
# Clean Power Hydrogen plc

## Corporate Update

July 2025

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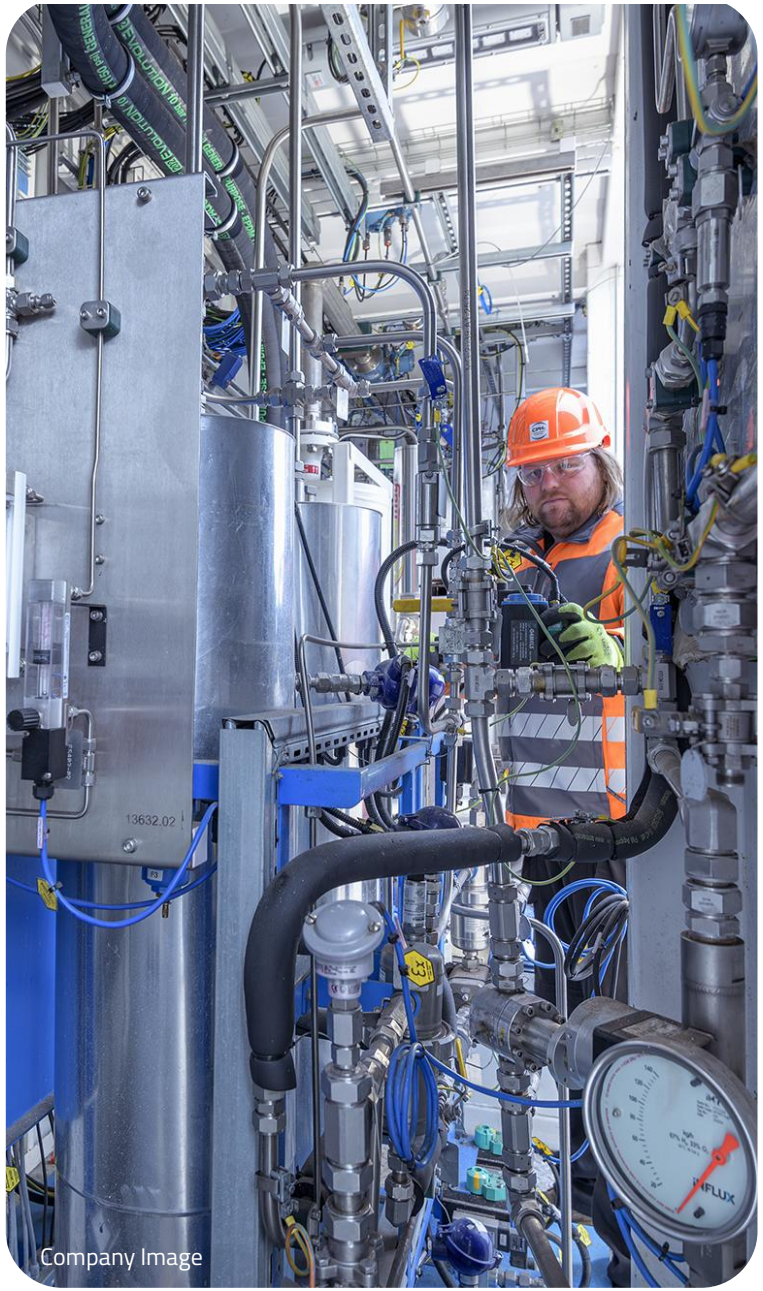
# Executive Summary

- CPH2 develops **patented** membrane free electrolysers for the **established, high-growth green hydrogen market**
- **£5m** of near-term contracted revenue
- **MOU signed for aggregate of 205 MW of electrolyser capacity**
- **Significant in-bound pipeline of business** - for green hydrogen & green oxygen solution – expected to scale rapidly



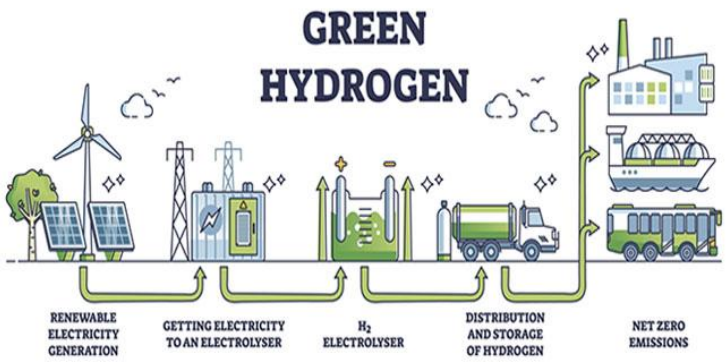
Company Image

# Electrolysers Today

## A fundamental building block of the hydrogen economy but clear challenges with incumbent technology

### What is an electrolyser?

- Device using electricity to split water molecules into hydrogen and oxygen through electrolysis.
- Electrolysis is fundamental to the hydrogen economy of the future and enables production of 'green' hydrogen by using electricity from renewable sources.




### Established electrolyser technologies

#### Alkaline Water Electrolysis

- Mature technology that uses an alkaline electrolyte
- Currently holds a significant share of the electrolysis market (c.45% in 2024)
- End users include energy companies, chemical companies, industrial gas companies and transport companies

\+ Proven technology

\+ Comparatively low up-front cost

– Not suited to variable power input such as solar and wind

#### Proton Exchange Membrane

- Methodology that employs a solid polymer electrolyte membrane that selectively conducts protons
- Sales accounted for c.35% of electrolyser market in 2024
- Various use cases including industrial applications and fertiliser production

\+ Suitable for variable power

– Membrane degradation creates poor reliability

– Requires platinum component metals and PFAs

– High-cost commodities

# The Problem

## Existing electrolysis technologies are expensive to purchase and operate – increasing the overall cost of hydrogen

- **Levelised cost of hydrogen ("LCOH") remains prohibitively high** for many applications
- LCOH is a function of the cost of electricity and the cost of electrolysis – cheap electricity is readily available in many places
- **PEM electrolysers require expensive component materials** - platinum and iridium
- **Membrane degradation** with PEM electrolysers leads to reduced efficiency, reduced reliability, more downtime, lower lifespan and **higher cost electrolysis**
- **Stacks represent a significant proportion of the overall cost** of an electrolyser – replacement costs are high

### Academic Insight

A number of academic papers describe the inherent challenges with PEM technologies.

*"PEM electrolyzer failure scenarios identified by failure modes and effects analysis (FMEA)"*

*"Understanding and identifying degradation mechanisms in PEM water electrolysis cells"*

### Industry Insight

"CPH2's lack of platinum group metals and very low degradation of their stacks gives us the lowest LCOH possible"

*Hidrigin – Customer and Licence Partner*

"We have been shadowing the CPH2 technology for a number of years and it is still our preferred technology due to the absence of a membrane requirement"

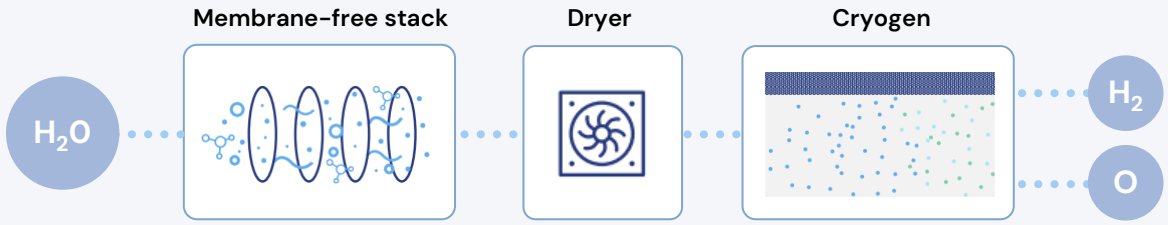
*Briain Smith, Aergaz – Potential Customer*

# CPH2's Solution

## Membrane-free electrolysis with cryogenic separation has clear advantages

CPH2 combines a unique membrane-free technology with advanced cryogenics, creating a simplified solution with minimal O&M costs

### CPH2 Electrolysis Process




Hydroxide ions dissolved in water to produce electrolyte

Water in the electrolyte is consumed by CPH2's patented electrolyser and is separated into hydrogen and oxygen by electricity

Wet mixed gases are dried to remove any water

Oxygen and hydrogen are separated at -200°C, liquifying the oxygen and leaving pure hydrogen. Patented heat exchanger allows hydrogen to be extracted and oxygen is regasified.

High purity oxygen and hydrogen outputs

Company produced Image

- ✓ High operating efficiency
- ✓ No membrane or platinum group metals
- ✓ High purity oxygen as byproduct
- ✓ Low stack degradation
- ✓ Modular, scalable design
- ✓ Compatible with variable load

### Key Innovations

#### 1. MFE Technology

Unique membrane-free solution, developed by CPH2 and ideally matched to curtailed and low-cost renewable power

#### 2. Cryogenics Solution

Already proven technology

Patented heat exchanger to improve efficiency and produce high grade oxygen

#### 3. Advanced Controls

Significant R&D investment into developing a fully automated 'one-button' system. Logic control now proven in operation and safety

# CPH2's Solution

## Clear market pull for CPH2's technology

Source: Longspur Research

| | | |
|---|---|---|
| LCOH | Alkaline | £6.30 |
| | PEM | £7.09 |
| | **MFE +O2** | **£5.78** |
| OpEx | **Significantly reduced** | |
| Downtime | **Significantly reduced** | |

## What our customers and partners are saying

"**We have painstakingly explored the supply chain of electrolysers** for our deployment against our renewable energy projects. **CPH2's Membrane Free technology is the standout solution** as we need reliability and the ability to take variable power."

Hidrigin | Customer and Licence Partner

"**The Green Hydrogen market** has been fundamentally held back in its early development, by the lack of availability of electrolysis technology which is reliable and bankable over the duration of the expected lifetime of the projects. We see enormous potential from the deployment of the **now validated technology from CPH2** ."

Source Energie | Potential customer

"**We see the CPH2 technology as a world beating, low-cost solution to the production of green hydrogen**. We have been experiencing **strong demand for hydrogen solutions** across various industries in this part of the world."

Fabrum Solutions | Customer, supplier and licence partner

"**The MFE110 electrolyser will play a crucial role in our efforts to decarbonise our operations** and explore the transformative potential of hydrogen and oxygen in wastewater treatment."

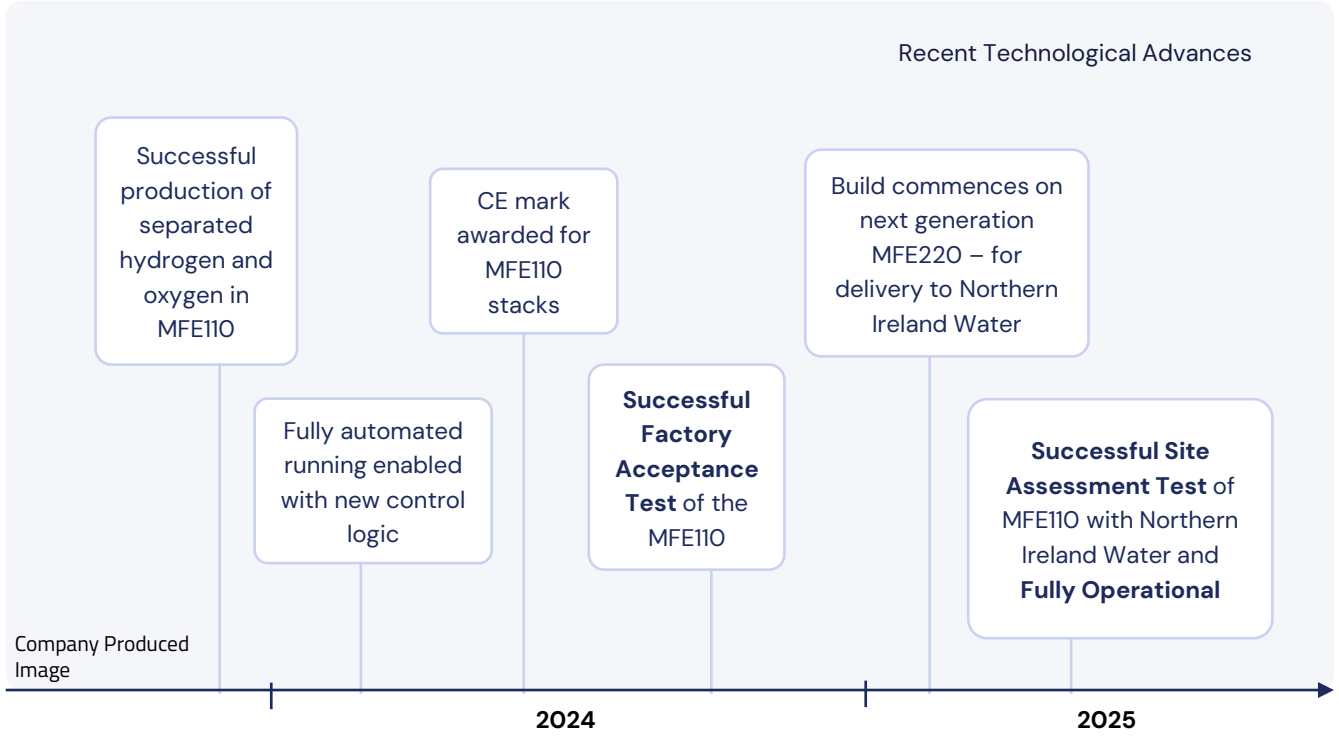
Northern Ireland Water | Customer

# 2024 | Milestones and Achievements

## Technology now validated through live site testing – Company now completed their R&D phase

### Technology Validated

- Technology proven through site testing at a critical infrastructure site (NI Water)
- High safety and operating standards required for NI Water project demonstrate readiness of technology
- Site tests demonstrated contracted output and purity of hydrogen and oxygen
- System fully automated upstream and downstream
- TRL 7+ - ARUP
- Company's next generation 'MFE220' product in advanced development – with commercial sales beginning in 2026
- Company now in its commercial phase, supported by 3 licence partners and with 4 MFE220 units sold




### MFE110 → MFE220

- The MFE220 Electrolyser is CPH2's entry point product and is considered the Company's first 'commercial' product – sales made to date are of the MFE220
- **MFE220 is a cost and design optimised version of MFE110** and will contribute positive gross margin. It is built on the same technology, with the same user benefits, as the MFE110

# Sales

## Four MFE220 units sold to three key customers – £5m revenue contracted

### Contracted Sales

northern ireland water

Major utility | Northern Ireland

**1 unit**

- Sole Northern Ireland water utility
- MFE110 SAT successfully completed. Significant, positive operational data witnessed, with high purity of hydrogen at 99.999mol%
- FAT of MFE220 expected Q4 2025 / Q1 2026; SAT H1 2026

hidrigin

Green Hydrogen | Ireland

**1 unit**

- Customer and licence partner
- First unit build in 2025 – sale expected to complete in 2026
- €100m funded 122 MW Solar farm

FABRUM.

Precision Engineering | New Zeland

**2 units**

- Customer and licence partner
- Manufacture of first MFE220 unit expected to commence H1 2026
- Existing sales into long distance trucking company (NZ and Australia)

### Routes to market

**Direct**

- Manufactured by CPH2 who then manage initial site acceptance test
- Highest gross margin sale, but has associated cash reqt
- Clear UK/European targets identified
- Sales interest inbound to date - CCO recently hired

**Via Licence Partners**

- Initial licence network established with 3 licensees
- Licensees have bought right to manufacture and sell CPH2 products
- Company earns royalty fees and makes component sales
- CPH2 can place orders with licensees to fulfil company generated sales

# Pipeline

## Clear demand for solution with tangible, near-term revenue opportunities

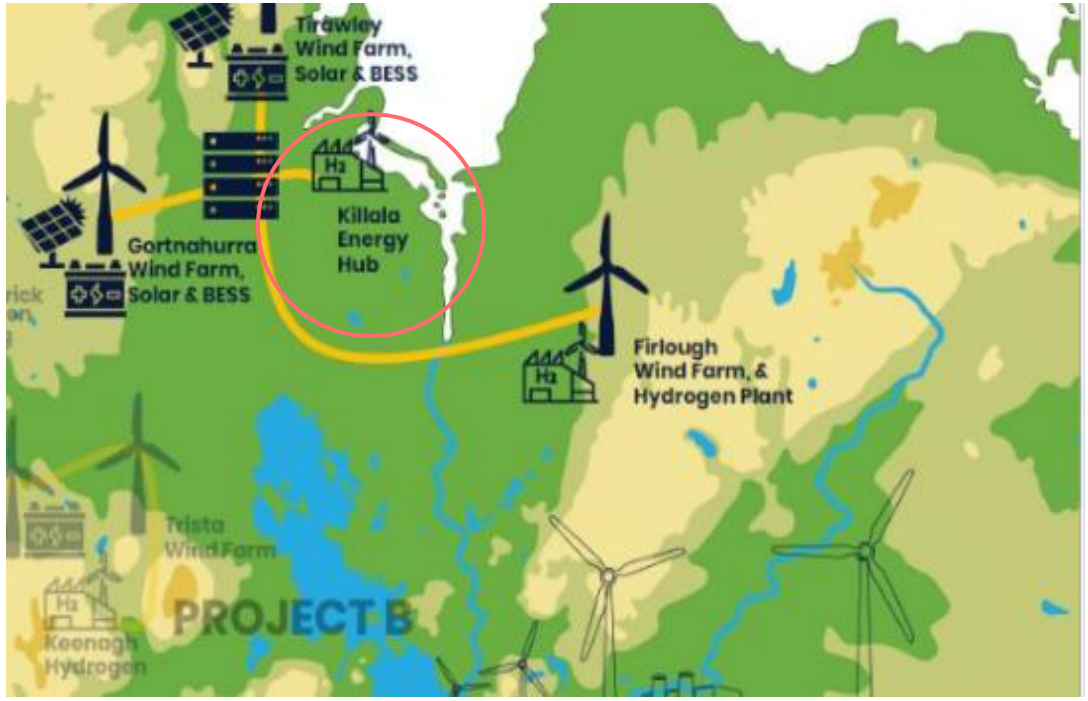
- Focus has been on projects that have plentiful / curtailed renewable power, a clear off-take for hydrogen and funding routes
- Proximity to build and commissioning engineers has been an important consideration

| Location | Use | Entity | Size | Timing | Potential Value |
|---|---|---|---|---|---|
| Ireland | Curtailed wind to tube trailer | Project owner with full planning | Up to 200MW | 2025 - 2030 | £16.5m to £300m |
| Ireland | Curtailed wind to Power to X | Multi-national SPV | Up to 25 MW | 2026 - 2029 | £1.65m to £37.5m |
| Ireland | Waste to H2 | Incinerator Company | 15MW | 2027-2030 | £22.5m |
| Ireland | Wind to data centre | Data Centre Company | 20MW | 2027+ | £30m |
| Northern Ireland | $O_2$ to waste water, H2 power to X (Preferred Supplier) | Utility Company | 10MW + | 2026 - 2029 | £15m |
| UK | Marine pilot | Energy Company | 2MW | 2026+ | £3.3m |
| Scotland | Wind to industrial power | Community Wind Farm | 2MW | 2027 | £3.3m |
| Lithuania | Wind to Natural gas replacement | EPC contractor | 2MW | 2026-2027 | £3.3m |


Company Image

# Recent Commercial Momentum

- **MOU signed** with Constant Energy
- Constant Energy (16 June 2025)
  - Killala Energy Hub, County Mayo, Ireland, with full planning permission. Renewables to green hydrogen, refuelling and gas peaking plant.
  - **Initial 5 MW** expected to be operational 2027/28. **Further 200 MW over next 10 years**. Subject to FID




Killala Energy Hub, County Mayo, Ireland

# Licence model

## Established network of licencees provides substantial sales and distribution potential

- Licence model enabled by comprehensive patent suite over critical innovations
- Licencees bought license because they understand the benefits of CPH2's membrane-free technology and they have an end-market they believe will buy it
- CPH2 earn **royalty fees** on each unit produced by licencee and **will earn revenue from key component sales** (stack).
- Licence packs now with Kenera and Hidrigin. Hidrigin to commence Q4 2025

kenera

- Global engineering and manufacturing organisation focussed on energy transition (a Helmerich and Payne inc. company)
- Manufacturing facilities in **Germany** and **Oman**
- Strategic investor in CPH2
- Ideal link into their **Oil and Gas client base** looking to invest in green energy

hidrigin

- Bought the right to **manufacture up to 2GW's of MFE220 units** in Ireland to connect with its own Solar PV & Wind Farms
- Stated goal to "**develop €500m renewable energy projects together with MFE220 electrolysers** across Europe by 2030"
- Units to be manufactured by **Jones Engineering Manufacturing**

FABRUM.

- Acquired licence to manufacture and sell MFE220 units (no limit) in 2023
- Have had a secondee with CPH2 engineering team for 2 years
- Expected to start producing in New Zealand under the agreement in 2026
- Can offer **liquid hydrogen** solutions

### Why pursue a licencing model?

✓ **Broaden revenue streams**

Royalty fees & component sales (stacks)

✓ **Accelerate growth**

Leverage sales networks of licence partners to accelerate growth

✓ **Boost manufacturing capacity**

Enables CPH2 to place orders with partners for their own contracted sales

✓ **Local manufacturing for local markets**

Ease of maintenance and servicing

# Water Opportunity

## Proves reliable operation and water treatment application – and provides significant revenue potential

### Northern Ireland Water

- CPH2 electrolyser produces high purity oxygen which is used to oxygenate wastewater – increasing processing volumes by up to 31%
- Hydrogen becomes an additional income stream for NI Water
- Allows NI Government to reduce renewable energy curtailment costs
- MFE110 has been on site since December 2024 and all three stages of Site Acceptance Testing are complete.

Company Image

### Opportunity

- CPH2's patented solution produces up to 3600kg high purity oxygen per day, creating a secondary use case for CPH2's technology
- Wastewater treatment process of aeration accounts for up to 75% of a treatment plant's overall energy expenditure
- Uisce Eireann (Irish Water) is obliged to be 50% more energy efficient by 2030
- Industry reports 58kg O2 per person to perform aeration treatment. This equates to a demand of 632 MW for the Island of Ireland (assuming full load)
- Use case and through-put benefit for water utilities has already been demonstrated by NI Water
- New demand expected from other European water companies once trials have been published

# Go-to-market approach

## Focus on conversion of immediate opportunity with a wider near-term focus on Ireland

### Commercial Phase – to 2027

- **Focus on conversion of near-term pipeline**
- **Leverage MFE110 test results with NI Water** and other UK water utilities – up to 10MW of near-term potential
- **Enable Licencees** for growth in their local geographies
- **Seek to convert successful HAR2 projects** to MFE electrolyser
- **Capitalise on Ireland opportunity** to convert existing opportunities with curtailed renewables and data centres

### Scale Phase – to 2030

(assuming 10 - 20% Serviceable Obtainable Market)

- Expand on potential in Ireland:
  - Curtailed wind and solar: 50 – 100 MW
  - Data Centres: 75 – 150 MW
  - Water Companies: 60 – 120 MW
- Replicate Ireland model in UK: 625 – 1,250 MW
- Replicate Ireland model via global licences: 9,675 – 19,350 MW

### The Ireland Opportunity

- Ireland Climate Action Plan targets 22,000 MW onshore wind, offshore wind, and solar by 2030 (National Hydrogen Strategy Ireland)
- 2,000 MW of this targeted for 'production of green hydrogen'
- Current curtailment above 10%
- Home to largest data centre cluster in Europe. By 2030 projected to use 30% of country's electricity (currently 21% +)
- Waste-water plants need to increase aeration efficiency and reduce power costs per unit treated. Trial shows 30% efficiency gain

# Near-term targets

## Commercialisation of MFE220 and focus on driving sales

- **Appointment of Chief Commercial Officer** (1 July 2025) to drive pipeline growth
- **Convert pipeline and MOUs into orders** following SAT at NI Water
- **Factory Acceptance Test of MFE220** expected in Q4 2025 / Q1 2026, Site Acceptance Test with Northern Ireland Water in H1 2026
- Further technical development of MFE220 in 2026, **targeting 35% reduction in build cost** and **10% improvement in efficiency**
- **Expected continued commercial progress** through product sales into renewable energy projects and with water utilities
- **Leverage results at NI Water** to engage with water utilities in UK and Europe

### Funding Strategy

- Proactively engage with strategic investors who can support the growth prospects of the business
- Capitalising the company to fulfil its growth potential will require a blend of equity and debt
- Company engaged with potential strategic investors to fund scale up of business
- In conversation with a number of hydrogen focused funds

# Conclusion

- Directors believe that the **successful completion of site testing** and the **strength of the performance gains** seen at Northern Ireland Water are **key catalysts** for the Company's future

- Clear focus over the next 12 months on:

  - **Converting the Company's significant pipeline** into orders

  - **Accelerating pipeline growth** with new CCO

  - **Leveraging test results at NI Water** with water utilities

  - **Supporting licencees** to start manufacturing and selling product

# Appendix

# Further endorsements

- "We have seen the development of the MFE electrolyser both as a consultant to existing and potential customers and as expert advisors to government and the industry. The successful deployment of CPH2's unit in Belfast takes the technology to TRL 7 and beyond and, we believe, is a major steppingstone in the commercial journey of the company".
  *Rob Duffin, Director ARUP*

- "As you know we have been shadowing the CPH2 technology for a number of years and it is still our preferred technology due to the absence of a membrane requirement. We note the recent advances and successful first tests in Belfast and are very encouraged by the early results, this is a credit to the hard work put in over the last few years. As previously discussed we would like to enter discussions as soon as possible regarding the securing of up to 10MW of capacity at the Newleaf site over the coming 4 years, this would be staged with the first 1MW element to be commissioned in late 2026".
  *Briain Smith, Aergaz (Lead on the Newleaf Project in County Offaly on behalf of SDCL)*

- “The Green Hydrogen market has been fundamentally held back in its early development, by the lack of availability of electrolysis technology which is reliable and bankable over the duration of the expected lifetime of the projects. We see enormous potential from the deployment of the now validated technology from CPH2. The news from deployment in a UK Utility environment such as Northern Ireland Water is highly encouraging. CPH2’s current progress is not overnight but represents the development of over 12 years of dedicated technology development and validation of a paradigm shift in water electrolysis”.
  *Kevin Lynch, Co-Founder & Director, Source Energie*

# Why Green Hydrogen

- Hydrogen is the most abundant chemical element in nature
- Hydrogen is a versatile energy carrier
- Traditionally hydrogen has been used in refining and chemical sectors and produced using fossil fuels and thus responsible for significant CO2 emissions
- Green hydrogen produced from renewable energy sources can help to decarbonise a range of sectors.
- Green hydrogen can also support the integration of variable renewables in the electricity system
- It is one of the only sustainable options for storing energy over weeks or months

Source - Hydrogen - IEA