

**GASSING UP** with

# HYDROGEN

Researchers are working on ways for fuel-cell vehicles to hold the hydrogen gas they need for long-distance travel



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**O**n a late summer day in Paris in 1783, Jacques Charles did something astonishing. He soared 3,000 feet above the ground in a balloon of rubber-coated silk bags filled with lighter-than-air hydrogen gas. Terrified peasants destroyed the balloon soon after it returned to earth, but Charles had launched a quest that researchers two centuries later are still pursuing: to harness the power of hydrogen, the lightest element in the universe, for transportation.

Burned or used in fuel cells, hydrogen is an appealing option for powering future automotive vehicles for several reasons. Domestic industries can make it from a range of chemical feedstocks and energy sources (for instance, from renewable, nuclear and fossil-fuel sources), and the nontoxic gas could serve as a virtually pollution-free energy carrier for machines of many kinds. When it burns, it releases no carbon dioxide, a potent greenhouse gas. And if hydrogen is fed into a fuel-cell stack—a batterylike device that generates electricity from hydrogen and oxygen—it can propel an electric car or truck with only water and heat as by-products [see “On the Road to Fuel-Cell Cars,” by Steven Ashley; *SCIENTIFIC AMERICAN*, March 2005]. Fuel-cell-powered vehicles could offer more than twice the efficiency of today’s autos. Hydrogen could therefore help ease pressing environmental and societal problems, including air pollution and its health hazards, global climate change and dependence on foreign oil imports.

HYDROGEN GAS resists being crammed into the volume of a standard automotive gasoline tank.