Demonstration of combustor technology enhancement of a 16 MW_e industrial gas-turbine, fuelled with natural gas admixed with hydrogen up to 100%, dry low NOx emissions (DLN), without catalytics, diluents and rated engine performances

The project, HyPowerGT, is an innovation action with a duration of four years started in January 2024. Behind the project is a European consortium of nine partners supported by the EU under the Horizon Europe programme.

The HyPowerGT project aims at moving technological frontiers to enable gas turbines to operate on hydrogen guaranteeing low NOx emissions without catalytics and diluents. The core technology is a novel dry-low emission combustion technology (DLE H_2) capable of starting up and operating with mixtures of natural gas and hydrogen with concentrations up to 100%. Besides ensuring low emissions and high efficiency, the DLE H_2 combustion technology offers fuel flexibility and response capability on a par with modern gas-turbine engines fired with natural gas.

Baker Hughes NovaLT^{TM}16 (*) gas turbine, 100% H2 ready, on dedicated Baker Hughes test bench at Florence (IT).

The new combustion technology will be fully retrofittable to existing gas turbines, thereby providing opportunities for refurbishing existing assets in industry (CHP) and offering new capabilities in the power sector for balancing the grid system (unregulated power) and for mechanical drives. The DLE H_2 technology adheres to the strictest specifications for fuel flexibility, NOx emissions, ramp-up rate, and safety, stated in the Strategic Research and Innovation Agenda 2021-2027.

System prototype. The new DLE H_2 combustion technology will be further refined and matured and, towards the end of the project, demonstrated at TRL7 on the Baker Hughes NovaLT^{TM}16 (*) gas-turbine engine, fired with fuel blends mixed with hydrogen from 0-100% H_2. Within this wide range, emphasis is placed on meeting targets for (a) fuel flexibility and handling capabilities, (b) concentration of hydrogen fuel during the start-up phase, (c) ability to operate at varying hydrogen contents, (d) minimum ramp speed, and (e) safety aspects pertaining to any level with regard to related systems and applications targeting industrial gas-turbine engines in the 10-20 MWe class.

Consortium. (1) SINTEF Energy (Norway) coordinator, (2) Baker Hughes (Italy), (3) SNAM (Italy), (4) ETN Global (Belgium), (5) CERFACS (France), (6) Lucart (Italy), (7) Zürich University of Applied Sciences, ZHAW (Switzerland), (8) TotalEnergies Onetech (France), and (9) EQUINOR (Norway).

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