

▶ stating that it was mostly propane, exact details of the mix were not released.

The banks of fuel cells were obviously bulky, and as they were also heavy the tractor had a poor power to weight ratio. It weighed 5270lb and achieved a 3000lb maximum drawbar pull in a dynamometer test, and this compares with the 3393lb unballasted weight and 4362lb of pulling power recorded when a British built Fordson Dexta was tested at Nebraska in 1959.

As well as the performance limitations, the A-C fuel cell tractors failed to create much interest because nobody had heard of global warming in 1959 and there were few concerns about the long term cost and availability of fossil fuels. Now, more than 40 years later, fossil fuel supply worries and the risk of climate change caused by global warming are rarely far from the headlines.

Current interest in fuel cells is prompted by the fact that they do not contribute to global warming or rely on the world's dwindling supplies of increasingly costly oil – or at least that's the theory. A fuel cell running on hydrogen produces pure water and nothing else and, unlike oil, hydrogen is extremely abundant, available in almost limitless quantities in water and in all plant and animal tissue. It sounds exciting and it has already persuaded most leading car manufacturers to invest in fuel cell research programmes. Experimental fuel cell powered



This cutaway view of Honda's FCX research vehicle shows how neatly a modern bank of fuel cells fits in a small family car.

buses are working in several cities, and a compact hydrogen powered cell will produce the energy to run a domestic central heating and hot water system and supply electricity for power and lighting as well.

There are, of course, some practical problems to solve before we can all benefit from abundant, low cost power that does not damage the environment. Producing large amounts of hydrogen from water, for example, would demand large amounts of energy and although some of the energy may come from renewable sources such as wind

power or burning crop residues in power stations, with our existing technology a massive switch to hydrogen powered fuel cells could only be achieved by burning fossil fuels – using them up and causing pollution – or by switching to nuclear power.

In spite of the problems, fuel cells are attracting a huge investment in research and development. Nobody, it seems, is following the Allis-Chalmers example, and the nearest I could find to a current fuel cell tractor project is John Deere's experimental utility vehicle for use on golf courses and other amenity areas, but there are plenty of experimental cars, trucks and buses and the American army is evaluating a fuel cell powered rough-terrain vehicle.

Meanwhile, the 1959 Allis-Chalmers tractor that was at least 40 years ahead of its time is out of sight in a store room at the Smithsonian Institution in Washington DC.

If fuel cells make the commercial progress many people expect, the old A-C tractor will deserve a polish and promotion to the museum's main display area.



Left: This fuel cell powered Pro-Gator utility vehicle is part of a John Deere research programme to develop and evaluate electric vehicles and equipment.

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