HyPowerGT Consortium

Project Newsletter #3

HyPowerGT

HyPowerGT – Demonstrating a hydrogen-powered gas-turbine engine fuelled with up to 100% H_2

Clean Hydrogen Partnership

Co-funded by the European Union

Project funded by

Schweizerische Eidgenossenschaft
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Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

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The first Reporting Period of HyPowerGT already concluded in June 2025. After eighteen months of implementation, consortium partners achieved relevant milestones.

Work Package 1 – Project Management

HyPowerGT successfully concluded its first reporting period in June 2026. Under the coordination of WP1, all ten deliverables due in this phase were submitted on time.

Key activities included the Innovation Radar assessment, the annual Clean Hydrogen Joint Undertaking (CHJU) data collection exercise, and regular meetings of the Management Support Team and Executive Board.

In parallel, two additional projects (within HyPowerGT) funded by industrial partners Equinor and TotalEnergies have been launched.

Preparations are underway for the first review meeting with the CHJU (September 2025).

Work Package 2 – Modelling assessment of DLE H2 combustion system

SINTEF completed DNS simulations at 15 bars, complementing the existing numerical and experimental database on the turbulent burning rate of high-pressure hydrogen flames. Further cases are planned. A joint SINTEF-Sandia NL paper was presented at MCS 2025.

ZHAW received the instrumented burners, dampers and rig adaptions from Baker Hughes (BH), assembled the experimental setup and subsequently achieved first fire.

The numerical assessment of the combustion system is progressing with several LES simulations by SINTEF and BH revealing new fuel mixing insights, prompting a design update and further studies on flame stabilisation.

Work Package 3 – System prototype demonstration at TRL7

WP3 aims at demonstrating the demonstration of a Full Annular Rig test campaign of the H2

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DLE combustor for NovaLT16 at TRL6, which will be followed by the demonstration of the NovaLT16 gas turbine in a dedicated instrumented engine test campaign at TRL7.

At M18, the design activities for the flashback proof burner and the NovaLT16 combustion chamber have been completed. Moreover, the test rig, the instrumented combustion chamber, and the two instrumented kits of burners are ready for the shipment at the test facility of SestaLab and for the test commissioning phase. Full Annular Rig test campaign will be performed in Q4 2025.

Work Package 4 – Safety management and risk assessment

A comprehensive FMECA workshop was conducted, identifying potential failure modes and evaluating their severity and criticality. These findings informed the development of preliminary HSE guidelines and the first draft of the safety management plan.

Transient analyses and high-fidelity LES simulations of the NovaLT16 exhaust system were performed to assess ignition risks under various boundary conditions. Simulations identified key ignition locations and highlighted the influence of wall temperature and flow characteristics on auto-ignition likelihood. A parametric study was also initiated to generalise ignition delay behavior, supporting future risk mitigation strategies.

The safety team finally developed dedicated safety plans for all hydrogen-related test campaigns. ZHAW completed a safety plan for burner testing at their facility, while SINTEF led the preparation of safety documentation for the Full Annular Rig and the Instrumented Engine test campaigns. These plans incorporate findings from HAZOP studies and ensure systematic risk tracking.

Work Package 5 – Impact assessment, retrofitting, roadmapping, and techno-economic analyses

During the first half of 2025, WP5 activities officially commenced, with particular emphasis on tasks aimed at developing a roadmap for the deployment of HyPowerGT technology within the broader context of European hydrogen infrastructure and market development. Closely linked to the creation of this roadmap, dedicated fucus groups were recently established involving the consortium partners, to define the techno-economic analyses that will evaluate the application of NovaLT16 DLE technology both in hydrogen compression stations along the future H2 transport network and in the industrial context for combined heat and power (CHP) generation.

Specifically for these latter applications, methodologies for analysis have been identified, along with the regulatory and normative frameworks in which these technologies will operate, with special focus on infrastructure development for hydrogen transport, both at the European level and with a focus on Italy. Given the considerable hydrogen demand generated by a single NovaLT16 DLE unit, the existence of a widespread hydrogen transport network to reach industrial users is recognized as an essential prerequisite.

Within these activities the feasibility of retrofitting existing plants to enable hydrogen operation in turbomachinery will also be explored, thus supporting the decarbonisation process of the European industrial sector.

Work Package 6 – Communication, dissemination and exploitation

The promotional video of HyPowerGT was published in April 2025. This material aims at disseminating the expected outcome of the

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project, as well as the background of its concept.

Project partners Sintef and Baker Hughes represented the HyPowerGT consortium at the Clean Hydrogen Partnership and the Japanese New Energy and Industrial Technology Development Organisation (NEDO) workshop in Kobe, Japan. The event, which took place at the end of March 2025, served as an appropriate platform to enhance cooperation among European and Japanese stakeholders in the domain of energy transition.

In June 2025, Sintef also delivered a presentation of some of the relevant results from WP2 at the Mediterranean Combustion Symposium.

HyPowerGT in the Media

HyPowerGT promotional video on YouTube

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