Hydrogen Fuel Cells
The New Environmentally Friendly Kid on the Block?

As we know, Elon Musk's Tesla has certainly made the car industry take notice with battery electric vehicles (EV), and if success is measured purely in share price, then he is certainly very successful.

Interestingly though, he has a real dislike of hydrogen fuel cells, calling them 'fool cells' and 'mind-bogglingly stupid.'

Perhaps he is correct, but I am starting to think the concept of hydrogen fuel cell vehicles might just have legs.

Fuel cell companies are starting to attract investor attention as the world's top economies desperately search for the panacea that is a clean, green future.

The problem is that the idea of battery electric vehicles is not very 'joined-up'.

Even the Tesla Model S cannot provide more than about 400 miles of driving without a charge, which is a big challenge, because even with a fast charger it still takes about 15 hours to charge from empty to full.

That's a very long mid-journey rest stop, and takes the idea of 'overnight' charging to another level!

Let me be clear, I am not against Tesla, or any other EV, but there's another issue.

The average British motorist drives 9,200 miles per year. Assuming the EV is a Tesla S, it will require at least 31 complete charges during the year, some 2,945kWh. If all 32,697,400 cars registered in the UK were battery EVs, this would equate to 96.294 Terawatt Hours to add to the current 284 Terawatt Hours used in the UK each year.

To meet this need, the UK's electricity grid would need to be able to provide roughly one third more than it does now. It is a lot of extra wind, sun, gas, coal, or nuclear power generation and distribution needed. And that's just the UK!

The Alternative to Electric Vehicles

With the relatively low energy density of even the most advanced battery technology making EV large commercial vehicles impractical, investments in hydrogen fuel cell development have increased in the last year.

It may also be a potential fuel for the aviation industry.

Oil companies are starting to team up with fuel cell companies like FuelCell Energy, Ballard Power Systems and Plug Power. In April, Chevron and Toyota announced they are partnering to develop hydrogen fuel cell infrastructure.

It is suggested by some, that hydrogen created with renewable sources could supply up to 25% of the world's energy by 2050. However, the cost would need to be about US $2 per kilogram to make it competitive against other types of energy. Currently it's $5 - $6/kg, so there is some way to go.

Part of the recent enthusiasm for fuel cell stocks has been driven by the steep fall in costs for wind and solar power. These energy sources would allow for the needed reduction in cost of producing hydrogen without using hydrocarbons.

Of course, better battery technology could hurt the emerging hydrogen economy, and, like the more advanced battery EV market, more infrastructure is needed for fuel cells to be widely adopted.

How Hydrogen Fuel Cells Work

Hydrogen fuel cells combine gaseous hydrogen with oxygen to create electrical energy. Water is the only byproduct.

Unlike batteries, hydrogen fuel cells don't need hours of recharging.

But there is a problem. While hydrogen is the most abundant element in the universe, it's very high energy value means it invariably exists as a compound with other elements (water for example), not independently. Gaseous hydrogen needs to be stripped out.

Most of the hydrogen produced in the U.S. today is not ‘green’ hydrogen because it is derived from natural gas or coal, or uses nuclear power.

Green hydrogen requires solar and wind energy to power the process of extracting hydrogen from water.

With no carbon released in the process, it is the ideal hydrogen production method.

For years, the share prices of fuel cell companies have trundled along, with no real sign of growth, but started to perk up in 2020.

This, I am sure, was partly on the probability of a Joe Biden presidency that would stress funding for green energy.

Shares continued to soar early this year, before diving again.

In April this year, oilfield supplier Baker Hughes, Plug Power and Chart Industries established a private fund that provides capital for large-scale, green hydrogen infrastructure projects.

Saudi Aramco, the world's largest oil company, currently has massive oil reserves, but is working with China to develop hydrogen and ammonia technologies for fuel cells. Aramco also converts hydrogen to liquid ammonia as a means to transport it.

Royal Dutch Shell, Equinor, and BP are all involved in large hydrogen projects, as the long-term outlook for oil looks bleak.

Last year, Airbus announced study concepts for hydrogen-powered aircraft, with hopes for the first one to be in service by 2025.

After years of looking at the possibility of using batteries, they decided that technology hasn't advanced fast enough.

Nikola Motor Company is building both battery and hydrogen-powered semi trucks.

Nikola also claims its long-range fuel-cell HGV will get as many as 900 miles on a tank of hydrogen when it comes out in 2024. The battery-powered Tesla Semi, which may be produced later this year or next, will only have a range of 200-300 miles.

Advent Technologies are building hybrid fuel cells and batteries that run on hydrogen, natural gas and other fuels. They anticipate there will be a big market for fuel cells to power things like drones and boats.

Top Challenges To Hydrogen

As battery-powered vehicles become more commonplace, car makers are working to fix the current limitations.

And although improvements are coming thick and fast, the huge charging issues of needing vastly more grid power, better charging times and access for all, along with the on-going acquiring and use of lithium and rare earth metals for batteries, all seem to suggest that maybe, just maybe, hydrogen fuel cells are the holy grail of zero carbon travel.

Would you invest in fuel cell technology?

It seems possible that one or some of the companies in this field will be the next Apple, Microsoft, or Google stock to buy.

But which one? Well at this stage, that is any investors' guess.

As always, proceed with caution. Any new technology or concept can make you millions or fail miserably. So be sure you know if you are investing, speculating, or gambling.

Remember the industrial battles of the past, like;

- Betamax / VHS
- Google / Bing / Onesearch
- Apple / Dell / Lenovo / Samsung / HP / Sony

The best technical solution, the most user-friendly, the first to market, or the most innovative product is not guaranteed the win.