

# System advancements could accelerate near-term introduction of fuel cell vehicles



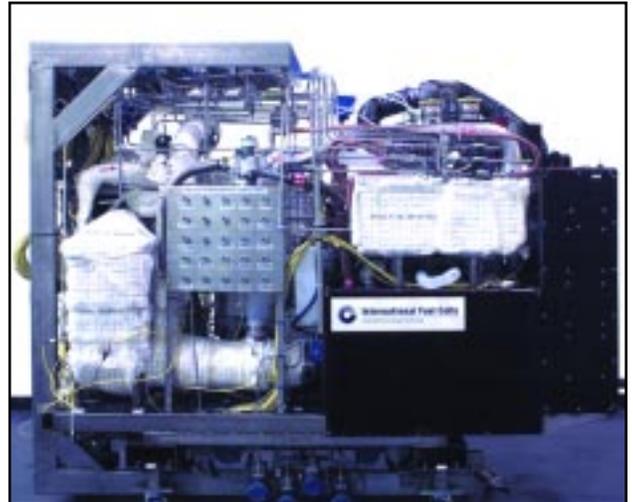
## O A A T A C C O M P L I S H M E N T S

### Atmospheric Fuel Cell Power System

#### Challenge

Hydrogen-fueled fuel cells offer the opportunity for advanced vehicles to achieve very high mileage while emitting zero or near-zero emissions. However, in the absence of a nationwide hydrogen-refueling infrastructure, significant challenges exist in the near term for development of technology that will allow for the fuel cell's large-scale introduction. These include:

- A compact, quick-starting, transient-capable, fuel-flexible fuel processor to reform complex fuels, such as gasoline, to hydrogen.
- A full-scale system that integrates all of the required auxiliary equipment (water and air management, sensors, etc.) with an onboard control system.
- A reduction in the full-scale system's parasitic power requirements.
- Reduction of the high compressor power required to run the system under pressures (2-3 Atm) currently necessary to maximize fuel cell performance and reduce volume.



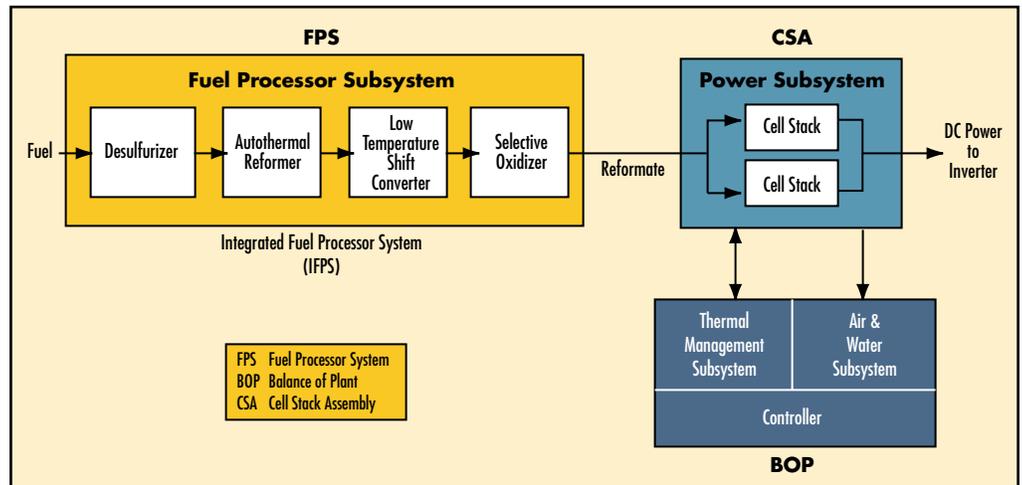
50-kW gasoline-fueled power plant ready for verification testing.

#### Technology Description

A 50-kW (net) gasoline-fueled power plant has been developed for system verification testing. The laboratory power plant, designed to operate at near-ambient pressure, consists of a fully tested, 50-kW-equivalent, fuel-flexible fuel processing system (FPS) and a 50-kW polymer electrolyte membrane stack assembly.

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Atmospheric Fuel Cell Power System

## **Accomplishments**

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The system was demonstrated using California Phase II reformulated gasoline. It operates at ambient atmospheric pressure, requires no compressor, and includes all necessary ancillary equipment and control systems for automated operation.

Steady state testing of the FPS was conducted throughout the required fuel flow range, as well as during start/stop and transient cycles. A fuel conversion of 98% was demonstrated, with overall fuel processor efficiency exceeding 83%.

## **Benefits**

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Onboard reforming of liquid fuels, such as gasoline, eliminates concerns about hydrogen storage and a refueling infrastructure. This could increase customer acceptance of the technology and accelerate near-term introduction of fuel cell vehicles.

When compared with conventional internal combustion engines, the fuel cell system's increased efficiency will lower fuel consumption and reduce criteria pollutants and carbon monoxide emissions which contribute to global warming.

## **Future Activities**

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Verification testing of the complete power plant is now underway.

## **Partner in Success**

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- International Fuel Cells

