

PEM electrolysis for Decentralised Hydrogen Production

TU/e Hydrogen event
02-12-2024



Fluidwell B.V.

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- Introduction
- Fluidwell: History and Outlook
- Hydrogen Systems Development
- Opportunities for students
- Questions?



Role: Test Engineer Hydrogen Systems

PhD: Chemical process engineering (Hydrogen recovery from Coke Oven Gas)

MSc: Renewable Energy and Resource Management

BSc: Environmental Studies

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Fluidwell history and outlook



Your success counts



31 years of professional experience

- ✔ Independent manufacturer of flow computers, totalizers and indicators
- ✔ Leading OEMs choose Fluidwell: Krohne, Eaton, Yokogawa, etc.
- ✔ Expertise in products for hazardous areas/explosive atmospheres
- ✔ A worldwide distribution network, over 30 countries represented.



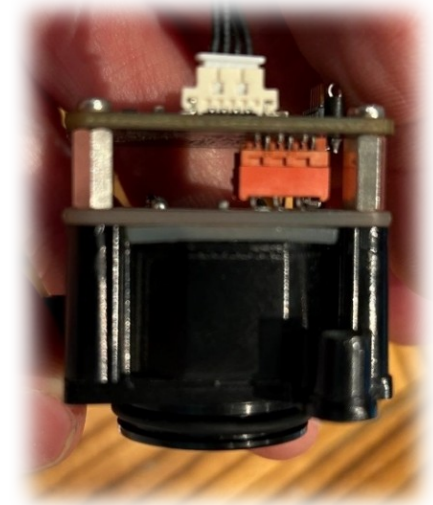
Your success counts



Flow computers



Remote Monitoring



Instrumentation

Hydrogen momentum – truck dispensing ('16)



Your success counts



Next Hydrogen opportunities:

- Modular electrolyser systems for decentralised hydrogen production
- 100 – 500 kWe/module



Opportunities

Your success counts



Source: Truedyne

120 kWe PEM prototype

Your success counts



Hydrogen Systems



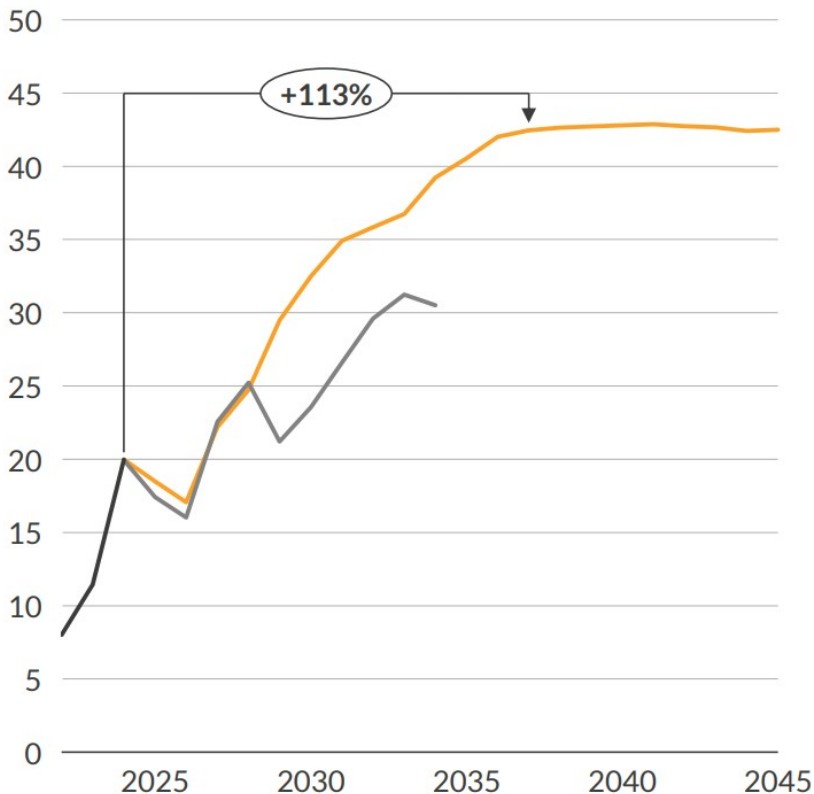
Our target market:

- Conversion of locally produced electrons to green hydrogen
- Renewable energy projects with limited or no grid connection



Challenge: Electricity grid

Annual HV¹ grid fee projection for baseload off-takers²
€/MWh, real 2023



Source: [Grid Fee Outlook for the Netherlands 2045 | Aurora Energy Research](#)

- Netherlands: heavily congested electricity grid
- 20 GWel. vs 300 GWgas
- Grid fees have almost tripled in the last 2 years (from ~7 to 20 €/MWh)
- Centralised, grid-connected ELX will pay $\text{€}0.043/\text{kWh} * 50 \text{ kWh/kg H}_2 = \underline{\underline{2.15 \text{ €/kg H}_2}}$ on grid fees alone.
- **Our target market:** Decentralised conversion of electrons to green hydrogen

Why PEM? → Flexibility

Your success counts



- **Operational flexibility → load follow renewables**
- Grid congestion:
>12 TWh of renewable electricity was Curtailed in EU in 2023*
 - 12 TWh / 60 TWh Mt H₂⁻¹ = **0,2 Mt H₂**
 - 450 kg d⁻¹ at 8760 FLH = 1 MWe ELX
 - **444 MW Electrolyser capacity,**
 - but!?

* Downward redispatching

Source: [Transmission capacities for cross-zonal trade of electricity and congestion management in the EU - ACER 2024 MMR](#)

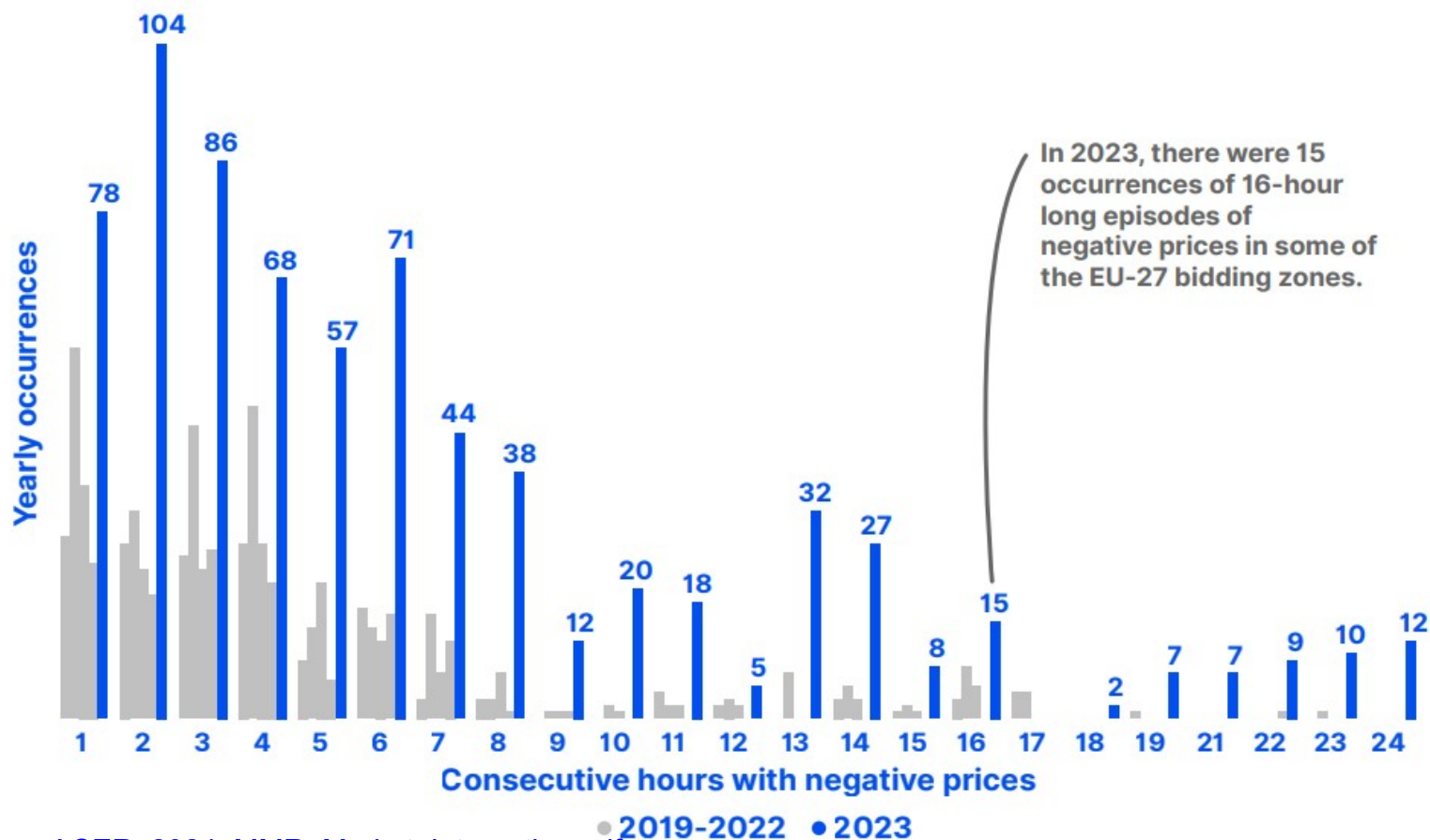
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Hydrogen Systems

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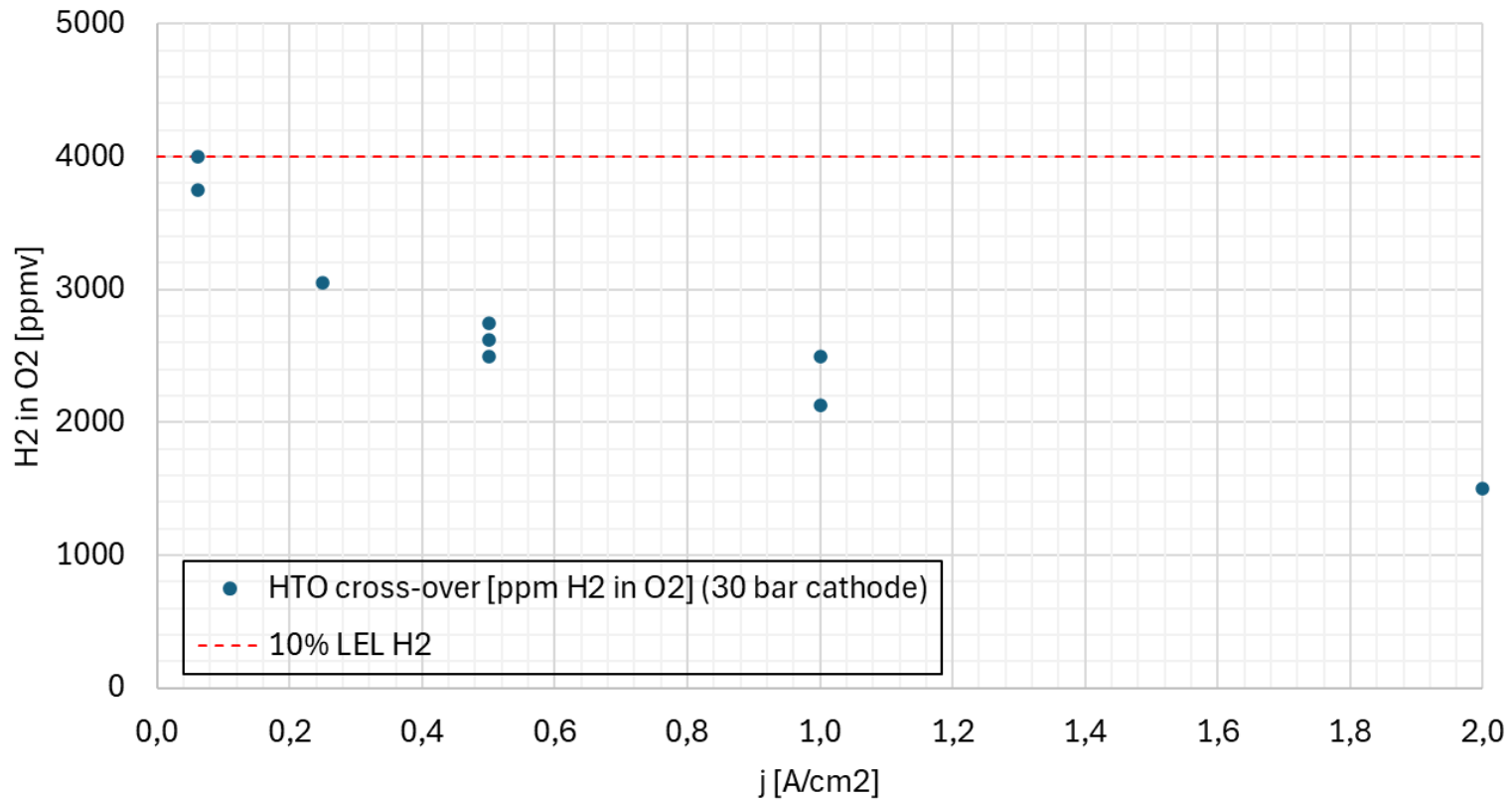
- Operational flexibility → load follows renewables



Source: [ACER 2024 MMR Market Integration.pdf](#)

Your success counts

- **Safety in Operational flexibility**





- **Technology with the lowest cross-over (HTO)**
 - **Also at low current densities (loads), (0,0625 A/cm²)**

Enables:

- **Safety**
 - **Operational flexibility → load follows renewables**
-
- **Compact footprint**



- **Internship vacancies from February 2025**
 - Chemical/Process/Mechanical engineering for Hydrogen Systems Development
 - Focus on P&ID/mechanical design
 - Design control loops
 - Gain hands-on experience with pilot scale PEM electrolyser
 - Hydrogen sensor development assignment
 - Learn about the innovative speed of sound detection principle
 - Response time testing
 - Performance testing up to 50% LEL H₂
 - Performance testing with oxygen depletion/enriched mixtures

Your success counts



Hydrogen Systems

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