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CUMMINS X VERNE

Surpassing Diesel: Maximising Hydrogen Performance for Heavy-Duty Trucks

Cummins and Verne demonstrate next-generation hydrogen storage for heavy-duty trucks.

The Challenge

Hydrogen trucks are currently lower in performance relative to diesel: They have a lower range than diesel trucks, and weigh much more; enabling sufficient hydrogen storage is the main challenge. Currently, hydrogen is mostly stored in compressed gas tanks that are heavy, large and costly. Replacing these compressed hydrogen tanks with liquid hydrogen tanks enables larger fuel storage and reduced weight, but introduces new challenges. Liquid hydrogen tanks require expensive liquid hydrogen supply and are not compatible with hydrogen combustion engines. A better form of hydrogen storage is required for diesel-parity performance.

The Solution

Verne has developed a novel form of hydrogen storage that maximises hydrogen density while avoiding dependence on liquid hydrogen supply. Specifically, Verne has developed cryo-compressed hydrogen storage technology, storing hydrogen as a cold-and-compressed gas. This enables trucks to achieve diesel parity in range and payload and is also compatible with hydrogen combustion engines. Cummins equips heavy-duty trucks with its hydrogen combustion engine and fuel cell systems, and together with Verne, they are swapping the hydrogen storage systems on one of their trucks: removing the compressed storage system and replacing it with Verne's cryo-compressed storage to validate the benefits of this new technology in real-life operations.

The Outcome

Cummins and Verne have started working on the pilot project, which will be fully completed in early 2026. Preliminary work results are encouraging: Verne has already demonstrated its cryo-compressed hydrogen storage technology on a heavy-duty truck. In this demonstration, Verne accomplished its expected high density of hydrogen storage.

Project Highlight

Verne's cryo-compressed hydrogen storage is 80% higher in density relative to high-pressure hydrogen storage systems. Therefore, it is expected that switching to Verne's high-density hydrogen storage will significantly increase the range of heavy-duty hydrogen trucks.

Verne

Verne maximises hydrogen performance

Verne's technology maximises hydrogen storage density at low cost by storing hydrogen as a cold-and-compressed gas.

Headquarters
San Francisco, United States

Founded
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No. Employees
11 – 50

Website
www.verneh2.com

Acknowlegement

We would like to express our sincere thanks to Simon Lange (Cummins) and Ted McKlveen (Verne).

Project Contact

Dr. Simon Lange
Strategy Director (Growth Office) – Hydrogen & Electrochemistry & STARTUP AUTOBAHN Program Management
Cummins Inc.
simon.lange@cummins.com

Raul Martin Montero
Ventures Mobility
STARTUP AUTOBAHN powered by Plug and Play
r.martin@pnptc.com

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STARTUP AUTOBAHN powered by Plug and Play is an open innovation platform that provides an interface between innovative tech companies and industry-leading corporations.

The basis of the program is the partnership that develops between startups and the corporate business units. The two entities hold an equal footing from the get-go: together they evaluate the potential for a joint venture, move forward to pilot the technology, and work to achieve the ultimate goal – a successful production-ready implementation.

Designed with the intention to exceed startup acceleration, STARTUP AUTOBAHN powered by Plug and Play moderates a community for collaboration with a focus on implementable results.

Over the years, the platform has successfully cultivated over 500 projects with more than 350 startups since its founding in 2016.

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