DEVELOPING NEXT GENERATION DISASTER RELIEF CAPABILITIES

With the increasing frequency of natural disasters, it is critical that we develop and leverage new and emerging green technologies that can be employed during disaster relief efforts and do not require fossil fuels for operation. Disaster and crisis situations frequently put first responders in locations with limited fuel resources, or in remote areas far from resupply. Through an interagency collaboration between the Department of Homeland Security (DHS) Science and Technology Directorate (S&T), the U.S. Department of Energy (DOE), the Department of Defense, and Cummings, Inc., an advanced hydrogen (H2) fuel cell truck prototype — known as H2Rescue — is being developed and tested. The H2Rescue is a hydrogen fuel cell/battery hybrid vehicle that first responders can drive to disaster mitigation sites to provide sufficient H2 that will power and heat during emergency response operations for up to 72 hours without refueling.

THE BENEFITS OF HYDROGEN FUEL CELLS

Hydrogen fuel cells offer valuable benefits to the emergency response industry. H2 fuel cells are 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 energy efficient. They are also environmentally friendly, as water and heat are the only byproducts created.

Additionally, hydrogen fuel cells remove barriers brought about by fossil fuel dependency. Specifically, the fuel cell module’s flexibility in storage and use allows emergency workers the freedom to operate in inhospitable environments for extended durations. As such, all areas that are directly affected by natural disasters will receive a quicker and more efficient response from emergency professionals during and after an incident.

H2-POWERED EMERGENCY RELIEF TRUCK

The integration of an electric drivetrain, an H2 fuel cell module, 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. Because of this, the prototype has the potential to provide heat and potable water to first responders as byproduct of electricity production while creating little to no noise during operation.

Furthermore, the impact of the prototype H2-powered search and rescue vehicle will be widespread. The H2Rescue will help identify H2, fuel cell, and battery research and development gaps to ensure the technology not only meets the needs of the emergency management industry, but also provides additional capability and sustainability for the future.

PROJECT ACCOMPLISHMENTS TO DATE

• Completion of technical evaluations of required equipment (FY20, Q1).
• Completion of final design review (FY21, Q1).

UPCOMING MILESTONES

• Completion of vehicle prototype (FY22, Q4).

PROJECT PERFORMERS/PARTNERS

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

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