



## HYDROGEN CAN GO THE DISTANCE FOR BUSES

I was invited to see a new hydrogen-powered bus at the Citybus depot a fortnight ago alongside its new electric bus and was most impressed with the technological development of our road transport equipment.

To achieve carbon neutrality by 2050, diesel buses will need to be replaced by more environmentally friendly vehicles.

Readers may not be aware that Hong Kong probably has the largest fleet of buses in any city.

We are also unique in having the largest buses. Our standard bus is now a double-decker with three axles, carrying over 150 passengers.

The reason they need three axles is to meet local regulations that limit the axle load of road vehicles to ensure safety and to minimize excessive wear to our roads.

The hydrogen bus I saw is, as such, a one-off prototype of a three-axle vehicle specially ordered as an experiment for tests under Hong Kong conditions.

Compared to an electric bus, the hydrogen one requires much shorter refueling time of about 10 minutes, instead of hours, and has a longer range of about 400 kilometers, allowing it to do a full day's work without the need to refuel.

This will be most useful as we do not have enough space to park buses at night, not to mention the need for dedicated spaces with power supply for recharging.

Critics may suggest that the power conversion efficiency of hydrogen fuel cells could be lower than for battery-powered electric motors, but I am optimistic that, with further development, the gap will be significantly reduced by the time they are ready for commercial operation.

After all, it took EVs some two decades with extensive development to reach the present stage of range and efficiency.

What is more pertinent for us is the need to update our laws to allow hydrogen-powered vehicles to run on the road.

The bus we saw was required to have all its hydrogen emptied from the storage tanks before it would be allowed on



the road, not to mention the opportunity to test run its hydrogen powered prime mover.

So, the opportunity to test it for range and reliability for Hong Kong application is now a long way away in the horizon.

I was told the reason for the ban is our authorities' concern over safety.

Hydrogen is regarded as a dangerous gas susceptible to explosion when released to the atmosphere, in some critical percentages of concentration.

Although actual cases had been rare, the risk is still considered to be high.

With the roads being congested and the many tunnels on bus routes, the electrical and mechanical services and fire services departments will need more time to evaluate the possible impact.

My own technical view is that the risk of hydrogen explosion in a road vehicle should be comparable to that for LPG-powered taxis and minibuses.

Hydrogen is lighter than air and in the event of an accidental release, it will disperse upward and quickly dilute to become harmless.

All road tunnels have efficient ventilation systems and will be able to disperse any hydrogen that may escape from the bus inadvertently.

LPG, which is heavier than air, could, in theory, gather in gutters and drains and pose fire and explosive dangers, but with over two decades of operation, we have not heard a single case of an LPG explosion on the road. (There was a case of an explosion, but it was in an enclosed area, a garage, that had inadequate provisions).

Hydrogen is a clean fuel, and we must move forward to accept it as our future. We can rely on engineers to ensure safety in its use.

**Veteran engineer Edmund Leung Kwong-ho casts an expert eye over features of modern life**