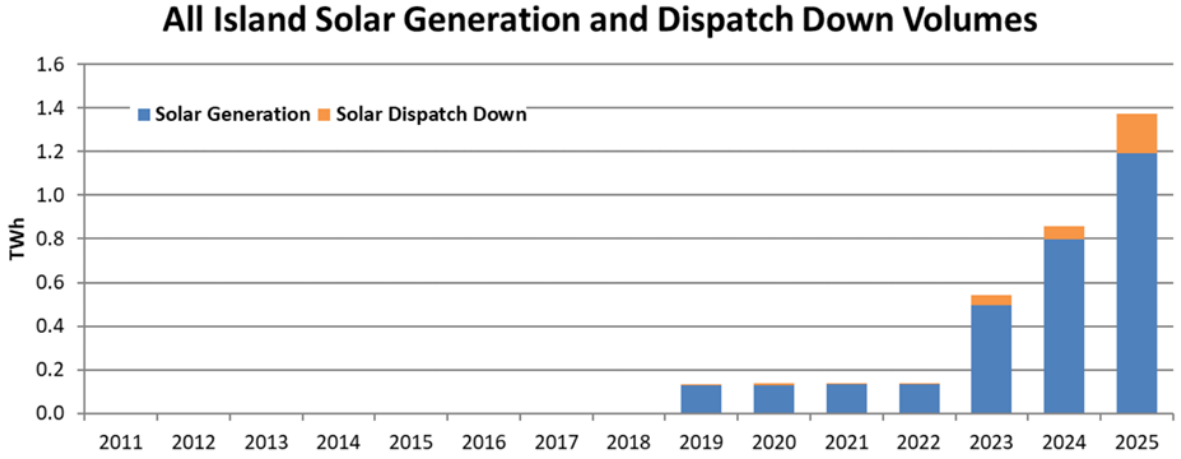
New Demands



DISPATCH DOWN OF RENEWABLE ENERGY GENERATION

Source: Eirgrid/SONI





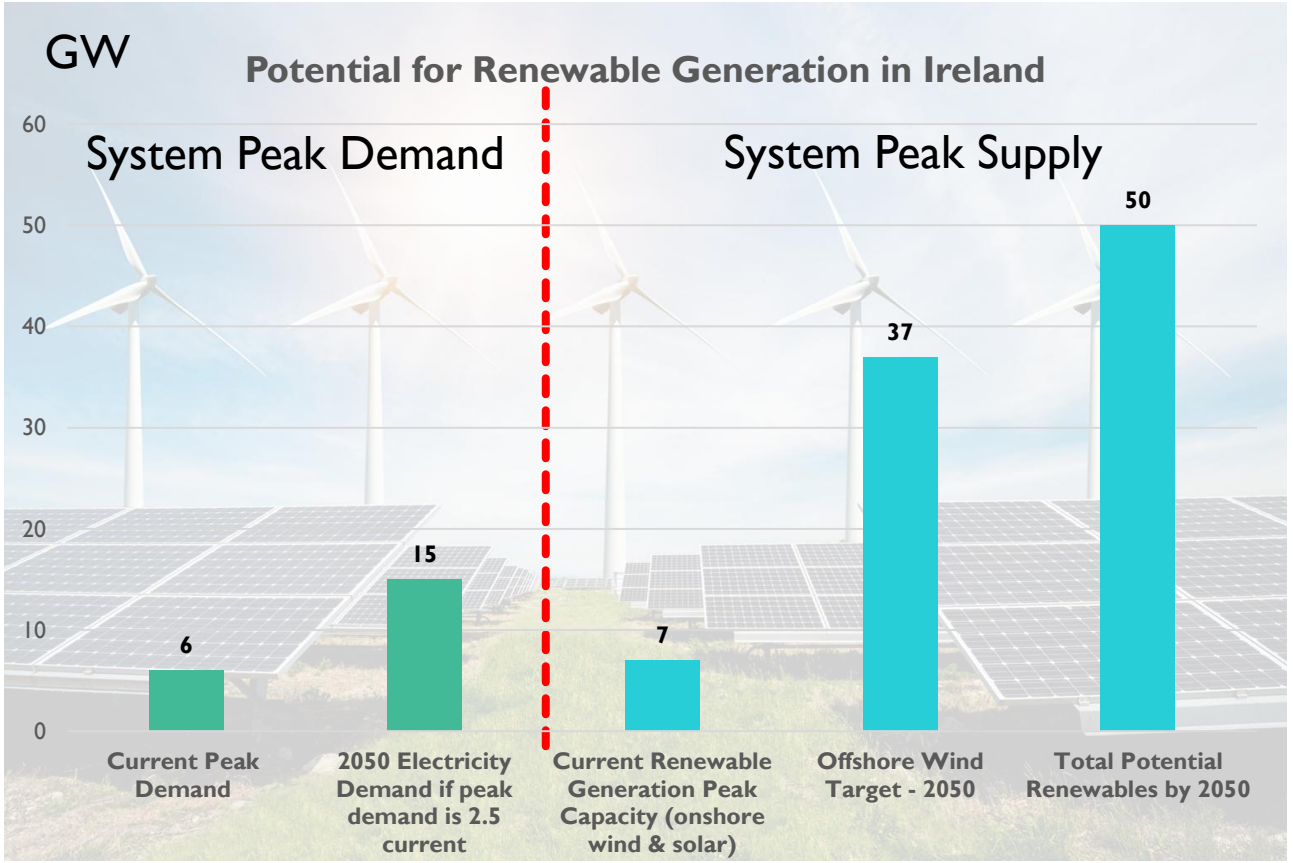
2025 Outturn	Dispatch Down – Wind	Dispatch down – Solar
Ireland	11.4%	12.9%
Northern Ireland	22.0%	12.9%
All-Island	**13.4%**	**12.9%**

- Intermittent nature of renewable generation and market structure means there will be times when the national electricity grids won't be able to take all renewable generation output.
- Lost Opportunities to maximise renewable generation

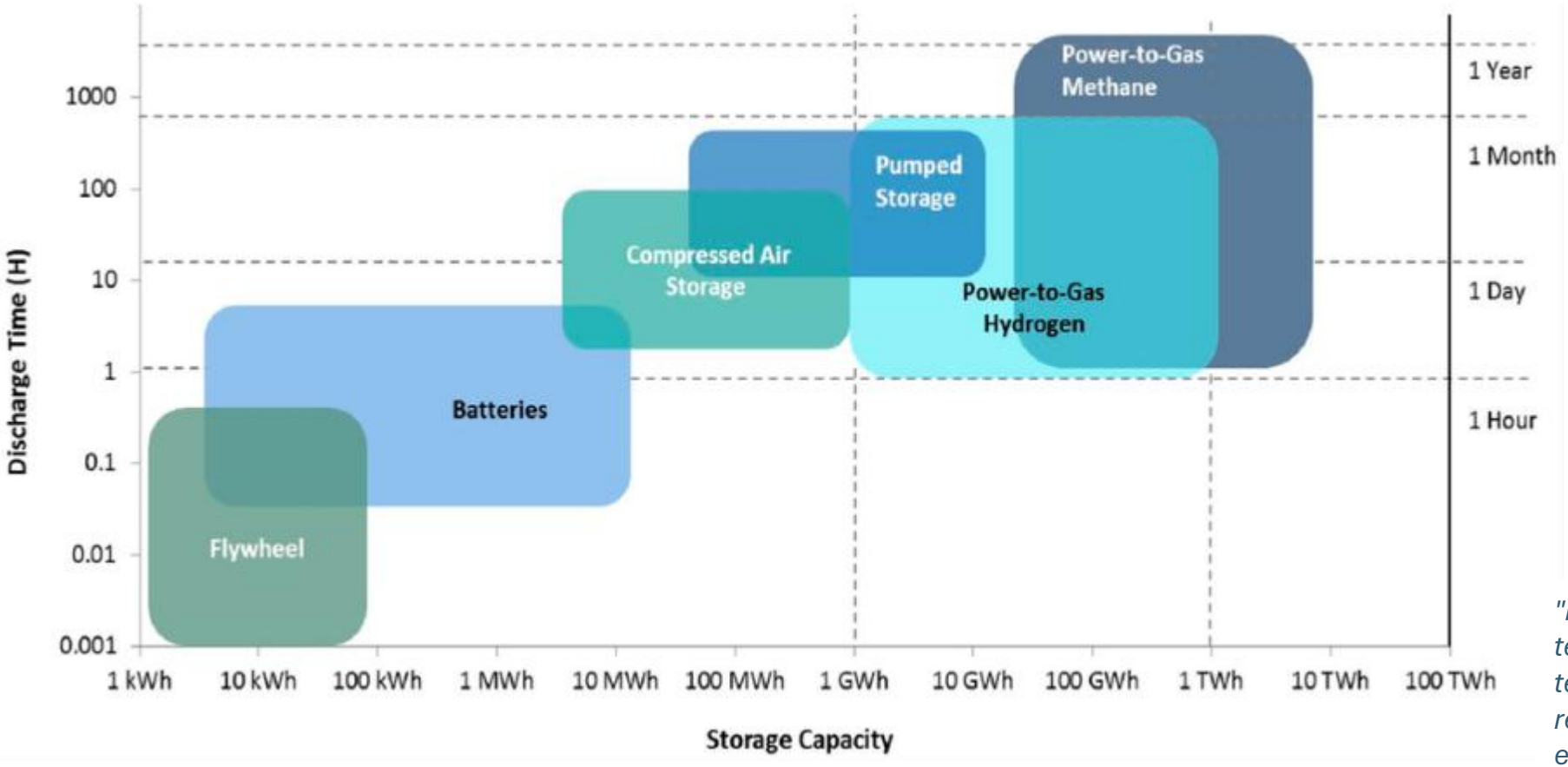
KEY OPTIONS TO ADDRESS EXCESS RENEWABLE GENERATION

- Total Peak Renewable Generation Capacity by 2050 could be multiples of prevailing electricity grid demand
  - » Significant mismatch likely to exist between prevailing renewable electricity generation and prevailing electricity demand – time of day, seasonal patterns.

- **Key Options to address this:**
  - » Curtailment/turn down of solar/wind farms
  - » Integrated energy parks/direct connection to renewable generator units
  - » Electricity interconnection to other jurisdictions
  - » Battery storage – limited duration
  - » **Conversion to hydrogen to store at scale for later use as electricity**
  - » **Conversion to hydrogen for use in hard-to-abate sectors**



A RANGE OF ENERGY STORAGE OPTIONS WILL BE NEEDED



Adapted from USGS and Aneke & Wang. [usgs.gov], [irena.org]

- Batteries highly effective for short duration requirements
- Pumped hydro, compressed air storage and other technologies can meet duration requirements of hours to days
- **Hydrogen one of the few technologies capable of providing long duration (weeks/months) storage**

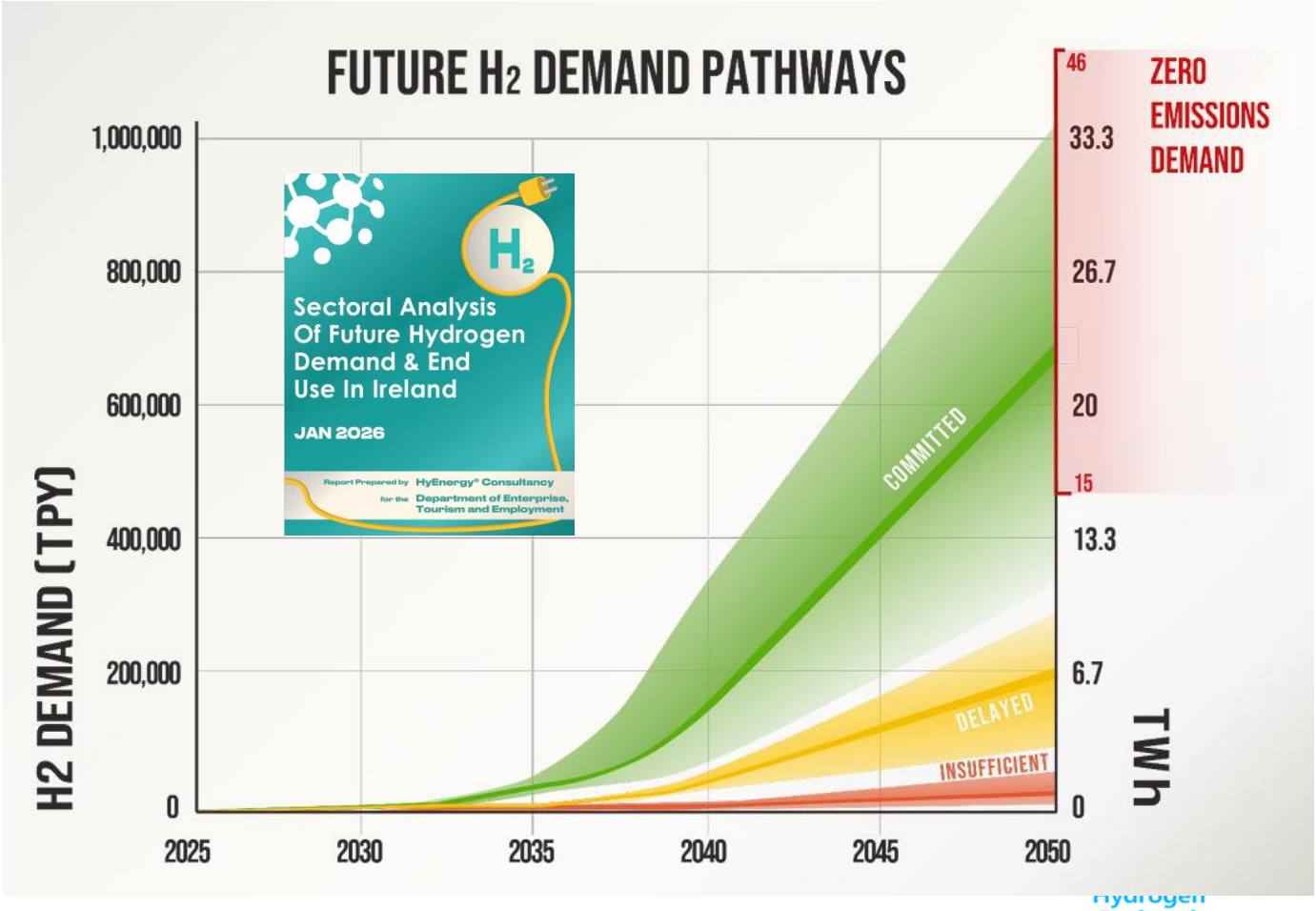
*"It is clear that a **balanced** portfolio of technologies, including an array of storage technologies across various durations, will be required to support the transformation of the electricity system as the level of renewable penetration increases and that we cannot rely on any single electricity storage technology to meet our needs" DCEE 2024*

SYSTEM DEMAND FOR HYDROGEN

- Government study published in September to examine the prospects for hydrogen in Ireland

- **Key Findings:**
  - Large range of future demand outcomes for hydrogen in Ireland
  - Key factors will include the pace and nature of policy, pace of offshore wind and the extent to which hydrogen industry is primed and ready to scale
  - Hydrogen key to delivering a net zero outcome

- **Key Sectors for Hydrogen Demand in Ireland**
  - Power Generation
  - Clean Fuel Production
  - Mobility
  - Other Industry



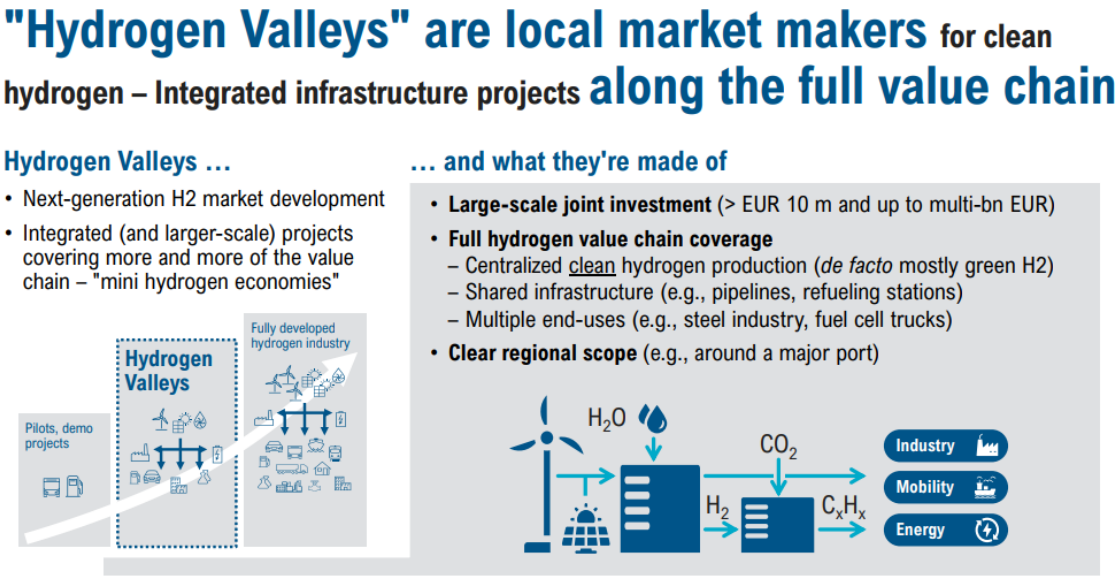
What's Happening in Hydrogen in Ireland?



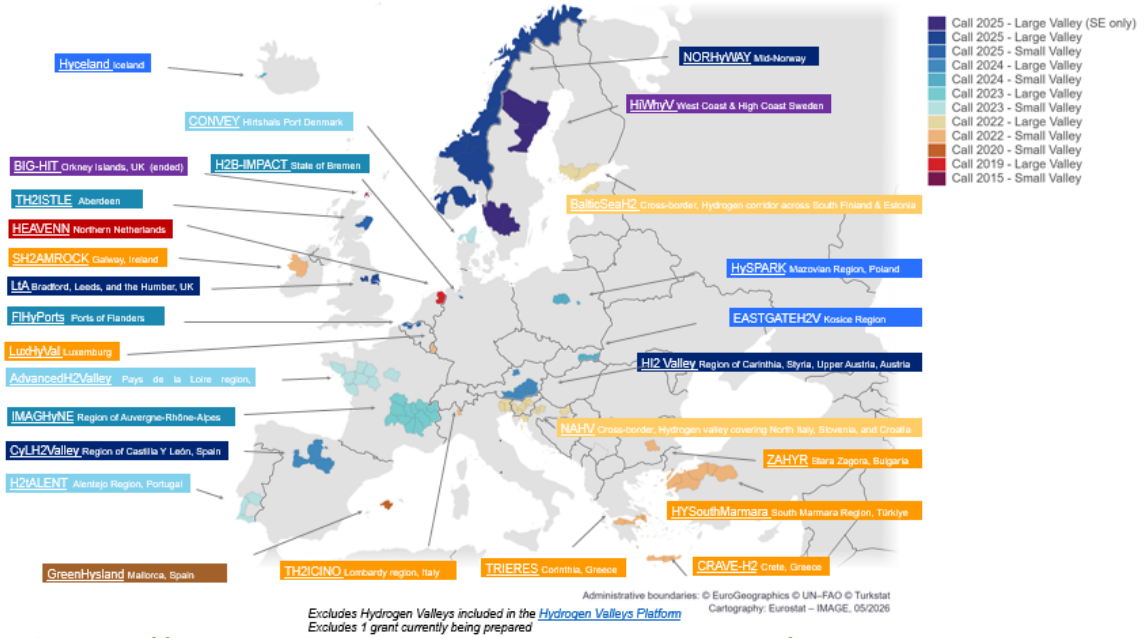
Prof Rory Monaghan

University of Galway
SH2AMROCK Hydrogen Valley

HYDROGEN VALLEYS



Mission Innovation Hydrogen Valley Platform, May 2023



https://www.clean-hydrogen.europa.eu/get-involved/hydrogen-valleys_en

SH2AMROCK IRELAND'S FIRST HYDROGEN VALLEY

Deployment of:

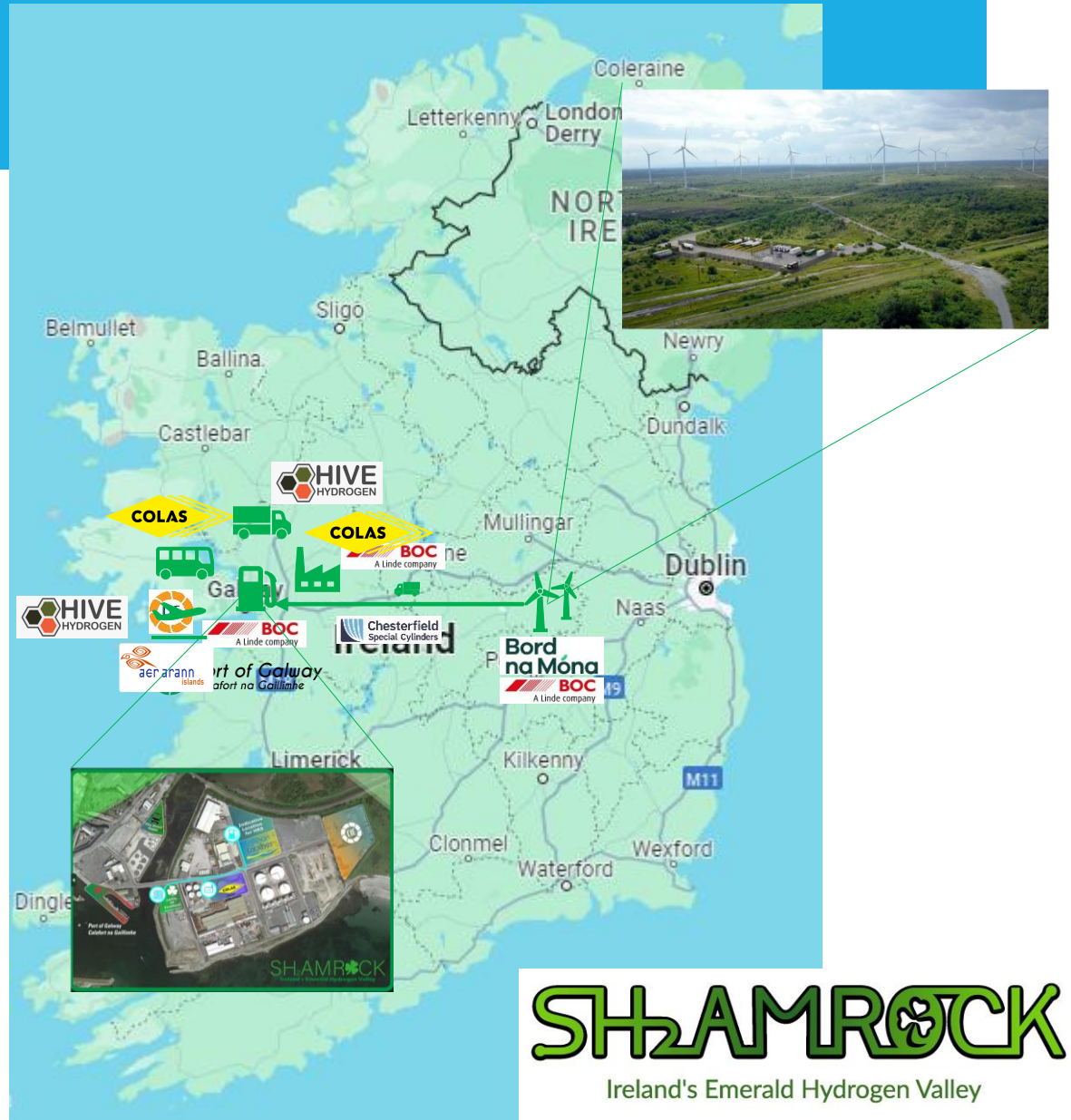
- Up to a 4-MW electrolyser
- At least 500 tonnes per year
- 3 tube trailers
- 1 hydrogen refuelling station
- 3 double deck buses
- 10 Intercity coaches
- 5 logistic trucks
- 4 vans/minibuses
- 1 bitumen plant decarbonisation
- 1 hydrogen aircraft demonstration

Bord na Móna · BOC A Linde company · BOC A Linde company · Chesterfield Special Cylinders · BOC A Linde company · Port of Galway Calafort na Gaillimhe · CIE · HIVE HYDROGEN · COLAS · COLAS · HIVE HYDROGEN · aer arann islands

Other end users

Studies:

- Project sustainability impact
- Project H2 market analysis
- H2 business models
- Decision tool for BEV-H2 fleet TCO
- Scale-up beyond project
- Regulatory barriers & opportunities
- H2 roadmaps for Galway & Ireland
- Replication studies in



SH2AMROCK
Ireland's Emerald Hydrogen Valley



https://youtu.be/SZZGEpLSrA0?si=ewmsRtAmKCQrvDYZ

Veo

SH2AMROCK
IRELAND'S FIRST HYDROGEN VALLEY

- Awarded funding from CHP 2022 call
  - Initial local hydrogen valley will expand to national coverage
  - Studies and replication actions for other regions
- Project commenced 1 January 2024, 6.5-year programme
  - 4.5 years develop & build, 2 years to operate infrastructure and applications
  - Total project budget €54 million (€8 million from CHP/UKRI)
- 28 partners from 13 countries
- 12 Irish partners accounting for €6.2 million at 20-25% funding rate

Coordinating partner

Ollscoil na Gaillimhe
University of Galway

Deployment partners – delivering infrastructure in Ireland

HyEnergy Consultancy
Bord na Móna
BOC A Linde company
COLAS
CIE
HIVE HYDROGEN
Chesterfield Special Cylinders
aer arann islands
Port of Galway
Calafort na Gaillimhe

Dissemination and replication partners – expanding knowledge globally

HYDROGEN ARCHITECTS
DCU Dublin City University
LEITAT managing technologies
THEMEPSTUDIO
Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón
ESRI
Університет Короля Данила
NWU North-West University
KEMIJSKI INŠTITUT
Politecnico di Torino
Hydrogen Ireland
IECE
Energy Co-operatives Ireland Ltd
energyco-ops.ie
EHA European Hydrogen and Fuel Cell Association
izes gGmbH Institut für ZukunftsEnergie- und Stoffstromsysteme

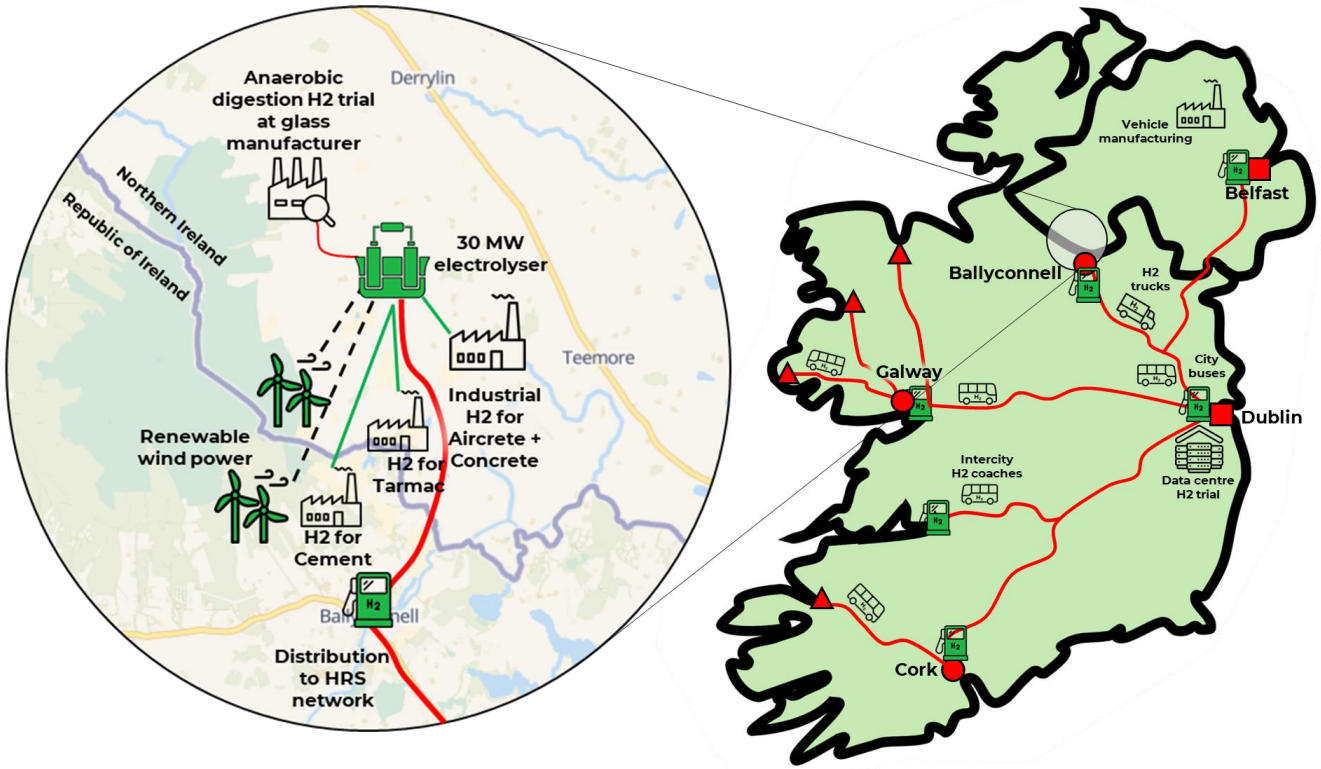
HYBERNIA
HYDROGEN ECOSYSTEM

SUPPORTING ENERGY INDEPENDENCE FOR THE ISLAND OF IRELAND

Hybernia is an all-island hydrogen system, combining renewably-powered electrolysis with a cross-border refuelling network and anchored demand from hydrogen coaches, buses, trucks, and industry.

Mobilise >€250m private investment

Produce >4000 t/a of green hydrogen



Sustain >2000 jobs across Ireland and Northern Ireland

Avoid c.500,000 tonnes of CO_2e


MANNOK
Internal Use only

HYBERNIA HAS WIDER SUPPORT FROM ORGANISATIONS AND COMPANIES ACROSS THE ISLAND AND EUROPE



Capturing all our renewables

Niamh Callanan

Technical and Regulatory Strategy - Irving Oil



Celtic Hydrogen Cluster - Linking Renewables & H2 Demand

A regional industry collaboration centered on Whitegate Refinery, Irving Oil, combining hydrogen production and demand with the potential to scale into renewable fuels and power.

WHAT IT IS

A full hydrogen value-chain proposition for East Cork

The cluster unites organisations spanning renewable power, electrolysis, refining, gas infrastructure, power generation and future hydrogen storage. It combines the key assets and capabilities needed to develop a fully integrated hydrogen value chain.

NEAR-TERM ANCHOR

20+ MW Whitegate Hydrogen Hub Project

Renewable hydrogen produced for immediate integration into existing refinery processes, enabling immediate decarbonisation

Bord Gáis Energy

IRVING

Gas Networks Ireland

ESB Energy for generations

WHY THE EAST CORK CLUSTER

1. Existing Hydrogen Demand & Route to market

Whitegate Refinery uses over 99% of Ireland's hydrogen, providing a ready-made market for green H2 without the need for new fuel cell applications, refuelling infrastructure, or changes in customer behaviour.

2. Credible partners

The partners have a strong track record in Irish energy infrastructure and are committed to delivering a large-scale project to advance hydrogen development in Ireland.

3. Location

Cork is uniquely positioned to be Ireland's hydrogen hub, with power generation, refinery and gas infrastructure providing the ideal platform for Ireland's largest electrolyser and a wider hydrogen ecosystem.

FOSSIL H_2 AND ELECTROLYSER RFNBO H_2 ENABLING LOW CARBON LIQUID FUELS

HYDROGEN AS AN INTERMEDIARY/REFINERY ROUTE

Celtic H_2 Cluster

FOSSIL H_2 (GREY H_2)

FROM CATALYTIC REFORMER



- Steam Methane Reforming
- PSA Purification
- Compressed H_2

RFNBO H_2 (GREEN H_2)

FROM ELECTROLYSER



- Renewable Electricity
- Water Electrolysis
- Compression

1 TON H_2 REQUIRED FOR:

- **300 TONS** FOSSIL DIESEL
- **30 TONS** RENEWABLE DIESEL

H_2 NETWORK

- Compression
- Distribution
- Flow Control
- Quality Monitoring

H_2 HYDROGEN SUPPLY

EXCESS H_2 USED AS FUEL IN REFINERY GAS MAIN

Provides low carbon fuel for heaters, boilers and other fuel users

DIESEL HYDROTREATER



- Hydrotreating
- H_2S & NH_3 removal
- Saturate olefins
- Metal deactivation

Operating Conditions: 300–380 °C, 50 bar

KEROSENE HYDROTREATER



- Hydrotreating
- H_2S & NH_3 removal
- Saturate olefins
- Metal deactivation

Operating Conditions: 250–320 °C, 25 bar

HEFA PLANT



- Hydrodeoxygenation
- Decarboxylation
- Isomerisation
- Hydrocracking

Operating Conditions: 280–350 °C, 30–50 bar

PRODUCTS

- **DIESEL (ULSD)**
- **CO-PROCESSED HVO** (RENEWABLE DIESEL)
- **JET FUEL** (SAF READY)
- **CO-PROCESSED SAF** (SAF VIA CO-PROCESSING)
- **SAF (HEFA)** (SUSTAINABLE AVIATION FUEL)
- **NEAT HVO** (RENEWABLE DIESEL)

FEEDSTOCKS



FOSSIL FEEDSTOCKS

- Straight Run Gas Oil (SRGO)
- Kerosene
- Naphtha

RENEWABLE FEEDSTOCKS

- Used Cooking Oil (UCO)
- Animal Fats
- Waste Oils and Greases
- Other Lipid Feedstocks

LEGEND

- Fossil H_2 (Grey H_2)
- RFNBO H_2 (Green H_2)
- Excess H_2 to Fuel

KEY BENEFITS

- Both fossil H_2 and RFNBO H_2 can be used seamlessly in existing hydrotreaters and HEFA units.
- Enables production of low carbon fuels: Diesel, Co-processed HVO, Jet, Co-processed SAF, Neat HVO and SAF (HEFA).
- Excess H_2 used as fuel in refinery gas main reduces Scope 1 ETS emissions.
- Supports refinery transition to lower carbon operations and compliance with decarbonisation targets.

A BRIDGE BETWEEN TODAY AND TOMORROW:
GREEN HYDROGEN STARTS OUT IN CONVENTIONAL FUEL MARKETS WHILE UNLOCKING FUTURE SAF AND E-FUEL GROWTH

EMERGING EUROPEAN PATHWAYS FOR RECOGNISING RENEWABLE HYDROGEN

For 2030, RED III requires RFNBOs to represent at least 1% of transport energy consumption.

NETHERLANDS

POLICY
1% RFNBO transport sub-target by 2030

REFINERY ROUTE
Renewable hydrogen used in refining expected to play a significant role in meeting the target.
.

IRELAND

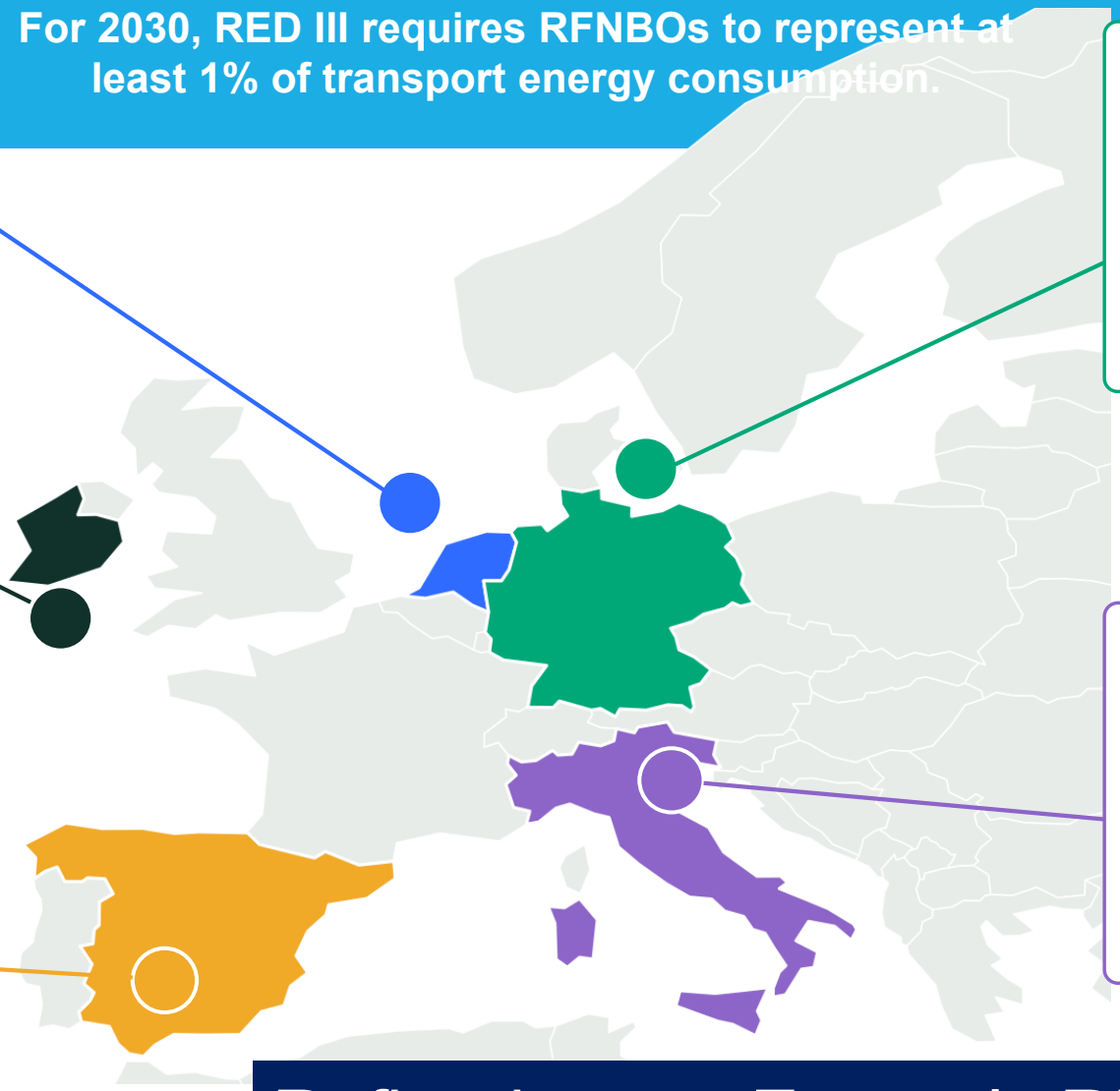
POLICY
Certified RFNBO hydrogen used in refining can contribute towards RTFO advanced fuels and RFNBO targets.

REFINERY ROUTE
Unlocks existing refinery hydrogen demand as an early market for renewable hydrogen.

SPAIN

POLICY
Dedicated RFNBO quota for transport fuels, starting 2027

REFINERY ROUTE
Renewable hydrogen used in refining counts towards RFNBO compliance.



GERMANY

POLICY
Dedicated RFNBO sub-quota within the fuel-supplier GHG quota.

REFINERY ROUTE
Creates a legally required market for renewable hydrogen and e-fuels, with tradable compliance value and a penalty for shortfalls.

ITALY

POLICY
1% RFNBO transport sub-target by 2030

REFINERY ROUTE
Refineries are expected to be the primary compliance route

Refineries are Europe's RFNBO Launchpad

GOVERNMENT ACTIONS TO UNLOCK GREEN HYDROGEN AT WHITEGATE

1 ENABLE EARLY HYDROGEN DEPLOYMENT

Provide long-term policy certainty that there will be a market for renewable hydrogen produced at Whitegate

Establish refining as a recognised pathway for meeting Ireland's RFNBO obligations

DoT, DECC, NORA, Industry

Government Output

- **Recognition of the refinery route**
- **Long term policy certainty**

2 CLOSE THE COST GAP

Mobilise support mechanisms to enable first-of-a-kind RFNBO projects

- Assess economics of meeting RFNBO obligations via the refinery route
- Evaluate funding mechanisms required to bridge green hydrogen costs
- Identify the optimal mix of capital and operating support
- Align State supports with available EU funding mechanisms

Government Output

- **CfD similar to UK**
- **CAPEX Grant**
- **Production Premium (Fixed €/kg)**

3 SUPPORT HYDROGEN HUB DEVELOPMENT

Position Whitegate as Ireland's first industrial hydrogen hub

- Recognise Whitegate as a strategic hydrogen project under Ireland's hydrogen and industrial decarbonisation strategy
- Align energy, transport and industry policy
- Coordinate infrastructure and grid planning
- Create a pathway to increased biofuels, e-fuels and industrial decarbonisation

Government Output

- **Ireland's first integrated hydrogen hub.**

OUTCOME: Deliver RFNBO targets through a bankable hydrogen hub at Whitegate.

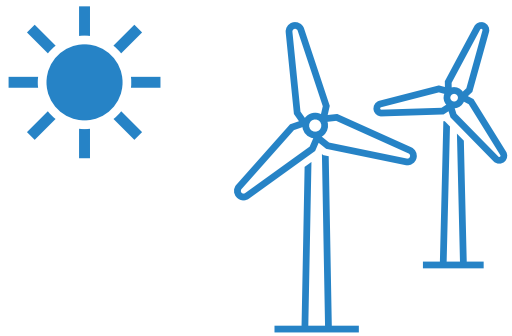
Key Policy Asks



Philip Connolly

Energy Policy Manager
ESB Generation and Trading

KEY POLICY ASKS



Convert Renewable Growth into a National Hydrogen Asset



Build an Integrated Hydrogen System That Supports Ireland's Energy Transition



Strengthen Ireland's Leadership in Hydrogen R&D, Innovation and Skills

THANK YOU!



The Association for Energy, Mobility, Industry & Community

Hydrogen Ireland