

UNDERSTANDING Hydrogen as a fuel



Above: a hydrogen fuel cell vehicle.

THE POTENTIAL for hydrogen as an energy source is excellent. It can be used almost anywhere energy is needed, such as power generation, transport and heating.

Anyone who has taken a chemistry class knows that hydrogen is number one on the periodic chart of elements and the lightest of all elements. It is easy to produce through electrolysis by splitting water (H₂O) into oxygen and hydrogen by using electricity. Commercially, nearly all hydrogen is currently made from natural gas, but there is limitless potential to use renewable sources of energy, such as photovoltaic cells, wind, wave or tides, to produce hydrogen.

Because hydrogen can burn pollution-free, it is the ultimate clean fuel. When burned, it turns into heat and water vapour. Being a non-carbon fuel, the exhaust is free of carbon dioxide, which the majority of the world's scientists believe is causing the world's temperature to increase and therefore the climate to change. Hydrogen is normally a gas, which can be compressed and stored in cylinders. One challenge with hydrogen is the bulk of the

fuel cylinders. Compressed hydrogen contains less energy per volume than liquid fuels like petrol, so to achieve equivalent vehicle range, more space on the vehicle is taken up. Hydrogen can also be cooled to produce liquid hydrogen, which takes up far less room and has about the same energy per unit volume as petrol, but this is costly due to the energy required to achieve the very low temperatures of liquid hydrogen.

Hydrogen's clean-burning characteristics mean it makes an ideal transportation fuel. At present, the challenges of how to produce and distribute hydrogen cheaply and how to store enough hydrogen on a vehicle for a reasonable range are slowing its adoption for widespread commercial use. However, research is progressing very quickly and hydrogen-powered vehicles are not far off. Several manufacturers have said they will have hydrogen fuel cell vehicles for sale in 2005.

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