



The Toyota Mirai is one of the first hydrogen fuel cell vehicles to be sold commercially. AP

THE FUTURE IS IN HYDROGEN, NOT EVs

It may be April 1 today, but this is no April Fools' joke. Electric vehicles are only an interim solution and will be replaced by a more convenient and sustainable prime mover.

Some 200 years ago, when vehicles were being invented to replace horse-drawn carriages, battery-powered vehicles were the first to be used but they were soon discarded because of insufficient range.

The internal combustion engines that replaced them provided longer ranges and much shorter refueling times.

For over a century, we have enjoyed the benefits of these ingenious machines.

The only snags are the carbon dioxide and nitrous oxide emissions and an anticipated long-term oil supply shortage.

So, there are valid reasons to look around for longer-term alternatives to fossil fuel vehicles for future generations.

My own bet is that hydrogen fuel cells will be the longer-term solution.

First, hydrogen is light and can be compressed for storage to provide reasonable ranges.

Second, in a fuel cell, hydrogen is chemically combined with oxygen to produce electricity, with only water vapor as a by-product.

Hydrogen fuel cell vehicles are still electrically powered, but instead of a large and heavy battery, electricity is generated through hydrogen reacting with the oxygen that is in the atmosphere.

A smaller battery is still used to provide a buffer of power for starting and for when a surge of power is required for sudden acceleration or climbing very steep hills.

All of these make hydrogen fuel cells seem perfect for vehicle propulsion.

So why have they not replaced internal combustion and battery-powered engines? The issue is, once again, supply and demand. Where do we get that huge amount of hydrogen needed for everyday use by the masses?

The answer lies in a new "hydrogen economy" to augment or eventually replace the traditional oil economy.

We all wish to use more renewables but



Nuts and bolts

Edmund Leung

know that the most effective applications of solar and wind power lie in remote areas where there are vast tracts of unused land.

Such locations do not see, like in large cities, heavy demands for energy.

Moving electricity through cables over long distances is not efficient, as the energy lost during transmission makes it uneconomical.

Power stations using renewable energy often have the problem of overproduction at times when there are reduced demands.

This is especially the case for wind power, as at night when power demand wanes, there is nowhere to store it.

It is also true that many solar-powered stations produce excess electricity that is not taken up by the consumers.

The result is that they have to "come offline," like a factory stopping production. How nice it would be if we can store this energy and use it elsewhere.

By installing hydrogen production plants near these renewable energy stations, we can "store" energy and transport it to cities. It will also boost the economy of these outlying regions.

To make it work, obviously a new supply and distribution network is needed.

Refitting petrol stations for hydrogen supplies should be no more difficult than adding an LPG filling service to the existing refueling network, and we have done that over the past two decades.

All that is needed is a policy to encourage their use and the technology to ensure total safety to consumers.

I estimate we will see fuel cell vehicles on roads in less than 10 years and them replace petrol and pure electric vehicles in 20 years.

When that happens, the air will be cleaner and we can help combat the threat of global warming.

Veteran engineer Edmund Leung Kwong-ho casts an expert eye over Hong Kong's iconic infrastructure