World’s Largest SOEC Electrolyzer Started up at Neste’s Rotterdam Refinery

Dresden / Rotterdam, October 06, 2025 – The pioneering MultiPLHY project demonstrating renewable hydrogen production has reached a key milestone: The consortium partners have successfully started up the world’s largest multi-megawatt high-temperature electrolyzer (HTE) in an industrial environment at Neste’s renewable products refinery in Rotterdam, the Netherlands.

The pilot project demonstrates the viability of renewable hydrogen in reducing the use of fossil hydrogen in the refining industry. Replacing hydrogen produced from fossil raw materials with renewable hydrogen is one of the key means to lower greenhouse gas emissions in refining. As a next step in the demonstration project, a test program will validate the technology's performance characteristics.

MultiPLHY is a demonstration project with consortium partners Neste, Sunfire, CEA, and ENGIE. The high-temperature electrolyzer is provided by the German electrolyzer manufacturer Sunfire and the hydrogen processing unit (HPU) by SMS group. Neste is responsible for the refinery integration and together with Sunfire oversees the operation of the unit. The research and technology organization CEA coordinates the project and ENGIE is in charge of techno-economic assessment.

> *"The MultiPLHY project has given Neste valuable insights and experience in integrating industrial-scale renewable hydrogen production into our refinery. We remain committed to exploring different pathways to replace fossil-based hydrogen in our refining processes to reduce greenhouse gas emissions in our own operations. This demonstration project also shows the importance of cooperation across the whole value chain," says* ***Jukka Kanerva, Senior Vice President, Renewable Refining at Neste.***

The electrolyzer integrated into Neste's refinery processes is based on the SOEC (Solid Oxide Electrolysis Cell) technology by Sunfire. It consists of twelve electrolysis modules, which together make up the world's largest high-temperature electrolyzer (2.6 MW) installed in an industrial environment. The system operates at high temperatures of 850 °C and produces more than 60 kg of renewable hydrogen per hour. Due to the utilization of heat, the high-temperature electrolyzer requires significantly less electricity to produce renewable hydrogen compared to other solutions on the market, leading therefore to a much higher efficiency of up to 84% $_{LHV,AC}$ [1].

> *"Thanks to their unrivaled efficiency, our high-temperature SOEC electrolyzers will be the preferred solution in many applications where waste heat is available. The MultiPLHY*

> *project demonstrates that the innovative technology can be integrated into industrial environments at a large scale. We are proud of this big milestone," underlines* ***Nils Aldag, CEO of Sunfire****.*

> *"High-temperature electrolysis has the potential to make renewable hydrogen more affordable while increasing the global energy efficiency of various industrial processes. The construction and commissioning achieved by Sunfire and Neste is a tremendous achievement and a big step in making green hydrogen competitive," says* ***Pierre Olivier, Head of Hydrogen Lab from ENGIE.***

> *"We are thrilled to witness the successful operation of the high-temperature electrolyzer at Neste's refinery in Rotterdam. This installation is the largest of its kind in an industrial environment and represents a significant milestone for both the technology and the clean hydrogen sector. I would like to congratulate all the project partners for making this project a reality and advancing the European electrolyzer industry as a whole," says* ***Mirela Atanasiu, Head of Unit Operations and Communication, Clean Hydrogen Partnership.***

[1] Electrical efficiency of 84 $\%_{LHV,AC}$ proven in EU-funded GrInHy2.0 project in 2022 with 1st generation of Sunfire's SOEC electrolyzers. Expected efficiency of 89$\%_{LHV,AC}$ of the 3rd generation of Sunfire's SOEC electrolyzers.

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under grant agreement No 875123. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research.

Read more about the MultiPLHY project: https://multiplhy-project.eu/

About Sunfire

Sunfire is a global leader in the production of industrial electrolyzers based on pressurized alkaline and solid oxide (SOEC) technologies. With its electrolysis solutions, Sunfire is addressing a key challenge of today's energy system: Providing renewable hydrogen and syngas as climate-neutral substitutes for fossil energy. Sunfire's innovative and proven electrolysis technology enables the transformation of carbon-intensive industries that are currently dependent on fossil-based oil, gas, or coal. The company employs more than 650 people located in Germany and Switzerland. For more information visit http://www.sunfire.de/

About Neste

Neste (NESTE, Nasdaq Helsinki) creates solutions for mitigating climate change and accelerating a shift to a circular economy. The company is the world's leading producer of sustainable aviation fuel (SAF) and renewable diesel, enabling its customers to reduce their greenhouse gas emissions. Neste refines waste, residues and other renewable raw materials to high-quality renewable fuels at its refineries located on three continents. The company's annual renewable fuels production capacity will be increased to 6.8 million tons in 2027.

Neste has high standards for sustainability and the company has consistently been recognized by several leading sustainability indices. In 2024, Neste's revenue stood at EUR 20.6 billion. Read more: neste.com

About CEA

The CEA is a French public research organization, working in four main areas: energy transition (nuclear and renewable), digital transformation for industry, future health technologies, defense and security. Based on an excellent fundamental research, the CEA participates in the organization of cooperation projects with a wide range of academic and industrial partners. It also carries out sovereign missions, entrusted by the French State. The CEA is the only French research organization in the Top 100 of the innovation players in the world, according to the Clarivate ranking (2018) and the leading research organization filing patents in France and Europe.

With its 20,000 employees and its research centers with impressive infrastructures, the CEA is a major player in European research and is strengthening its international presence where it supports the deployment of French innovative companies. Its Institute CEA-Liten, employing 1000 people, is fully dedicated to the activities on new technologies for renewable energy and energy efficiency. It is involved in various national and EU research and demonstration projects related to high temperature electrolysers and/or fuel cells (SOEC/SOFC) and their integration on the electric system in presence of large renewable energy sources. Further information at www.liten.cea.fr

About ENGIE

ENGIE is a global reference in low-carbon energy and services. With its 97,000 employees, its customers, partners and stakeholders, the Group is committed to accelerating the transition towards a carbon-neutral world, through reduced energy consumption and more environmentally-friendly solutions.

With several green and low-carbon hydrogen projects worldwide, ENGIE aims to support its customers from industry and heavy and intensive mobility in achieving their carbon neutrality objectives. Our presence along the entire hydrogen value chain (from production to distribution, through storage and transportation) allows us to offer a wide range of scalable and replicable solutions.

About Sunfire

Sunfire is a global leader in the manufacture of industrial electrolysers based on pressurized alkali (AEL) and solid oxide electrolysis (SOEC) technologies. With its electrolysis solutions, Sunfire addresses one of the key challenges facing today’s energy system: the provision of green hydrogen as climate-neutral substitutes for fossil fuels. Sunfire’s innovative and proven electrolysis technology enables the transformation of carbon-intensive industries that currently rely on fossil fuels such as oil, gas, or coal. The company employs more than 700 people in Germany.

For more information, visit www.sunfire.de

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