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Invited Talk Abstract

The HYFLEXPOWER Project: First Engine Validation of Siemens Energy's 100% Hydrogen Combustion Technology-Enabled by Additive Manufacturing of Burners

Siemens Energy (SE) is developing technologies to enable its gas turbines to operate on up to 100% hydrogen by 2030, supporting the goal of limiting global warming to 1.5°C. A combustion technology platform capable of operating on 100% hydrogen is being developed across the company's gas turbine portfolio, with the aim of meeting emissions requirements and maintaining hardware integrity across the full range of hydrogen–natural gas blends.

This keynote provides an overview of the development and validation of SE's dry low-emissions (DLE) combustion technology platform for operation on 100% hydrogen. It covers the iterative design process, high-pressure rig testing, and the first engine application of the technology in an SE gas turbine in the 10 MW class.

The technology was demonstrated within the HYFLEXPOWER consortium using an SGT-400 gas turbine at a customer site in Saillat-sur-Vienne, France. The installation served as the test platform for the world's first demonstration of a power-to-hydrogen-to-power cycle incorporating an advanced hydrogen gas turbine for CO₂-free power generation.

The talk presents the safe operating envelope with respect to flashback for fuel blends containing up to 100% hydrogen. It also compares engine results with rig-test data collected at SE's high-pressure combustion test facility, the Clean Energy Center in Ludwigsfelde, Germany.