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"Submission to Issues Paper 5 - Geoff Peverell"

Questions for Consideration

What are the key barriers to the adoption of cost-effective and low-emissions mode use in
the passenger transport sector? How might these be addressed effectively and efficiently
by government policy?
What policies would be suitable to address barriers to the uptake of more fuel efficient passenger vehicles?

These issues can be addressed largely by a move to the Hydrogen Economy. **This likely warrants its own issues paper so lets introduce it as follows.**

In January the car maker, BMW demonstrated its "Hydrogen 7 car". This is a dual fuel vehicle similar to a petrol/LPG, (Liquid Petroleum Gas) one. Instead of LPG it uses hydrogen. The interest lies in how the hydrogen is stored. While there are attempts under development at more efficient storage, BMW are using liquid hydrogen rather than compressed hydrogen gas. It uses highly efficient insulation which, while it would take 13 years for a snowball to melt, never the less can only store liquid hydrogen for weeks/months. This is not necessarily a problem as the hydrogen has to evaporate anyway. For railway locomotives more insulation could be used and more frequent use would reduce the hydrogen loss. Provided the same form factor was used larger storage tanks would have a lower surface to volume ratio and thus less loss.

The easiest low emission way of making hydrogen is by passing an electric current through water.
The current needs to be DC - Solar panels provide DC.
The voltage needs to be relatively low - Extra low voltage in Electrical Engineering nomenclature - The individual cells in a solar panel generate a fraction of a volt so panels could be made to provide the required voltage.
Some people have a problem with the efficiency of this process which seems to be about 70% of the power input. The Sun is free.

To be really useful at producing electricity by solar/wind there is a need for storage to get through the night and to some extent cloudy days /no wind. An example is the Vanadium battery system, to store wind power, on King Island between Victoria and Tasmania that has halved? the diesel requirement.

On a larger scale hydrogen is clearly a better option. By increasing the pressure a few days supply can be stored in a pipeline from NW Victoria to Melbourne where it could be burnt in Newport power station instead of Methane aka Natural Gas (A greenhouse gas 21 times more potent than Carbon Dioxide when it escapes being burnt.) Gas and Fuel Corporation was storing liquid methane/Nat Gas at Derrimut. Hydrogen needs to be a lot colder -250 degrees.

Power stations need cooling water in large quantities so using seawater makes sense. Using water to make hydrogen requires about a tenth of that used in the Latrobe Valley for cooling.

The land required for PV is small eg 5 by 10 kilometres, cloely packed, would give as much power as Hazelwoods 1.6 GW. In practice, more East-West spacing and raising the arrays would allow sunshine and rural pursuits underneath.

The cost of Photovoltaic panels, continues to drop, from at leat $10 per what to about $7 in 2 years. Considering the ready availability of the raw materials for next to nothing this is not surprising. eg Silicon is a major constituent of sand but needs extensive treatment.

Hydrogen can be used in industrial processes such as the Fischer Tropsch that produces a range of useful hydrocarbons.

In summary the Hydrogen Economy can be implemented with existing technology. This may not please some people who want to be paid to bury Carbon Dioxide, the oxymoron "Clean Coal" or develop "this" or "that". There are many proposals, while ingenious, that would not scale industrially.

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