

Press Release

FEV Presents Converted Engine for H₂-Operation

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Saint-Quentin-En-Yvelines (France), April 2023 – FEV, a globally leading provider of engineering, development, testing and consulting services for the sustainable mobility and clean energy markets, is developing the world's first H₂-converted 8.7-liter combustion engine for medium- and heavy-duty, on- and off-highway applications with NGV Powertrain.

With promises of a greener future through electrification lingering in the distance, and tightening emission requirements well within sight, the topic of hydrogen has been gaining enormous popularity with fleet owners and managers seeking the means to make their fleets compliant and keep operations running smoothly.

Pragmatic approach for zero CO₂ medium and heavy duty transport

The ubiquity of the internal combustion engine has served to make it both celebrated and scorned in modern society. Enjoying a well-deserved reputation for being economic and robust, paradoxically, its wide-spread use has made it a leading contributor of carbon emissions. However, by fueling combustion engines with a non-carbon containing resource, numerous benefits can be achieved.

The retrofit ICE solution developed by FEV and NGV Powertrain offers economy and robustness and is an alternative to fuel cell or battery electric propulsion solutions. An absence of carbon in dihydrogen (H₂) molecules promises significant reductions in NO_x emissions. The innovative solution can be adapted to gas- or diesel-powered vehicles, with applications ranging from on-highway to agricultural to marine. Most importantly, the solution can be attained for a fraction of the cost compared to outright vehicle replacement, which reduces waste by extending the life of existing fleets.

8.7-liters of power, clean hydrogen operation

Like conventional fuels, there are two methods to inject hydrogen for use in internal combustion – gaseous through the intake manifold as (indirect injection) or directly into the combustion chambers as a liquid, similar to modern direct-injection systems. For ease of use and to simplify conversion efforts, FEV and NGV's solution utilizes an indirect configuration. A turbocharger is employed due to the high volume of air required. Finally, software to monitor the engine parameters has to be adapted accordingly.

The sample engine features:

- Displacement: 8.7L
- Cylinders: 6
- Air management system: Turbocharged
- Injection: MPI
- Power: 230 kW (313 hp)
- Torque: 1,700 Nm@1300 rpm
- Combustion: Lean spark ignited
- Hydrogen injection pressure: 10-15 bars

Collaboration with NGV Powertrain

Investment in the project by the France Relance Plan, initiated by the French government, allowed FEV to invest in three test benches at its site in Saint-Etienne-du-Rouvray (Seine Maritime): two for development of hydrogen internal combustion engines and one dedicated to fuel-cell development, with a capacity of up to 240 kW (326 hp). For the "NGV-FP087" project, FEV worked on design and engine controls from its location in Saint-Quentin-en-Yvelines and managed calibration and testing from its facilities in Saint-Etienne-du-Rouvray.

NGV Powertrain oversaw engine hardware and control system design, system integration (ECU, wiring harness, sensors, ATS, etc.), and production planning, as the company plans to offer the solution to OEMs, dealers, fleet owners, and independent installers. NGV Powertrain develops fuel-agnostic engine platforms, customized to utilize alternative-fuels. The NGV-FP087 H2 PFI engine is a natural extension of NGV Powertrain's natural gas version.

Footage:



The jointly developed H₂-Internal Combustion Engine, © FEV

About FEV

FEV has always pushed the limits.

FEV is a globally leading engineering provider in the automotive industry and internationally recognized leader of innovation across different sectors. Professor Franz Pischinger laid the foundations by combining his background in academia and engineering with a great vision for continual progress. The company has supplied solutions and strategy consulting to the world's largest automotive OEMs and has supported customers through the entire transportation and mobility ecosystem.

As the world continues to evolve, so does FEV.

That's why FEV is unleashing its technological and strategic expertise into other areas. It applies its forward thinking to the energy sector. And its software and system know-how will enable the company to lead the way making intelligent solutions available to everyone. FEV brings together the brightest minds from different backgrounds and specialties to find new solutions for both current and future challenges.

But FEV won't stop there.

Looking ahead, FEV continues to push the limits of innovation. With its highly qualified 7,200 employees at more than 40 locations globally, FEV imagines solutions that don't just meet today's needs but tomorrow's. Ultimately, FEV keeps evolving – to a better, cleaner future built on sustainable mobility, energy and software that drives everything. For the companies' partners, its people and the world. [#FeelEVolution](#)

Presence in France

FEV has 500 employees spread over its five sites (Paris, Rouen, Lyon, Toulouse and Marseille), including two technical centers, in addition to its work directly customers' sites. Its services can be in the form of direct technical assistance, work-packages, framework contracts or turnkey projects.

About NGV Powertrain

NGV is an innovative startup manufacturing the next gen of internal combustion engines.

NGV Powertrain was founded in 2019 by visionary leaders of the sector.

It designs, develops, homologates, manufactures, sells, and services innovative engines (fueled by Natural Gas, Biofuels, E-fuels, Hydrogen) to decarbonize the *hard-to-abate* sectors of mobility and power generation and enable sustainable business models. It is a certified engine manufacturer serving the OEM market and the retrofit of running fleets, offering high-tech customized solutions for decarbonization and connectivity.

The company is already supplying its Euro VI Step E powertrains to its international customers.

In a future world with fewer engines... NGV takes a different way.

After the development of its own injection and control systems, NGV continues to pursue the development of a broad line-up of alternative-fuel engines. Next steps in 2023 will be the Non-Road Stage V homologation and new engines in the line-up.

But NGV won't stop there.

Looking ahead, NGV continues to develop its clean engines and innovative solutions for several industries. NGV's concept of "*fuel agnostic*" solutions will be further strengthened by the launch of the alcohol, LPG, and NG marine versions of its NGV-FP087 engine, already developed in NG and H₂ version.