NEWSLETTER No. 8

on hydrogen production

December 2025

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PEACE

1. Editorial

Welcome to the latest edition of the PEACE project newsletter! In this issue, we share key developments from our project, including new deliverables and reports on **safe and reliable operation** of our electrolyser technology and **test protocols for dual-stage alkaline electrolysis systems**. We also highlight the **5th PEACE Project Meeting** where we discussed our projects latest achievements and planned the next steps focused on assembling, testing, and operating our PEACE technology demonstrator. This issue also looks deeper to our ongoing **networking activities** with fellow hydrogen research initiatives.

Beyond the project, we cover important sector news, including updates from the **Hydrogen Bank auctions** and the **Innovation Fund**. Finally, we look ahead to hydrogen events in 2026, including **Hydrogen Days** in Prague where the PEACE project will be actively present.

This issue reflects the vibrancy of the hydrogen sector and the growing impact of collaborative research. We hope it inspires you to engage, learn, and connect as we continue advancing green hydrogen solutions together.

Finally, let me wish you a peaceful holiday season!

Dr. Fatemeh Razmjooei, PEACE project coordinator
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PEACE project website

2. About PEACE

“Pressurized Efficient Alkaline EleCtrolysEr” (PEACE) project is a research and innovation activity funded under the EU Horizon Europe programme by the Clean Hydrogen Partnership and coordinated by the German Aerospace Center (DLR). The PEACE project will deliver **high-pressure alkaline electrolysis** (AEL) technology which will substantially **reduce hydrogen production costs**. We will propose a new concept of hydrogen production with **two-stage pressurization** that will be demonstrated on an AEL system of 50 kW capable of operating at pressures exceeding 50 bar. The integration of advanced components, innovative design, and optimized operation strategies will be explored through modelling and experimental testing, ultimately aiming to demonstrate a system with impressive efficiency characteristics (see more on PEACE website).

Project members: German Aerospace Center (DLR); Materials Mates Italia (MMI); Eindhoven University of Technology (TU/e); Brandenburgische Technische Universität Cottbus Senftenberg (BTU); GRANT Garant (GG); The Hydrogen Chemistry Company (HyCC); Technical University of Denmark (DTU)

Figure 1: PEACE Project Team (Sept. 2025), Source: PEACE project (CC-BY-NC-ND 4.0)

2.1 A NEW DELIVERABLE TO ENSURE SAFE AND RELIABLE OPERATION OF THE PEACE PROJECT ELECTROLYSER TECHNOLOGY

The PEACE project member **Materials Mates Italia (MMI)** has recently submitted a report (deliverable) **D4.3: HAZOP and FMEA Analysis**, dedicated to ensuring the safe and reliable operation of the project's Proof of Concept (PoC) electrolyser system.

Two well-established industrial risk-assessment methodologies—**HAZOP (Hazard and Operability Study) and FMEA (Failure Mode and Effects Analysis)**— were applied to identify, classify, and address potential failures in both the **stack** and the **balance of plant (BoP)** components of the demonstrator system. The PEACE system has been examined from different perspectives to understand and evaluate safety and reliability considerations. The analyses prepared the way for the PEACE demonstrator system to apply for the safety approval of TÜV (Technical Inspection Association).

What's Inside the Analysis?

- **HAZOP Assessment:**

A top-down, qualitative method used to identify operational hazards and deviations from design parameters. The study was conducted node-by-node across the BoP, covering physical (see examles of risks assessment for parts of water circulation system in Fig. 2), chemical, electrical, and control-related risks.

This method is particularly well-suited for complex process systems and supports the identification of corrective measures to enhance operational safety.

- **FMEA Assessment:**

A bottom-up, component-focused analysis applied to the PoC stack. By evaluating each possible failure mode based on Severity, Occurrence, and Detection, the team calculated a Risk Priority Number (RPN) to prioritise actions where they are most needed.

This structured, quantitative method supports improved reliability, availability, and maintainability.

#	System	Part	Failure Description		Hazard Description	Risk before Mitigation Measures: Severity	Risk before Mitigation Measures: Likelihood	Risk before Mitigation Measures: Risk Hazard Index	Risk Elimination or Mitigation Measures	Risk After Mitigation Measures: Severity	Risk After Mitigation Measures: Likelihood	Risk After Mitigation Measures: Risk Hazard Index
1	WATER CIRCULATION	circulation pump	pumping failure	high flow	overtemperature	II	C	6	control of flow sensor value	III	C	11
2					overpressure	II	C	6	control of flow sensor value	III	C	11
3				low flow	stack integrity	II	C	6	control of flow sensor value	III	C	11
4				no flow	stack integrity	II	C	6	control of flow sensor value	III	C	11
5			pumping reduced	high flow	overtemperature	III	C	11	control of flow sensor value	IV	C	18
6					overpressure	III	C	11	control of flow sensor value	IV	C	18
7				low flow	stack integrity	III	C	11	control of flow sensor value	IV	C	18
8			flow meter wrong measurement	high flow	overtemperature	II	D	10	control of sensor value respect to a reference value	III	D	14
9					overpressure	II	D	10	control of sensor value respect to a reference value	III	D	14
10				low flow	stack integrity	II	D	10	control of sensor value respect to a reference value	III	D	14
11		electrical heater	electrical heater failure		overtemperature	II	C	6	control of temperature sensor value	III	C	11
12					overpressure	II	C	6	control of temperature sensor value	III	C	11
13					stack integrity	II	C	6	control of temperature sensor value	III	C	11
14			electrical heater reduced		overtemperature	III	C	11	control of temperature sensor value	IV	C	18
15					overpressure	III	C	11	control of temperature sensor value	IV	C	18
16					stack integrity	III	C	11	control of temperature sensor value	IV	C	18
17			temperature sensor wrong measurement		overtemperature	II	D	10	control of sensor value respect to a reference value	III	D	14
18					overpressure	II	D	10	control of sensor value respect to a reference value	III	D	14
19					stack integrity	II	D	10	control of sensor value respect to a reference value	III	D	14

Figure 2: HAZOP: Physical failure analysis (circulation pump & electrical heater parts), Source: MMI (CC BY-NC-ND 4.0)

The study confirms that **HAZOP is well-aligned with the BoP process characteristics**, while **FMEA provides the right level of detail for stack components**. Together, they form a comprehensive framework for risk evaluation across the entire system.

The report marks an important step toward ensuring that the PoC electrolyser system developed in the PEACE project meets the highest safety and reliability standards. As a living document, the analysis will continue to evolve alongside system operation.

2.2 NEW PEACE PROJECT REPORT: DEFINITION OF TEST PROTOCOLS FOR DUAL-STAGE ALKALINE ELECTROLYSIS SYSTEM

As the PEACE project is getting closer to assembly of its high-pressure alkaline electrolysis system, **Brandenburg University of Technology Cottbus - Senftenberg (BTU)**, hosting the PEACE AEL system, submitted a report (deliverable) defining a harmonised and robust testing framework for the project's demonstrator. These protocols ensure that system performance, responsiveness, and durability are evaluated in line with EU-harmonised testing procedures for low-temperature water electrolysers.

What the Test Protocols Cover

The document outlines a complete methodology for assessing the electrolyser's operational capabilities, including:

- **Operating state identification**, such as
  - system power range
  - response time
  - time at maximum power
  - cold start and stand-by start-up times

- **Performance testing**, focusing on two key indicators:
  - Polarization curve (I-V curve) to assess stack performance across current densities
  - Gas purity (H_2 and O_2), which influences system efficiency and safe operation

- **Durability assessment**, evaluating long-term behaviour over continuous or near-continuous testing for up to 500 hours.

By defining clear, reproducible testing procedures and measurement points, the deliverable ensures that PEACE's Proof of Concept (demonstrator) is validated under consistent, high-quality conditions.

2.3 5th PEACE PROJECT MEETING: IN FULL SWING

At the end of September 2025, the PEACE project held its fifth all-hands meeting, kindly hosted by the **Eindhoven University of Technology** (TU/e). The consortium gathered to assess progress in advancing highly pressurized alkaline electrolysis (AEL) technology.

Figure 3: PEACE project meeting in Eindhoven (Sept. 2025), Source: PEACE project (CC BY-NC-ND 4.0)

With the project entering its final quarter, all work packages are in full swing, and major milestones are just ahead. By the end of summer 2025, the project had already achieved **several key research targets**:

(1) Pressurized cell qualifications,
(2) Design and production of stack components for high-pressure AEL operation,
(3) Short stack assembly,
(4) BTU AEL test site readiness to accommodate the short stack into its pressure vessel

These achievements were thoroughly discussed, and the next steps carefully planned, as short-stack testing will soon pave the way for the full demonstration of the PEACE technology on a 50 kW alkaline electrolysis system capable of handling pressures above 50 bar, expected by the end of this year.

he meeting was opened by the Coordinator, **Dr. Fatemeh Razmjooei** from the **Institute of Engineering Thermodynamics at German Aerospace Center (DLR)**, who summarised the project's main achievements.

To date, PEACE has delivered twenty reports to the **[Clean Hydrogen Partnership](#)** (the granting authority), successfully completed its mid-term reporting, and is now focused on assembling, testing, and operating its technology demonstrator.

Work Package 2 – Electrochemical and Gas Purity Tests

The TU/e and DLR teams presented the latest findings on electrochemical and gas purity testing under pressurized conditions. The project reached to the goal of 1 A cm^{-2} below 1.8 V with the large cell under pressurized conditions.

Work Package 3 – Stack Development

Materials Mates Italia (MMI) produced and assembled a three-cell short stack using previously qualified stack components within PEACE, consisting of: Plastic parts (separator body & gasket press), Metal parts (bipolar plates & current collector plates), Elastic element, Cell components, Sealings and Endplates.

The short stack underwent leak and pressure tests to verify mechanical standing and gasket performance. After some adjustments, the stack is to be shipped to the Brandenburg University of Technology Cottbus - Senftenberg (BTU), where it will be mounted into a pressure vessel for high-pressure testing.

Work Package 4 – AEL test site preparation and test protocols

Meanwhile, the BTU team has been preparing its AEL test site to accommodate both the short stack and later the full demonstrator into its pressure vessel. Key Balance of Plant modifications were implemented, and safety approval from TÜV (Technical Inspection Association) is being pursued.

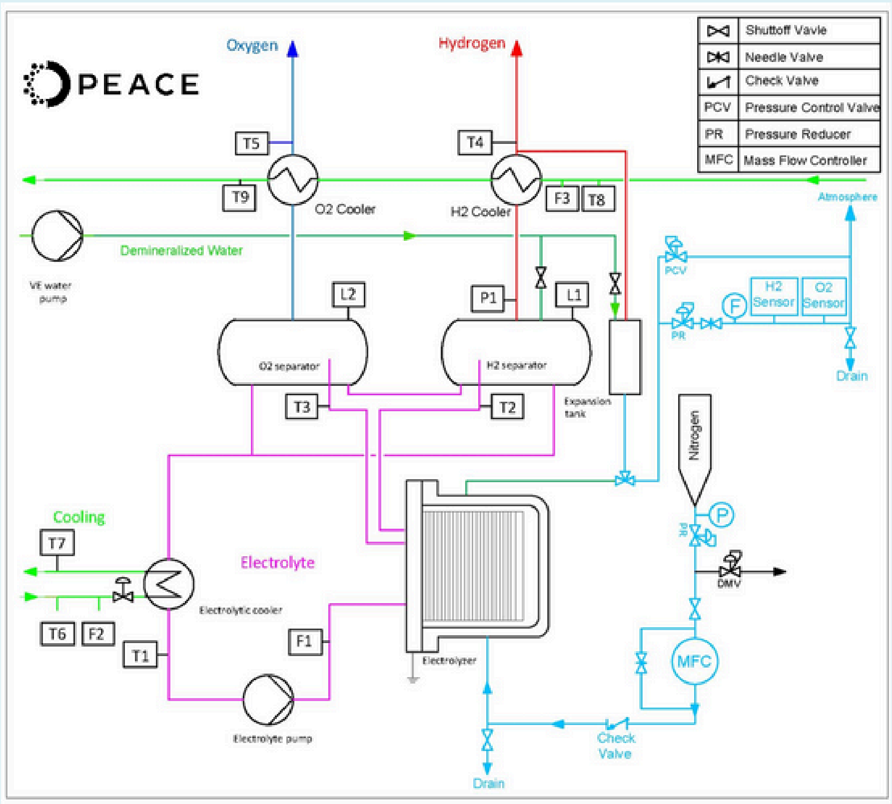

Figure 4: Simplified Piping and Instrumentation diagram (P&ID) of the PEACE demonstrator at BTU, Source: BTU (CC BY-NC-ND 4.0)

BTU also defined **test protocols** for the dual-stage alkaline electrolysis system, aligning with EU-harmonised testing protocols for low-temperature water electrolysers (see more in Section 2.2). The system's performance will be tested under varying temperature and pressure conditions, and durability will be evaluated over up to 500 hours of (nearly) continuous operation, tracking voltage increase rates as an indicator of system stability.

Work Package 5 – Modelling and System Integration

The DLR team presented updates from the **TEMPEST** modelling framework, which now includes gas crossover parameters. Transient simulations have been performed to study gas purity and stack temperature dynamics.

HyCC and DLR are working on process system **design for integrating the PEACE high-pressure AEL system into industrial settings with downstream processes**. Three scenarios are being simulated: I) ammonia plant, II) methanol plant, III) hydrogen fuelling station.

The design models will be coupled with Renewable Energy Sources (RES) to simulate how the PEACE hydrogen production process might operate using renewable electricity.

Work Package 6 – Environmental Assessment and Communication

The Technical University of Denmark (DTU) presented its **life cycle assessment (LCA) methodology** to quantify the environmental impacts of the PEACE technology. A comprehensive life-cycle inventory dataset is being prepared for the PEACE high-pressure AEL process together with a reference data collection. The functional unit has been set to 1kg H_2 (99.5 % pure, 80 bar, 80°C), with results scaled to industrial plant level.

Meanwhile, GRANT Garant, continues to ensure active communication and dissemination, maintain a steady outreach through the PEACE website, X and LinkedIn channels, with strong audience engagement. Both the dissemination and exploitation plans were reviewed and strengthened to maximise project impact.

The day, filled with discussions, brainstorming and knowledge exchange, concluded with guided visit to TU/e's electrochemical laboratory: their pressurised single cell test rig was on display...

2.4 CONNECTING HYDROGEN RESEARCH: PEACE PROJECT NETWORKING IN ACTION

Networking between research and innovation projects can be highly beneficial, fostering collaboration, sharing resources, and driving innovation. To accelerate knowledge exchange in the fast-evolving hydrogen domain and to maximise the impact of our project, the PEACE consortium identified several **R&I projects with synergies in hydrogen research.**

Building on these connections, the PEACE project launched a set of **networking actions** focused on communication, cross-promotion, and results dissemination. One of the key outcomes was the PEACE project workshop held in February 2025, which brought together several hydrogen research initiatives (see more in Newsletter #6). The event showcased discussions on sustainable and cost-effective hydrogen production across different electrolysis technologies.

Our efforts to share hydrogen knowledge have continued since then. **Cross-promotion and social media engagement** with our networking partners are now a regular part of the PEACE communication strategy. In addition, a new networking session is currently being prepared to feature in the agenda of the next PEACE all-hands meeting in February 2026.

Since 2023, the PEACE project has proudly collaborated with the hydrogen projects listed below to support mutual visibility and knowledge exchange:

CLEAN HYPRO	**CLEANHYPRO** - Open Innovation Test Bed for Electrolysis Materials for Clean Hydrogen Production, Horizon Europe project, Coordinator: FUNDACION TECNALIA RESEARCH & INNOVATION (ES), DOI: 10.3030/101091777
HYPRAEL	**HYPRAEL** - Advanced alkaline electrolysis technology for pressurised H2 production with potential for near-zero energy loss, Horizon Europe project, Coordinator: FUNDACION PARA EL DESARROLLO DE LAS NUEVAS TECNOLOGIAS DEL HIDROGENO EN ARAGON (ES), DOI: 10.3030/101101452
Aemelia *Green Hydrogen for the future*	**AEMELIA** - Anionic Exchange Membrane water ELectrolysis for highLY efficIenTcy sustAinable, and clean Hydrogen production, Horizon Europe project, Coordinator: COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES (FR), DOI: 10.3030/101137912
NAUTILUS	**NAUTILUS** - Nautical Integrated Hybrid Energy System for Long-haul Cruise Ships, Horizon 2020 project, Coordinator: DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV (DE), DOI: 10.3030/861647

3. Hydrogen News

3.1. SECOND HYDROGEN BANK AUCTION: PARTIAL BUDGET REDIRECTION TO RESERVE LIST PROJECTS

Following the Second European Hydrogen Bank auction for renewable hydrogen production, **7 of the 15 initially selected projects dropped out** before signing their grant agreements, indicating an immature status of their proposed bids or insufficient level of financial support offered.

The released budget has now been redirected to projects on the reserve list, with 10 projects invited in order of their price bid ranking. The final list of funded projects is expected by the end of 2025. Meanwhile, the third Hydrogen Bank auction has just been opened (see Section 5).

Source of the news

3.2 EU TO INVEST €2.9 BILLION IN 61 BREAKTHROUGH NET-ZERO TECHNOLOGY PROJECTS

In November 2025, the European Commission announced **€2.9 billion in funding** for **61 breakthrough net-zero technology projects**, selected from the 2024 Innovation Fund Net-Zero Technologies call (IF24), financed through the EU Emissions Trading System (EU ETS). The IF24 call received 359 applications in total, requesting over nine times the available budget.

The selected projects aim to strengthen Europe's technological leadership while accelerating the deployment of innovative decarbonisation solutions. The projects cover **19 sectors in 18 countries**, including energy-intensive industries, renewable energy and storage, net-zero mobility and buildings, cleantech manufacturing and industrial carbon management. They are expected to reduce **221 million tonnes of CO_2 equivalent** in their first decade of operation.

The next 2025 Innovation Fund call (IF25) has just been opened in early **December 2025** (see Section 5).

Source of the news

4. Hydrogen Events

Hydrogen Days 2026, 11-13 March, 2026, Prague (CZ)

The 16th edition of international conference on hydrogen technologies, titled "Hydrogen at the Crossroads – Courage to Continue", will explore current challenges such as regulatory complexity and high costs, while highlighting progress in electrolyser deployment, pilot projects and emerging policies. Registration is still open. **Don´t miss the chance to meet the PEACE project team at the event - more details coming soon!**

Event link

World Hydrogen Summit & Exhibition, 19-21 May, 2026, Rotterdam (NL)

One of the world's largest hydrogen events is back, attracting around 15,000 attendees. With large exhibition and over 300 speakers at the summit, the event is a premier opportunity to explore hydrogen projects, policies, and technologies, and to connect with key industry and research players.

Event link

5. Hydrogen Project Funding Opportunities

INNOVATION FUND 2025 Net Zero Technologies – General Decarbonisation

A freshly opened IF 2025 call to support and advance innovative low-carbon technologies and processes to mitigate climate change in sectors listed in Annex I and Annex III to the ETS Directive 2003/87, including projects focusing on the utilization of waste heat and improvements in electrification and energy efficiency within industrial processes and energy systems; activities involving environmentally safe carbon capture and utilisation (CCU); development of products that substitute carbon-intensive ones produced in sectors listed in Annex I to the ETS Directive.

The call involves projects of different scale:

- Large-scale projects (INNOVFUND-2025-NZT-GENERAL-LSP) – with capital expenditure above EUR 100 000 000
- Medium-scale projects (INNOVFUND-2025-NZT-GENERAL-MSP) – with capital expenditure above EUR 20 000 000 and up to EUR 100 000 000
- Small-scale projects (INNOVFUND-2025-NZT-GENERAL-SSP) – with capital expenditure above EUR 2 500 000 and up to EUR 20 000 000

Submission deadline: 23 April, 2026

INNOVATION FUND 2025 Net Zero Technologies – Clean-tech Manufacturing

This topic of the IF 2025 call will support projects for manufacturing innovative clean-tech components for hydrogen production/consumption (e.g., electrolysers, fuel cells), renewable energy (e.g., components for photovoltaics, concentrated solar power, onshore and offshore wind power) and energy storage (batteries etc.). Available budget for this topic (INNOVFUND-2025-NZT-CLEAN-TECH-MANUFACTURING) is EUR 1 000 000 000.

Submission deadline: 23 April, 2026

INNOVATION FUND 2025 Net Zero Technologies – Pilot Projects

Highly innovative, disruptive or breakthrough technologies enabling deep decarbonisation needed for achieving climate neutrality are aims of this topic. Portfolio of supported activities is wide, including sectors listed in Annex I and Annex III to the ETS Directive 2003/87, construction and operation of innovative energy storage systems, CO2 storage, or renewable energy installations. The maximum amount of IF grant for an individual project is limited to EUR 40 million.

Submission deadline: 23 April, 2026

INNOVATION FUND 2025 Fixed Premium Auction Call 2025

The third European Hydrogen Bank auction, backed by a €1.3 billion EU budget plus national contributions, totaling around €3 billion, has been launched to fund renewable and low-carbon hydrogen production (e.g., nuclear-powered electrolysis). The competitive auction aims to close the cost gap for producers by awarding support based on the lowest bid (€/kg of H_2), covering specific topics:

- RFNBO hydrogen production (INNOVFUND-2025-AUC-H2-RFNBO-GENERAL) to support the production of renewable fuel of nonbiological origin (RFNBO) hydrogen in Europe from new, additional installed capacities
- RFNBO and/or electrolytic low-carbon hydrogen production (INNOVFUND-2025-AUC-H2-RFNBOLOWCARB-GENERAL) to support the production of RFNBO and electrolytic low-carbon hydrogen in Europe
- RFNBO and/or electrolytic low-carbon hydrogen production for the maritime and aviation sectors (INNOVFUND-2025-AUC-H2-RFNBOLOWCARB-MAR-AVI) to support the production of RFNBO and electrolytic low-carbon hydrogen in Europe from new, additional installed capacity that will be used by stakeholders in the maritime or in the aviation sector.

Submission deadline: 19 February, 2026

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“Pressurized Efficient Alkaline EleCtrolysEr“ (PEACE)
is a research and innovation project funded under the EU **Horizon Europe programme** by the **Clean Hydrogen Partnership.**

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HyCC

GRANT GARANT

DTU

Clean Hydrogen Partnership

The project is supported by the Clean Hydrogen Partnership and its members.

Co-funded by the European Union