

analyst view

Two-Wheelers and the Demand for Fuel Cells

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Suzuki's Intelligent Energy fuel cell powered Burgman scooter (Source: Suzuki)

Earlier this week the Taiwanese government [released](#) a fuel cell motorbike standard to facilitate domestic mass production, with development of a global standard for such vehicles planned. When it comes to fuel cell transportation, most would think of buses, taxis, passenger cars such as the iconic Honda FCX Clarity, or perhaps the quirky Riversimple city car. These all represent major markets for fuel cells, but slightly further from the public eye there is a rapidly emerging fuel cell market in the form of emissions-free two-wheeled transport, particularly in industrialising regions.

Scooters are popular as a cost-effective means of inner-city transport across the world, in long-industrialised areas such as the Mediterranean (the Italians are famed for their love of scooters) but more prominently in newly industrialised regions such as India and China, where fast-paced urbanisation is resulting in over-congested cities in which scooters provide the most nimble means of personal transportation at a cost much lower than that of the gridlocked cars. In these cities air pollution from an ever-increasing number of vehicles is a real problem and is negatively impacting the health and overall quality of life of the city-dwellers. This is creating a strong demand for affordable zero-emission scooters, a demand that several fuel cell manufacturers are now looking to meet.

One company that has followed this emerging demand is UK fuel cell developer Intelligent Energy, who in 2005 introduced the world to its ENV concept motorbike (below). Powered by a 1 kW PEMFC, the bike has a range of 100 miles with a top speed of 50 mph. The futuristic concept bike, and more importantly the viability of the fuel cell technology inside it, caught the attention of Japan's Suzuki Motors. After a period of collaboration and development Suzuki showcased its Crosscage fuel cell battery hybrid motorbike at the 40th Tokyo Motor Show in October 2007.



In the intervening period a number of European fuel cell scooter projects and concepts were demonstrated. The [FRESKO](#), a collaboration between Vespa manufacturer

Piaggio and the Energy Research Centre of the Netherlands, was successfully tested at Piaggio's Italian test ground in February 2006. GR Grafica, another Italian company (an indication of the country's adoration of scooters), began development of a fuel cell scooter, the [Hysyrider](#). Elsewhere, a Dutch graduate student demonstrated the [Fhybrid](#), a battery powered motorbike charged by a compact fuel cell system.

Whilst others demonstrated first concepts, Intelligent Energy and Suzuki pressed forward with product development and two years on from the unveiling of the Crosscage, the pair demonstrated their next product, the Suzuki Burgman Fuel Cell Scooter at the 2009 Tokyo Motor Show. Moving from a motorbike format to a city scooter format, the Burgman (top image) features an improved fuel cell stack and offers a 350 kilometre range. The Burgman became the first fuel cell vehicle to receive EC [Whole Vehicle Type Approval](#) in March 2011, the necessary certificate for mass production of vehicles in Europe. Japan's Nippon Steel [took receipt](#) of the first commercial delivery of a fuel cell Burgman two months later in May.

A fleet of up to five Suzuki Burgman fuel cell scooters has been commissioned under the European [HyTEC](#) project, which also sees the launch of five fuel cell taxis in London and ten FCEV in Copenhagen. The scooters will be tested for up to two years by London's Metropolitan Police starting later this year.

Back in Asia, Taiwanese outfit Asia Pacific Fuel Cell Technologies (APFCT), having identified strong domestic demand, was busy developing its own fuel cell scooter. Having [successfully completed](#) a four-day 1,000 kilometre test drive in May 2010 and building a test fleet of ten scooters, APFCT [won a contract](#) from the Taiwanese Ministry of Economic Affairs (MOEA) for a further 80 scooters for demonstration and validation in July 2011. The testing of these vehicles is likely to have been the catalyst for the publication of the new standard to support fuel cell scooters.

APFCT has partnered with Italian electrolyser manufacturer Acta to [develop a refuelling system](#) for APFCT's commercial scooter model, which will run off two hydrogen canisters dispensed from vending machines that combine solar power and an Acta electrolyser to refill canisters with hydrogen. APFCT has a production target of 1,000 fuel cell scooters for the full year 2012; a target now supported by the MOEA. It is anticipated that a fleet of up to 2,000 APFCT scooters and 100 Acta vending machines will be deployed on a Taiwanese 'green island' tourist destination in the near future.



The pair is also investigating a zero-carbon transportation solution for Honolulu. With a 90% dependency on imported oil, Hawaii is America's most fossil fuel dependent state and suffers from some of the highest fuel prices, and the highest electricity prices, in the USA; one would imagine such a project would be received with great public enthusiasm. From the swift acceleration of APFCT's scooter project, which has now surpassed the commercial readiness of the Suzuki Burgman by some way, it is clear that the areas in which transport is poor, where scooters are most popular and where air quality is declining, are in a strong position to catalyse change domestically. By targeting Hawaii, an export market suffering from similar issues, APFCT is, as others will, offering a solution as well as a fuel cell product.

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