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NEWSLETTER #4  
From September to December 2025



Funded by the European Commission, DECODE is a collaborative project that strives to develop and showcase the first decentralised cloud-based platform in the sustainable energy technology field. It connects laboratories across Europe (and in Canada) and aligns their efforts to achieve a drastic acceleration in the way materials for sustainable energy technology are designed and integrated.

### Latest DECODE project updates!

#### Consortium Meeting #4

In November 2025, the DECODE consortium convened in beautiful Grenoble, France, for its fourth meeting. Partners shared impressive progress in all different areas of activity, from advancing modeling and characterization methods and developing next-generation descriptors for electrochemical systems to the development of scale-crossing and multimodal workflows and tools for workflow orchestration. The integrated DECODE software-hardware platform is quickly taking shape and will soon be demonstrated for a first use case, targeting optimization of the ionomer-loading in polymer electrolyte fuel cells.



In a dedicated session, the DECODE Advisory Board shared valuable insights to maximize our scientific impact and keep our activities closely aligned with forays in industry. The positive feedback by the AB affirmed us in our mission to accelerate the development of technologies for a sustainable energy transition.



[Read more](#)

#### Congratulations to Bosch on winning German future prize 2025!

It is our distinct privilege to congratulate our partner **Bosch Hydrogen Energy** for winning the prestigious **German Future Prize 2025** for their groundbreaking **Fuel Cell Powertrain System**! This innovation marks a major step toward climate-neutral mobility, enabling heavy-duty vehicles to operate CO<sub>2</sub>-free with impressive robustness, short refueling times, and ranges of up to 1,000 km per tank.

As partners in DECODE, we are committed to contributing to future successes of the industry by developing methods that drastically reduce the time and effort required for future fuel cell generations to reach technological maturity.

[Learn more](#)

### Work in progress!

#### WP2: Linking materials insights to device performance

Now already approaching its completion, WP2, led by the **Paul Scherrer Institute** (Switzerland) connects insights on the local reaction environment and the distribution in electrocatalytic media (as generated in WP1) with device-level metrics. This will enable novel correlative analytics and the identification of optimal multiparametric descriptors. This work package also focuses on harmonising lab testing practices and applying multiscale, multimodal characterisation to explore the relationships between structure, properties, activity, and stability.

In a coordinated effort, a multitude of characterisation methods were applied to a PFSA based polymer electrolyte fuel cell catalyst layer variation study, in order to verify the knowledge graph of WP1 and create a holistic dataset that can be used for parameterisation and validation of the modelling methods. Having 39 methods contributing 182 datasets was a great achievement. The knowledge gained from this joint effort will be used to finetune the DECODE platform and address some limitations in the tool chains, thereby increasing the connectivity between the different modelling and experimental methods.

#### WP3: building the DECODE cloud platform

Launched in December 2024 and led by **Forschungszentrum Jülich (JET-3)**, WP3 focuses on developing the core modules of the DECODE platform. Running until February 2027, it includes the implementation of a central processing unit (CPU) and the development of advanced finetuning methods to retrain models embedded in the DECODE FOUNDRY.

In the past year, this work package has been developing and testing a recommendation system using advanced deep learning models. This module can suggest the most relevant modeling and experimental methods for a given use-case. The goal is to build an intelligent system that can understand complex criteria provided by users and return tailored toolchains of methods, along with an evaluation of how ready and suitable they are for integration. DECODE is building AI agents and agentic workflow to connect and execute the recommendation capabilities across methods, tools, and databases within DECODE platform. The first agent, DECODE Foundry is already validated and will be launched in Q1 2026. This agent plays the central role as a materials science for creating and validating workflows. It uses a pre-built and semantically searchable knowledge graph (created with GraphRAG) to explore and identify relevant modeling and experimental methods based on the user's entered use-case. All interactions between agents are coordinated through a short-term memory system, which stores intermediate results and ensures that each agent has access to the necessary context. This system will continue to evolve through iterative improvements to its logic, memory structure, and agent communication as project progresses and use cases are executed.

#### WP4 progress: demonstrating DECODE in real use cases

June 2025 saw the launch of WP4, which focuses on showcasing the DECODE platform through use-case studies. Led by **Forschungszentrum Jülich**, it includes a well-established baseline case (PEFC) with extensive data, used to demonstrate efficiency gains in technology optimisation. Insights from this case will be transferred to exploratory cases (PEWE, AEWE, AEFC), which are less mature and data-rich, to highlight DECODE's potential in accelerating technological development.

Focusing on execution of various DECODE use cases, this work package aims to demonstrate the effectiveness of the DECODE platform in connecting and orchestrating experimental and modeling methods across multiple partner labs. Success is defined by meeting predefined key performance indicators (KPI) and by quantifying the efficiency gains of the platform-enabled approach compared with a conventional, manual and experiment-driven workflow. This work package is fully operational in Q1 2026. Started in December 2025 and as part of the activities within T4.1, this WP has been focusing on validating the DECODE platform's ability to manage cloud-connected data workflows in an industry-grade environment; with the objective to demonstrate seamless data exchange between partner laboratories and the DECODE platform while ensuring compliance with IT security requirements and multi-level data confidentiality.

### News highlights

#### New EU Hydrogen Bank Auction & net-zero tech funding

On December 8, 2025, the **European Commission** announced new funding that could bring over **€6 billion** to the hydrogen sector and wider clean energy technologies. Firstly, the EC unlocked €1.3 billion for the third **European Hydrogen Bank** (EHB) auction, a financing instrument to accelerate the establishment of a full hydrogen value chain in Europe. National top-ups (Germany €1.3 billion, Spain €415 million) bring the total potential funding close to €3 billion. Secondly, €2.9 billion for net-zero technologies call, including hydrogen production, manufacturing of renewable energy components, and decarbonisation projects, are dedicated under the **Innovation Fund** (IF25). This will accelerate hydrogen production and clean-tech innovation across Europe.

#### A breakthrough in electrolyser technology paves the way for lower-cost green hydrogen

**Researchers at the University of California, Berkeley** have redesigned membrane electrolyser electrodes to dramatically reduce degradation, offering the potential for **5-10x longer lifetimes** for PEM electrolysers. This breakthrough significantly enhances the durability and cost-effectiveness of green hydrogen production. By limiting electrode wear and extending system lifetime, the new design could **substantially lower overall costs** and strengthen the commercial viability of large-scale renewable-powered electrolysis, accelerating the deployment of clean hydrogen for industrial use and energy storage.

#### AI-driven electrolyser monitoring for green hydrogen goes commercial

In October 2025, Pulsenics and Endua launched the **world-first AI-powered electrochemical impedance spectroscopy system for green hydrogen electrolysers**, enabling real-time optimization and longer asset life.

[Learn more](#)

### Upcoming events

Our consortium partners frequently participate in local, national and international events and conferences, promoting our DECODE project results. Take a look at this list of upcoming events and join us!

**2026 AI for Materials, Energy, and Chemical Sciences GRC**  
1-6 February 2026  
Galveston, Texas, US

[Join us](#)

**GCMAC Final Conference**  
4-5 March 2026  
Forschungszentrum Jülich, Germany

[Join us](#)

**Workshop on Platinum Group Metal and Platinum Group Metal-free Electrocatalysts**  
9-13 March 2026  
Telluride, CO, USA

[Join us](#)

**ModVal 2026**  
10-11 March 2026  
Lausanne, Switzerland

[Join us](#)

**Ecatalytix II**  
8-10 April 2026  
Strasbourg, France

[Join us](#)

**854 WE-Heraeus-Seminar**  
3-6 May 2026  
Berlin, Germany

[Join us](#)

**FDFC 2026**  
5-7 May 2026  
Montpellier, France

[Join us](#)

**Future Labs Live Basel 2026**  
27-28 May 2026  
Basel, Switzerland

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**2026 GRC on Fuel Cells**  
26-31 July 2026  
Southern New Hampshire University, USA

[Join us](#)



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