Toyota Provides Technology Roadmap at the 2025 Hydrogen and Fuel Cell Seminar

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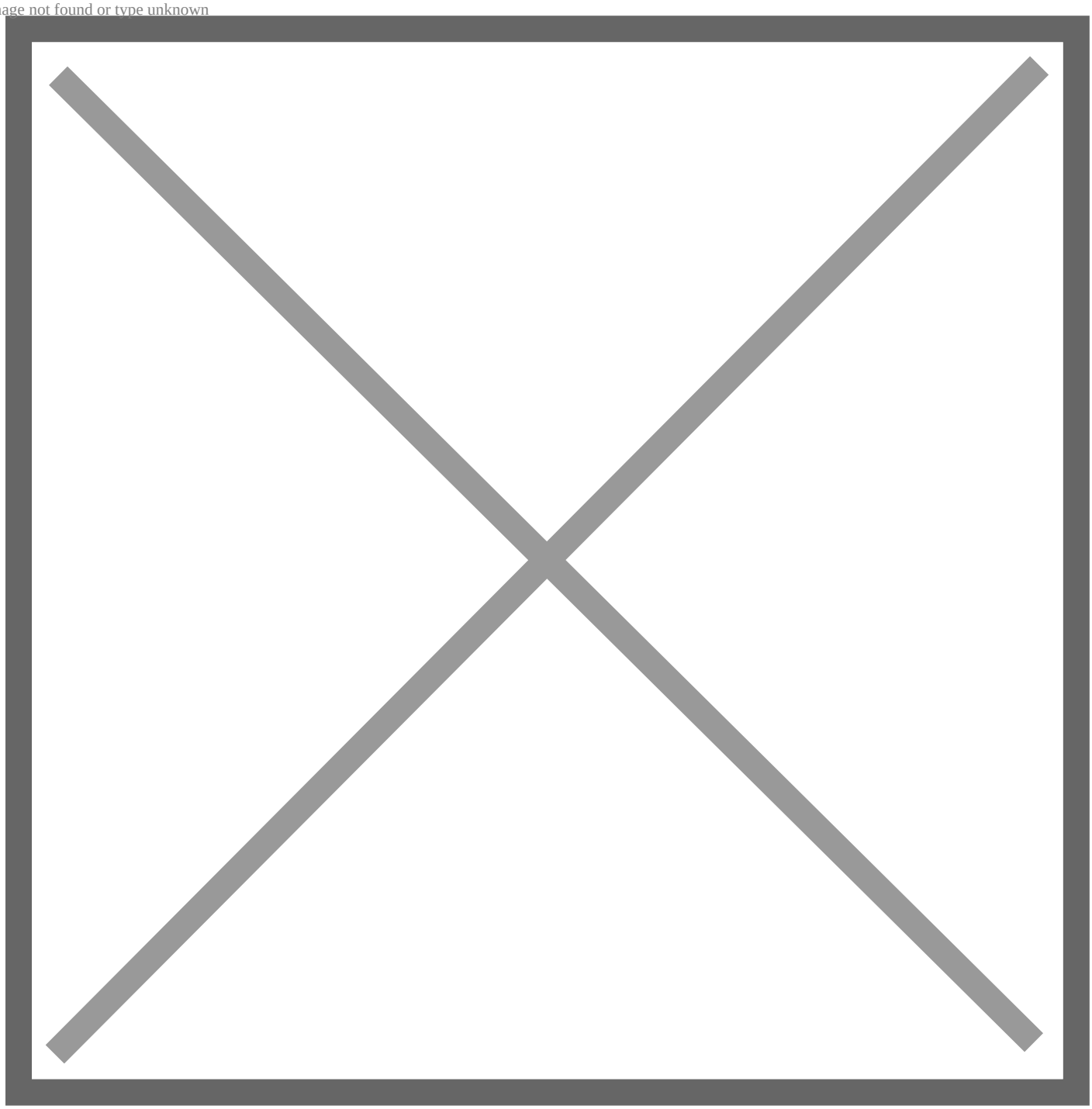


Toyota's long-term strategy on the advancement of a hydrogen-powered society took center stage at the 2025 Hydrogen and Fuel Cell Seminar as executives presented and outlined the company's vision and plan for achieving carbon neutrality, a plan that includes using hydrogen-powered technologies. At the event, Toyota reaffirmed its commitment to the fuel and introduced a number of applications and strategies aimed to expand Toyota's hydrogen and fuel cell business.

In his opening remarks, Toyota's Chief Engineer of Advanced Mobility Jay Sackett shared his goal for the seminar: to foster connections among industry leaders and advocates dedicated to promoting hydrogen as a sustainable energy solution.

"We are collaborating with companies that would traditionally have been our competition to develop standards for hydrogen fueling connections and protocols, recognizing that an industry standard was of greater benefit than our own competitive advantage," Sackett said.

Hydrogen and the Multi-Pathway Strategy

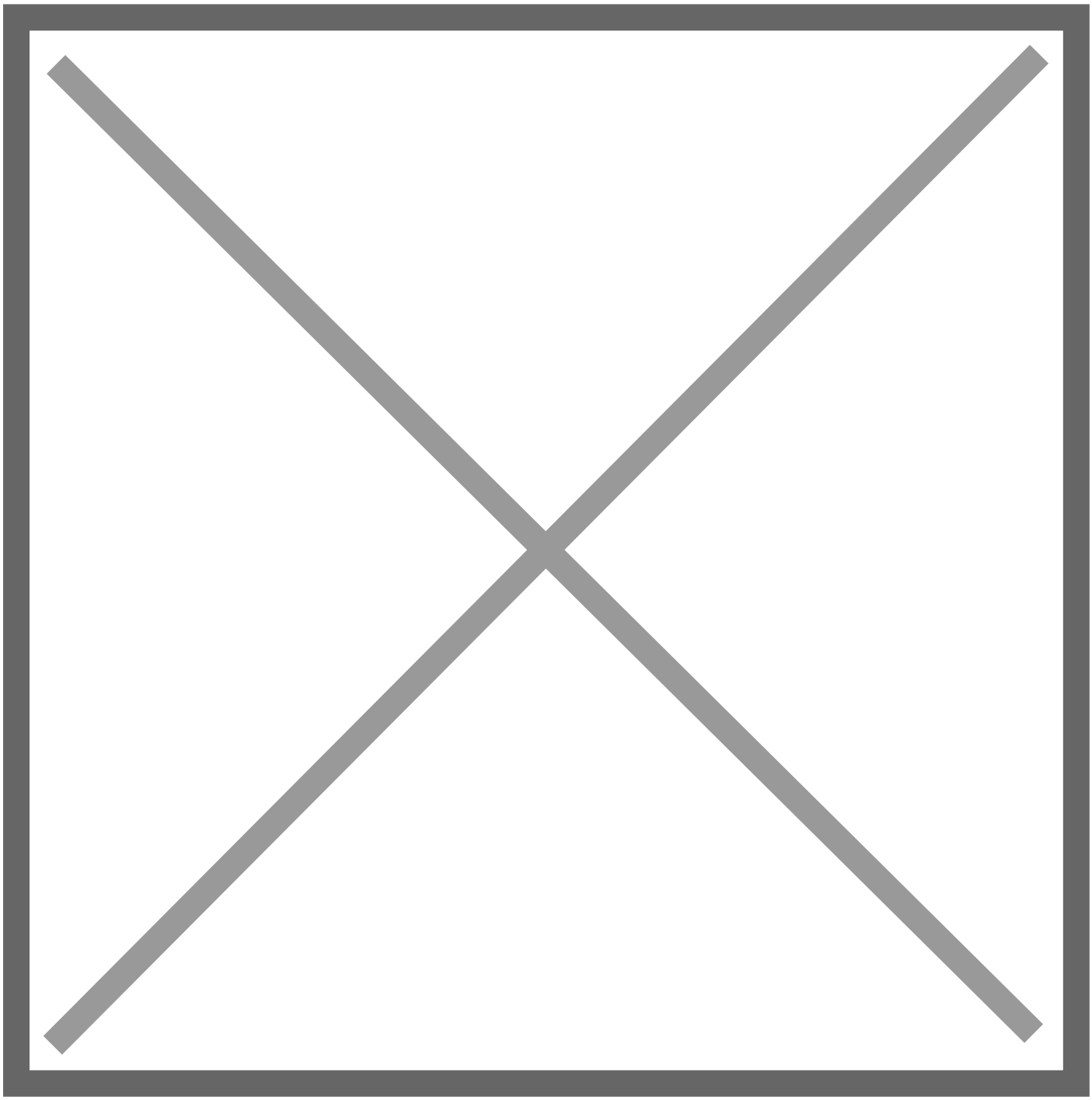
Many of Toyota's public-facing efforts toward decarbonization have focused on hybrid, plug-in hybrid, and battery electric powertrains, though hydrogen-powered fuel cell electric vehicles and powertrains remain an important part of Toyota's multi-pathway strategy. The company believes that hydrogen can play a role in the transition to a carbon-neutral future, particularly in sectors with significant carbon footprints, such as heavy-duty trucking.

An example shared at the event was how Toyota's largest port vehicle processing center in the U.S., located at the Port of Long Beach, which processes upward of 200,000 vehicles per year, has applied the technology. With FuelCell Energy, Toyota built the first-of-its-kind Tri-gen system at the Port.

The system was designed to use directed renewable biogas and convert it to hydrogen, which is then used to produce 2.3 megawatts of electricity per day, part of which is used to power Toyota Logistic Services' port operations. Some of the hydrogen produced by the system, up to 1,200 kg per day, is pumped to two adjacent stations, providing fuel for heavy-duty trucks and light-duty passenger vehicles. The third product of the facility is water. Tri-gen produces 1,400 gallons of water a day as a byproduct of the electricity being generated by hydrogen – the Toyota team members use the water to wash vehicles when they come off shipping vessels. The system offsets 9,000 tons of CO? emissions per year from the Long Beach community.

The port has about 30 FCEV trucks in its rotation, all of which can take hydrogen produced from Tri-gen, as the station is open to trucks from competitive truck makers. While this is a small start, given the more than 20,000 heavy-duty truck routes operating daily in the area including both the Ports of Long Beach and Los Angeles, Toyota sees a substantial opportunity to replace conventional diesel trucks with zero-emission, hydrogen-powered alternatives.

"There are as many as 20,000 opportunities every day to clean up the air with hydrogen fuel cell-powered trucks," Sackett said.



FCEV trucks are capable of not only matching the payload capacity of their diesel counterparts but also allow greater up-time for drivers through significantly quicker refueling times than pure BEV commercial trucks (15 to 20 minutes for a full fuel cell tank versus 90 minutes on the quickest chargers available for a 90% battery charge) and emit only water vapor.

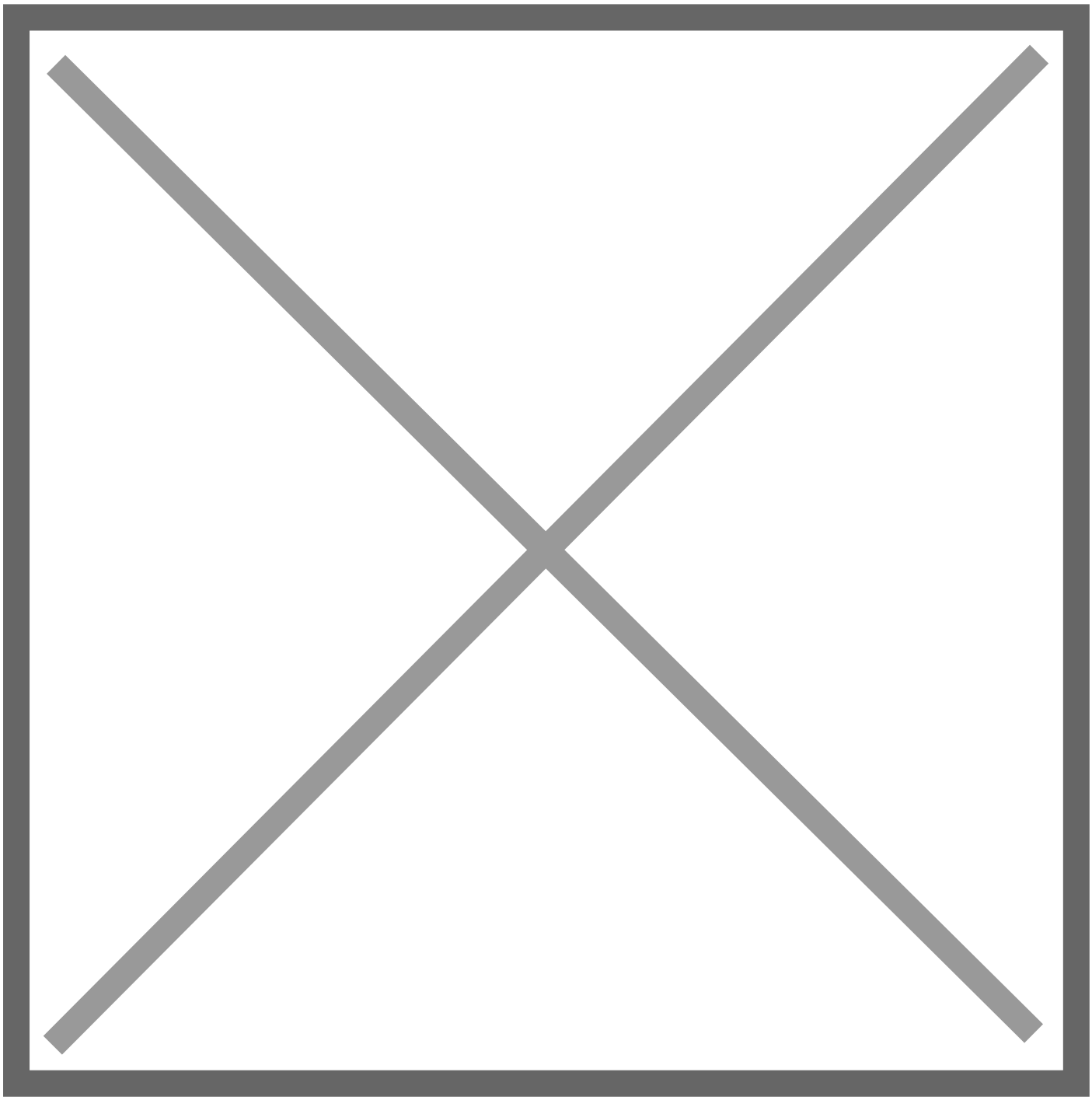
Innovations and Collaborations

Toyota has been at the forefront of hydrogen technology for more than three decades, launching the world's first mass-produced hydrogen fuel cell electric vehicle (FCEV), the Toyota Mirai, in 2014.

That vehicle showed that Toyota's polymer electrolyte membrane fuel cell stack could reliably convert hydrogen into electricity to power passenger vehicles. Those vehicles – and the millions of miles they've traversed in the ensuing decade – were only the start. Now, Toyota has shown that there are other use applications and cases to be found with the versatility and scalability of fuel cells.

Toyota's North American Hydrogen Headquarters in Gardena, California, called H2HQ, has been codeveloping the technology with Toyota Motor Corporation in Japan, from the earliest fuel cells to the semi-truck applications to mobile and stationary generators, replacing diesel-powered generators in several applications.

General Manager of Fuel Cell Solutions Thibaut de Barros Conti touched on how a Toyota fuel-cell-based generator is already in use as a backup generator in a hospital in the Pacific Northwest. On a smaller scale, a mobile generator built into a Toyota Tundra by TRD North America for motorsports and marketing activations was used to power the Hot Cocoa Village and Santa's Workshop, presented by Lexus, at last year's Detroit Christmas tree lighting.



On a much larger scale, a 1-Megawatt proton exchange membrane fuel cell power generation system using Toyota's fuel cells was installed at the National Renewable Energy Lab in Colorado, and a future microgrid at H2HQ includes fuel cells in its design to enhance energy resilience.

Addressing Challenges

Despite advancements in hydrogen technology, de Barros Conti highlighted the challenges faced in the creation of a hydrogen society. With a limited number of stations available across California, Toyota has been taking steps to address the infrastructure gap.

Looking Ahead

As Toyota continues to innovate and expand its hydrogen initiatives, the company is committed to decarbonizing its logistics and trucking fleet, integrating hydrogen solutions where they make sense.

With more than 500 industry leaders and government officials from California, Texas and other states attending, Toyota led the discussion at the seminar keynote session with optimism and reaffirmed its commitment to sustainability. With a heavy emphasis this year on national energy independence and recently revised incentives toward hydrogen production, there's a lot of new opportunity.

Calling upon the audience for collaboration, de Barros Conti expressed optimism.

"This has not been an easy road," he said, "but it is the right road."