

Hydrogen Fuel Cell-Powered Emergency Relief Truck Prototype



Science and
Technology

DEVELOPING NEXT GENERATION DISASTER RELIEF CAPABILITIES

Disaster and crisis situations frequently put responders in locations with limited fuel resources or deployed to areas far from resupply. Through an interagency collaboration between the Department of Homeland Security (DHS) Science and Technology Directorate (S&T), the U.S. Army Corps of Engineers, the U.S. Department of Energy (DOE), the Department of Defense, and Cummins, Inc., an advanced hydrogen (H₂) fuel cell truck prototype—known as H₂Rescue—is being developed and tested. The H₂Rescue truck is a hydrogen fuel cell/battery hybrid vehicle that can be driven to disaster recovery sites to provide on-site power for up to 72 hours without refueling.

THE BENEFITS OF HYDROGEN FUEL CELLS

Hydrogen fuel cells offer viable fuel alternatives to the emergency response community while also operating in near silence without volatile exhaust. Hydrogen fuel cells have the potential to be a stable and easily transportable energy storage medium for use in disaster response operations. With 80% of the energy created being utilized, the fuel cells are both energy efficient and environmentally friendly, as water and heat are the only byproducts created.

H₂-POWERED EMERGENCY RELIEF TRUCK

The integration of an electric drivetrain, a hydrogen fuel cell, and a hydrogen storage system coupled with high-energy-density lithium-ion battery packs allow the H₂Rescue to operate on zero-emission power generation using a state-of-the-art power delivery system. With this, the H₂Rescue prototype can operate as a self-propelled electric generator, providing up to 25 kilowatts export power, enough to power 20 average U.S. homes, lights at a shelter, a communications trailer, etc. In addition, the system operates at full capacity with little to no noise. The H₂Rescue truck is the first vehicle of its kind and will assist in further defining the capabilities of new technologies in the future. In addition to power generation, future applications could capture and utilize the water and heat byproducts of the hydrogen fuel cell.

Vehicle Specifications & Vehicle Concept

Vehicle Specifications	
Main Model	Cummins/T310 M2000
Classification	Class 7 Medium Duty Conventional
Application	Rescue Vehicle with Mobile Command Center
Truck Dimensions:	
Length	42'1"
Height	12'1" (from bottom of frame rail)
Width	108"
GVMC	33,000 lbs
Wheelbase	272"
Powertrain	Cummins PowerDrive PD750DFC
Traction Motor:	
Rated Power	245 kW (330 kW peak)
Rated Torque	3400 Nm (2507 lb-ft)
Transmission:	
Transmission	Direct Drive
Hydrogen Fuel Cell:	
High Voltage	Cummins H290 PEM Fuel Cell (90kW)
Battery	155kWh (2 pack); 500-700Vdc
Hydrogen Storage	175 kg @ 700bar, 10 tank system
Target Range	180 miles +72 hours of Export Power up to 25kW
Emissions	Zero emissions Fuel Cell Electric Hybrid



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PROJECT IMPACT

- The H₂Rescue prototype demonstrates the ability to provide emergency power with green energy and minimal noise.
- This effort provides the homeland security and emergency management communities with a vision into what future technologies can provide.

PROJECT ACCOMPLISHMENTS TO DATE

- Completion of final design review (FY21, Q1)
- Field Test, Sacramento, CA (FY23, Q3)

UPCOMING MILESTONES

- Field Test, Fort Carson, CO (FY23, Q3)
- H₂Rescue Demonstration/Showcase in Washington, DC (FY23, Q3)

PROJECT PERFORMERS/PARTNERS

- U.S. Army Corps of Engineers, Engineer Research and Development Center, Construction Engineering Research Laboratory
- U.S. Department of Energy — Hydrogen and Fuel Cell Technologies Office and Vehicle Technologies Office
- Cummins Electrified Power Inc., Milpitas, CA
- U.S. Army Ground Vehicle Power and Mobility
- U.S. Naval Research Laboratory
- DHS Federal Emergency Management Agency

