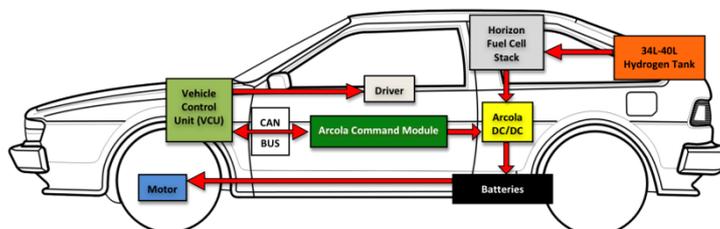


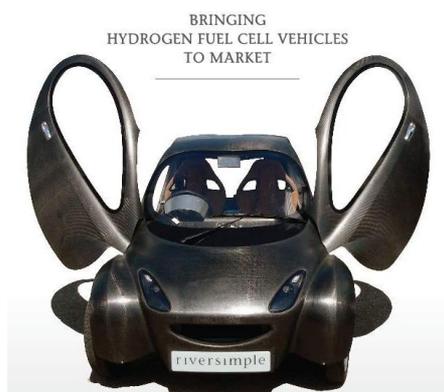
## Case Studies: AutoPAK - Fuel Cell Solution for Electric Vehicles

The easiest and most cost effective way to convert a battery electric vehicle to run on hydrogen



*AutoPAK is a turnkey automotive hydrogen fuel cell solution utilising Horizon Fuel Cell's high-performance, low-cost next generation stacks. The system is designed for use in high efficiency lightweight electric vehicles as a range-extender supplying 'base load' power where peak loads are supplied by batteries or super-capacitors. Modules of 3kW or 5kW can be deployed individually or combined .*

## Riversimple



Riversimple is a car manufacturer, based in the UK, aiming to produce highly efficient vehicles for personal transport.

The hydrogen fuel cell is approximately 50% efficient; double that of a petrol engine. Further fuel and emissions savings are gained because, unlike an internal combustion engine, no energy is lost when the car is stationary in traffic.

Arcola Energy has installed a customised version of AutoPAK in Riversimple's highly innovative new vehicle, using twin Horizon 3kW stacks. Compared with conventional vehicles, the ultra light-weight riversimple car requires less hydrogen and a much smaller fuel tank.

The ultra light-weight design and optimised architecture results in a car with a fuel consumption equivalent to 300 mpg (petrol), a range of 240 miles, a top speed of 50mph, and greenhouse gas emissions at 31gCO<sub>2</sub>/km (well to wheel) from hydrogen derived from natural gas - less than a third of the carbon footprint produced by the most efficient diesel and petrol-engine vehicles currently available. If renewable sources of hydrogen are used, the CO<sub>2</sub> emissions become negligible.

## Microcab



This next-generation hybrid machine brings together expertise from the automotive and motorsport industries, incorporating a chassis designed by Delta Motorsport and Microcab and engineered by Lotus. For the power source of the H2EV, Arcola Energy has installed a system composed of fuel cell, control system and power-conditioning circuitry to charge the vehicle battery while in transit.

Measuring just 3.5 metres in length, the Microcab H2EV boasts a Lotus-engineered bonded-aluminium chassis, weighing just 60kg and allowing for both passenger car and commercial vehicle body-styles. Arcola's fuel cell system allows the vehicle to travel up to 180 miles on a single 1.8kg tank of hydrogen, which can be filled in just three minutes. The H2EV's twin 72V motors provide peak power of 40kW, allowing for a top speed of 55mph.

This four-seat, multi-purpose H2EV Microcab can be used as a car, a light van or a taxi.

## Research purposes

AutoPAK is ideal for university research either in the lab or for student vehicle projects. A wide range of customisation options are available to suit different vehicles and even portable generator applications.

AutoPAK has been sold to UK universities (Kingston University and UCL) and internationally to the Research and Development Center for Electricity Technology, New-Renewable and Conservation of Energy in Indonesia.

Arcola Energy provides support throughout the vehicle design and integration process. Example projects include optimising control based on drive cycle, system efficiency studies, hybridisation strategies and fuel cell control strategies.

Riversimple & Microcab are part of the EU Fuel Cells Hydrogen & Joint Undertaking (FCHJU) which aims to roll out 90 hydrogen-fuelled passenger cars across Europe, the largest number of such vehicles ever made available for a demo project.