Joint press release

Berlin, October 13, 2023

Press release by Siemens Energy, ENGIE, and Centrax

HYFLEXPOWER consortium successfully operates a gas turbine with 100 percent renewable hydrogen, a world first

Latest successful series of tests offer a decisive outlook for carbon-neutral power generation and the decarbonization of industry.

Installed on the site of Smurfit Kappa, world leader in paper packaging, at Saillat-sur-Vienne in France, the HYFLEXPOWER project consists in producing, storing and re-electrification of 100 percent renewable hydrogen. The hydrogen is produced by an 1MW electrolyzer on-site, and then stored in an almost one-ton tank and used to power a Siemens Energy SGT-400 industrial gas turbine.

The HYFLEXPOWER project demonstrates that hydrogen can be used as a flexible energy storage medium, and that it's also possible to convert an existing gas-fired power turbine to operate using renewable hydrogen. It is thus a real driver for accelerating the decarbonization of energy-intensive industries.

In 2022, an initial series of tests enabled the industrial gas turbine to operate with a 30 percent hydrogen content, mixed with natural gas. Now the power-to-hydrogen-to-power demonstrator has proven that state-of-the-art turbines with dry low emissions technology can be fueled with up to 100 percent hydrogen as well as with natural gas and any blends in between.

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From demonstrator to market

The HYFLEXPOWER consortium includes Siemens Energy, ENGIE via its subsidiary ENGIE Solutions, Centrax, Arttic, the German Aerospace Center (DLR), and four European universities.

Building on the promise of the HYFLEXPOWER demonstrator, it is planned to expand the consortium to include additional members. Having tested HYFLEXPOWER for electricity production, the goal is now to extend its operation to industrial heat production and additional operational modes. It is also planned to explore ways of scaling up and commercializing decarbonized electricity generation.

Exemplary multi-partner project supported by the European Commission

HYFLEXPOWER has received substantial funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation.*

As the consortium lead, Siemens Energy supplied the electrolyzer for hydrogen production and developed the hydrogen gas turbine. ENGIE built the hydrogen production, storage and supply for the demonstrator. Centrax were responsible for the package upgrade to ensure safe operation with hydrogen fuel. The German Aerospace Center (DLR) and the Universities of Lund (Sweden), Duisburg-Essen (Germany), and University College London (UK) contributed to the hydrogen turbine technology development. Arttic supported the operational project management, while NTUA in Athens (Greece) carried out economic, environmental, and social analysis of the concept.

"The knowledge and experience gained from the HYFLEXPOWER project where we installed the 1st gas turbine to run on 100 percent hydrogen will help us to continue develop our entire gas turbine fleet for a hydrogen-based future. The interaction between electrolysis, storage, and hydrogen conversion at one site has been impressively demonstrated, and now it's a matter of scaling the results," says Karim Amin, Member of the Executive Board of Siemens Energy.

"At ENGIE, we are very proud of this world first. The HYFLEXPOWER project is remarkable for many reasons: for the exceptional collaboration it has enabled between several European partners, for the forward-looking technologies it has tested, and for the promising prospects it opens up for the use of renewable hydrogen in the industrial sectors most difficult to decarbonize. We look forward

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to continuing this decisive work for the future of decarbonized industry with our partners," says Frank Lacroix, ENGIE Executive Vice President in charge of Energy Solutions.

"We're proud that our Saillat paper mill has been the host for this project because trialing new and emerging technology, such as hydrogen, aligns with our decarbonization strategy and Better Planet 2050 journey. Today's announcement is a great milestone that puts us in good stead," says Garrett Quinn, Chief Sustainability Officer at Smurfit Kappa.

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gas and steam turbines, hybrid power plants operated with hydrogen, and power generators and transformers. Its wind power subsidiary Siemens Gamesa Renewable Energy (SGRE) makes Siemens Energy a global market leader for renewable energies. An estimated one-sixth of the electricity generated worldwide is based on technologies from Siemens Energy. Siemens Energy employs around 94,000 people worldwide in more than 90 countries and generated revenue of €29 billion in fiscal year 2022. www.siemens-energy.com.

ENGIE is a global reference in low-carbon energy and services. With its 96,000 employees, clients, partners and stakeholders, the Group strives every day to accelerate the transition towards a carbon-neutral economy, through reduced energy consumption and more environmentally friendly solutions. Inspired by its purpose statement, ENGIE reconciles economic performance with a positive impact on people and the planet, building on its key businesses (gas, renewable energy, services) to offer competitive solutions to its clients. Turnover in 2022: €93.9 billion. The Group is listed on the Paris and Brussels stock exchanges (ENGI) and is represented in the main financial indices (CAC 40, Euronext 100, FTSE Euro 100, MSCI Europe) and nonfinancial indices (DJSI World, Euronext Vigeo Eiris - Europe 120 / France 20, MSCI EMU ESG screened, MSCI EUROPE ESG Universal Select, Stoxx Europe 600 ESG-X).

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