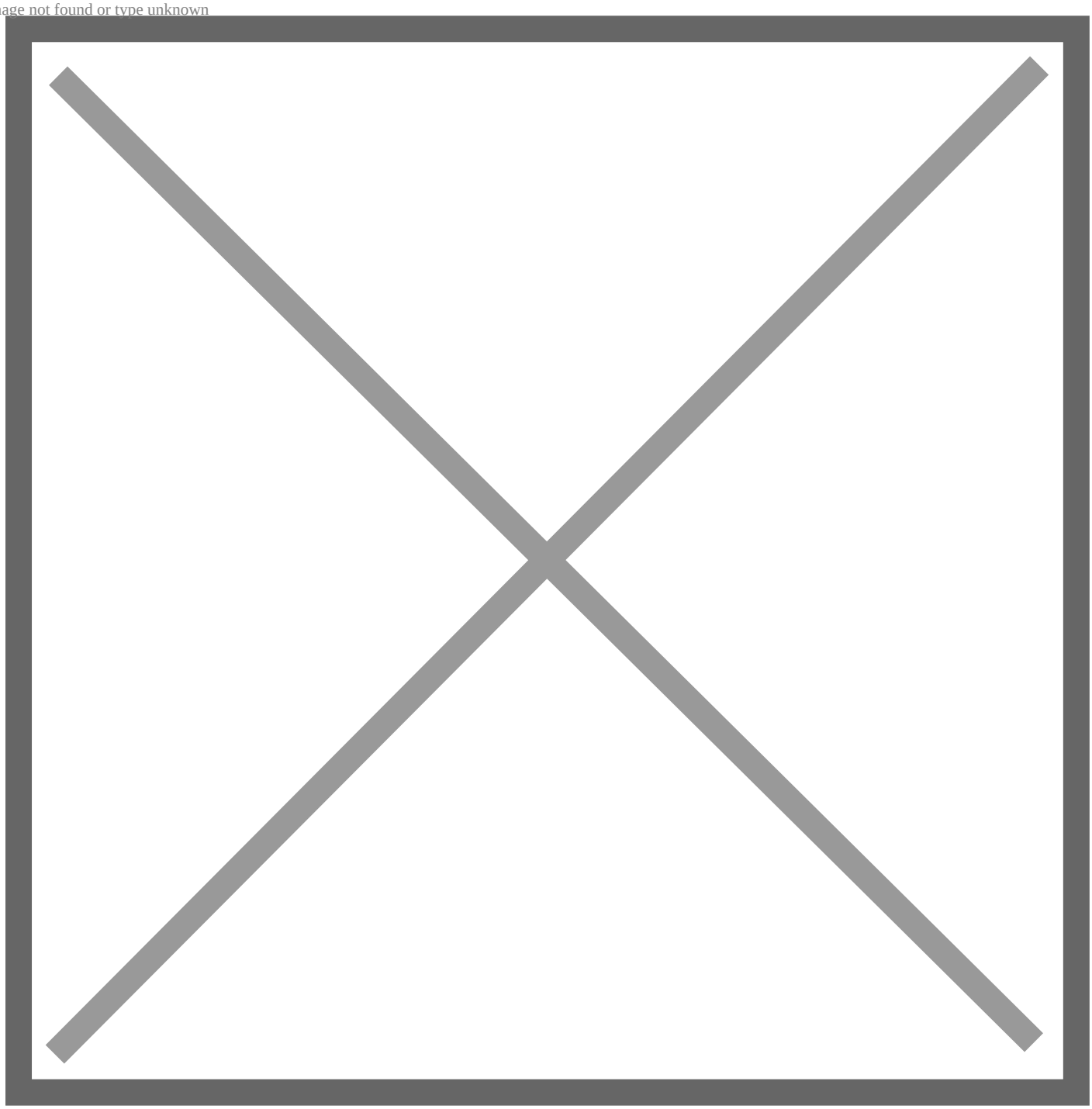
Hydrogen Fuel Cell Toyota Tacoma H2-Overlander Concept Can Charge Your Buddy’s EV in the Great Outdoors and Filters Water, Too

November 03, 2025

Image not found or type unknown



LAS VEGAS (Nov. 3, 2025) – Like any responsible camper, the Toyota Tacoma H2-Overlander Concept can venture deep to the great outdoors, tread lightly and leave no traces, thanks to its hydrogen fuel cell electric (FCEV) and battery electric (BEV) technologies that deliver only water as the tailpipe emissions built into the proven TNGA-F truck platform.

Also, a champion of the buddy system, the Tacoma H2-Overlander Concept will never leave a friend behind, as it features a 15-kW power takeoff capable of running something as power-intensive as a home off-grid or even charging two EVs simultaneously via dual NEMA 14-50 outlets. That way, compatriots in battery electric-powered off-roaders will never find themselves stranded on the trail.

The Tacoma H2-Overlander was engineered and built by the Toyota Racing Development (TRD) engineering teams in California and North Carolina, backed by the strong technical expertise of Toyota Motor North America R&D for the SEMA show. It highlights the potential of hydrogen fuel cells and the many places they can go.

And, with 547 horsepower from two electric motors, a near-silent powertrain and plenty of camping innovations, there's a whole lot of "go" in this concept.

"We wanted to keep that theme of TRD's off-road heritage and desert racing while incorporating cutting-edge powertrain technologies," said Craig Cauthen, manager of TRD's Emerging Technologies Group. "This vehicle showcases the ability of the TRD team that goes beyond just what we can do on the racetrack."

High-Performance Fuel Cell Powertrain

When the TRD-USA team isn't building snarling engines for NASCAR® it's serving as a skunkworks for Toyota, solving complex problems in ways that take Toyota's sustainability goals to heart. In the past, such efforts have included building mobile hydrogen fuel cell generators that can power a weekend's worth of race events without the noise or smell of a diesel generator – only taking up space needed in the bed of a Tundra pickup.

As a follow-up, the Tacoma H2-Overlander Concept integrates a second-generation Toyota Mirai fuel cell stack and three hydrogen tanks housed within its frame rails – 6 kg of capacity. Fuel cells work by combining hydrogen and oxygen, creating a chemical reaction that produces electricity and water vapor. That's it.

The powertrain is augmented by a 24.9-kWh lithium-ion battery pack. Together, they power a 225-kW front motor and a 188-kW eAxle and deliver the quick response, torque and regenerative capability of a battery-electric vehicle using electric motors combined with the quicker refueling benefits of hydrogen.

The nearly instantaneous torque of the electrified powertrain is routed through a front limited-slip differential and rear electronic locking differential, making this a true four-wheel-drive overlanding machine. Chassis and suspension upgrades reinforce the concept's overlanding mission. Inside the wheel wells, a TRD billet long-travel kit with heavy-duty, high-performance Fox 2.5 Performance Elite Series shocks—adapted from Toyota Tundra suspension development—ensures increased articulation and shock absorption over rough terrain. Improved stopping performance comes courtesy of a Tundra front brake upgrade, while custom 17×8.5-inch wheels mounted with aggressive, 35×12.5R17, off-road tires provide traction. The Tacoma H2-Overlander Concept relies on a TRD custom cooling system, adapted from Tacoma TRD Pro and Lexus RZ components, to ensure thermal stability for the hydrogen and electric systems under load.

Not to be overlooked, one of the concept's most distinctive features is the patent-pending TRD exhaust water recovery system, which captures and filters one of the only byproducts of the hydrogen fuel cell stack—water—for camping and outdoor use. The water is essentially distilled, containing no minerals, making it suitable for washing and showering. While not recommended for drinking, its availability adds significant utility

in remote settings where water can be a scarce resource.

From the Drawing Board to the Real World
The Tacoma H2-Overlander Concept proves that hydrogen fuel cell technology can deliver both adventure and performance, fueling Toyota's vision of a carbon-neutral future. However, the project was anything but simple. Transforming a gasoline-powered Tacoma into a hydrogen fuel cell 4WD concept meant fitting an entirely new powertrain into a vehicle never designed to house it—all within just a few months.

"Time was our greatest challenge," Cauthen said. "The question became: 'What can we do on a tight timeline to be prepared for SEMA with a fully integrated vehicle that used to run on gasoline and now runs on hydrogen?'"

To meet that challenge, TRD engineers relied on advanced CAD modeling, 3D-printed guides and a multi-site collaboration effort that spanned TRD's North Carolina chassis group and California-based hydrogen/EV engineering teams, designed and built entirely in-house by TRD-USA. Through its development, the team pioneered several firsts, including the patent-pending water recovery system and a TRD-tailored, roboformed tailgate developed with Toyota Motor North America Stamping.

The exterior is equally purposeful, with a customized overlanding camper fitted with recycled carbon-fiber aero panels. It also features heavy-duty, off-road bumpers front and rear, integrated recovery points, a winch and dual swingouts. The team integrated tiedowns and a recovery board storage system in the bed. Specialized, DOT-compliant lighting includes front lightbars, fog lights and camp lighting.

"The Tacoma H2-Overlander Concept embodies Toyota's multi-pathway approach to carbon neutrality—showing that there's more than one road to a cleaner future," said Mike Tripp, group vice president, Toyota Marketing. "At SEMA, under our theme '*Powered by Possibility*,' we're demonstrating that hydrogen isn't just viable, it's a core consideration in Toyota's vision for what's next. This concept proves that clean energy and real-world capability can go hand in hand."

The Tacoma H2-Overlander Concept will be on display at the 2025 SEMA Show from November 4–7 at the Las Vegas Convention Center in the Toyota booth (Central Hall, Booth 22200). This hydrogen-powered overlanding rig is one of several Toyota builds featured under this year's theme, *Powered by Possibility*, showcasing the brand's commitment to innovation across every powertrain—gasoline internal combustion (ICE), hybrid (HEV), plug-in hybrid (PHEV), battery electric (BEV), and fuel cell electric (FCEV). Show attendees are invited to explore the Tacoma H2-Overlander Concept and see firsthand how Toyota is shaping the future of mobility while staying true to its off-road heritage.

Vehicle shown is a special project prototype vehicle, modified with parts and/or accessories not available from Toyota. Such modifications may void the vehicle's warranty, may negatively impact vehicle performance and safety, and may not be street legal.