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mental dream." Within its walls, hydrogen and oxygen react with an electrolyte (such as phosphoric acid) to produce electricity and two waste products, water and carbon dioxide. The hydrogen and oxygen are supplied, in most cases, by natural gas, but methanol or synthetic gas can also be used. The cells are enormously efficient. They capture about 40 percent of the energy in natural gas; conventional gas turbines, by contrast, achieve only 30 percent efficiency.

A fuel cell provided electricity and drinking water for the two U.S. astronauts who flew Gemini V in 1965, but there have been problems bringing the technology down to earth. A small demonstration plant in New York City is already a year late for start up thanks to a plague of technical troubles and what builders call "silly rigors" imposed by nervous local politicians. But a similar plant in Tokyo has been operating intermittently for a year with few problems.

The two companies involved in fuel cell production, Westinghouse and the United Technologies Corporation, believe that they will get all the kinks out by 1990. Since 1976, they have spent—along with participating utilities—some $250 million in fuel cell research; the federal government has invested a like amount.

Fuel cells will never take the place of coal, oil, or nuclear power. The commercial cells planned for the 1990s will have a capacity of only about 7.5 megawatts: An average coal-fired generator supplies 100 times more power. Construction costs per kilowatt ($850) are about the same for both kinds of generators. But with demand for electricity growing very slowly nationwide, Marshall says, fuel cells could be very valuable where small boosts in output are needed—unless they fail to shake the "lemon" label earned by the New York test plant.

ARTS & LETTERS

Photographing U.S. History

"Brady's Portraits" by Alan Trachtenberg, in *The Yale Review* (Winter 1984), Yale University Press, 92A Yale Station, New Haven, Conn. 06520.

"When the history of American photography comes to be written," declared *Harper's Weekly* in 1863, "Brady, more than any other man, will be entitled to rank as its Father."

The magazine was referring, of course, to Mathew B. Brady, the famed Civil War era photographer. Brady was "neither an innovator nor a great artist" observes Trachtenberg, a Yale English teacher, but he deserved the *Harper's* accolade. Skill with a camera, sheer energy, and a dash of entrepreneurship helped him, but Trachtenberg believes that the key to Brady's success was his conception of the photographic portrait as "a vehicle of certain ideas and feelings important to the culture of his age."

Born in upstate New York in 1823 or 1824, Brady opened his first da-

Brady's widely distributed picture of General Robert E. Lee, dignified in defeat after Appomattox, helped assure the Confederate general's place in history.

guerreotype studio in Manhattan in 1844. "From the first," he later explained, "I regarded myself as under obligation to my country to preserve the faces of its historic men and mothers." Brady was already a wealthy celebrity by the time the Civil War broke out. "His galleries, in New York and Washington, belonged with Barnum's American Museum as places not to be missed," writes Trachtenberg. (As early as the 1850s, failing eyesight apparently prevented Brady from actually taking many pictures on his own. He arranged the poses, lighting, and background; assistants snapped the actual photographs.)

Other photographers pursued the powerful and eminent of the day, but none were as successful as Brady. "To have been invited for a sitting by the impresario himself, 'the indefatigable Brady,' was a sure mark of distinction," Trachtenberg reports.

Unlike his modern-day successors, Brady "did not probe, did not try to lift the corner of a mask or to elicit an off-guard betrayal." He and most of his contemporaries believed that faces were "maps of character, of moral life, and so they expressed a *history* of behavior as well as innate qualities." Viewers could visit Brady's emporiums or buy his *Gallery of Illustrious Americans* (1850) to see and understand "a miniature symbolic America." Brady's pictures, Trachtenberg writes, showed the public "the *look* of the lofty, the famed, and the mighty." They also offered "a promise of transformation for everyone"—and in so doing provided a generation more confident than our own with its "idea of itself."