

# Scotland's First Fuel Cell Battery Powered Electric Vehicles

By Sinclair Gair

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In December 2000 the Scottish Fuel Cell Consortium (SFCC) was formed as a partnership between the Scottish Enterprise Energy Team, industry and academia. It draws upon the engineering expertise of the University of Strathclyde (Centre for Economic and Renewable Power Delivery); Products of Technology Ltd; ASCO plc; the Grampian Primary Care NHS Trust; PowerGen Renewables; and fuel cell manufacturers.

SFCC is focused on using fuel cells in vehicles. To aid this at Strathclyde, there are projects on clean hydrogen production using electricity from renewable energy devices (wind or wave turbines to power electrolyser units). This clean hydrogen production and utilisation is one of Scotland's efforts towards a sustainable hydrogen economy.

## Hybrid Fuel Cell Vehicles

As part of this effort, SFCC has developed Scotland's first fuel cell battery hybrid powered electric car. The vehicle is equipped with an alkaline fuel cell range extender, compressed hydrogen gas storage, a lead acid battery pack, and a water-cooled induction motor drive system. The prototype fuel cell vehicle is a Mark 1 drivetrain demon-

stration unit with the lowest possible cost configuration achievable with standard production items. This hybrid drivetrain and system configuration is also being applied to a small delivery van, retrofitted to take a fuel cell/battery electric drive, and an 18-seat battery-powered bus with a fuel cell range extender for inner city transport use. Other units for transport fleet application customers are in development.

SFCC also has expertise in higher specification items in the hybrid drivetrain layout, including:

- PEM or alkaline fuel cell systems, using onboard hydrogen storage systems;
- high efficiency, permanent magnet brushless DC, axial field, direct drive traction motors with oscillating rotor capability; and
- customised power electronic controllers.

Advanced software modelling tools allow fast custom design of the drivetrain for any vehicle duty cycle.

### The Author

Professor Sinclair Gair is a director of the Scottish Fuel Cell Consortium and works in the Institute for Energy and Environment at the University of Strathclyde. His research interests are in fuel cells for vehicular and stationary applications, and the design of electric traction drive motors and power electronic controllers.

[www.scottishfuelcellconsortium.org.uk](http://www.scottishfuelcellconsortium.org.uk)

*The fuel cell battery hybrid drivetrain has been packaged into the space frame of an AC Cobra sports car. The range which the vehicle can achieve is a function of the amount of hydrogen stored onboard which, in this case, doubles the range available from the lead acid battery pack*

