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BUILDINGS | CARBON CAPTURE AND STORAGE | **FUEL CELLS** | NUCLEAR | POLICY | PLANNING  
RENEWABLES | SMART GRID | STORAGE | SUSTAINABLE MOBILITY | SUSTAINABILITY ANALYSES



## DRIVING THE DEVELOPMENT OF FUEL CELL VEHICLES

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Hydrogen-powered cars promise to reduce greenhouse gas emissions and air pollution, along with our dependence on petroleum. And auto companies around the world are buying into that promise, investing billions of dollars to create road-ready fuel cell vehicles.

So why haven't these greener vehicles hit the nation's highways? Two of the biggest commercialization challenges are increasing battery durability and reducing overall costs.

WISE researcher Mehrdad Kazerani and his former graduate student Jennifer Bauman's powertrain proposal might be just the ticket.

Their optimized fuel cell-battery-ultracapacitor (FC-B-UC) design combines the high specific energy of a battery with the high specific power and efficiency and long cycle life of an ultracapacitor. In this setup, the ultracapacitor provides the initial power, while the battery only kicks in once the ultracapacitor voltage drops. This design means the ultracapacitor provides the majority of power required for acceleration, reducing demands on the battery and extending its life.

To charge the battery from the fuel cell, the researchers have opted for a low-power unidirectional boost converter. This choice reduces the weight and cost of the vehicle by eliminating the need for a high-power DC/DC converter.

Vehicle simulator tests reveal that their design outperforms the most promising published designs for FC-B-UC powertrains, bringing fuel cell cars one step closer to commercial reality.