

## Gas infrastructure advice submission - 85

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**Stakeholder group/interest:** Retired

### **Q1. Do you have any further information, evidence, or concerns that you wish to raise in relation to the scenario design and analysis?**

The option of having reticulated hydrogen, replacing methane, in existing infrastructure is a very good option; so long as the hydrogen comes from the electrolysis of pure water using electricity from renewable sources e.g. wind, photovoltaic, hydro-electric, sea wave, tidal, or similar non-polluting electrical sources.

Hydrogen can be used for purposes other than heating. It can be a chemical reagent, and feedstock for the production of electricity by stationary or mobile fuel cells.

The option of producing hydrogen other than by electrolysis of pure water, e.g. from coal, or nuclear power, should be eliminated.

The option of carbon capture and storage (CCS) of carbon dioxide (CO<sub>2</sub>) should be eliminated because it is thermodynamically very inefficient, impractical, and geotechnically highly risky. Simply, CCS does not work. We should not waste any more resources on CCS.

The use of biogas, that is methane from anaerobic digestion of biological wastes, is defensible as a small scale localised strategy. That is, the digester and the consuming appliance(s) must be in close proximity and well matched for supply and demand. This already happens in relation to sewerage treatment plants, some domestic landfill waste disposal sites, and some food factories.

Another "energy gas" which should be considered is ammonia (NH<sub>3</sub>). The combustion of ammonia with oxygen yields water and nitrogen gas, both of which can be released back into the atmosphere without harm. Ammonia can be made from hydrogen and nitrogen using the Haber-Bosch process, powered by renewable energy. As a means of transporting "hydrogen" in ships over long distances, ammonia has the advantage of allowing lower pressures and far less refrigeration than pure hydrogen. As a transport fuel, hydrogen is encumbered by the bulky and very heavy pressure vessels used to contain it. Ammonia is less encumbered.

Ammonia is also a widely used chemical reagent.

### **Q2. Do you have any further information or evidence that can help identify an optimum scenario for a net zero emissions gas sector in 2050?**

Well before 2050, the gas sector should be producing zero emissions of greenhouse gasses, and zero emissions of ozone depleting substances, either as the gas product, or as products of combustion of the gas.

### **Q3. What policies and/or regulations, if any, are needed to support the development of low carbon pathways such as biogas, green hydrogen, and carbon capture and storage?**

Legislation, plans, budgets and political support will be required to make a vigorous transition from a methane fuelled to a hydrogen fuelled economy.

Oil and coal field developments should be phased out as soon as possible.

Hydraulic fracturing (fracking) of carbonaceous deposits should be immediately banned in Victoria. Similarly offshore exploration, drilling and mining for coal and hydrocarbons, should cease as soon as possible.

Carbon capture and storage (CCS) is a dead-end technology that does not work. Do not waste any more resources on CCS.

**Q4. What is your view on the best ways to maintain the reliability and affordability of Victoria's gas supply if natural gas use declines?**

The use of methane-based natural gas should be progressively replaced by hydrogen produced by the electrolysis of pure water. All the energy for the electrolysis should come from renewable energy sources.

The water feedstock could come from desalinated sea water, itself produced using renewable energy.

**Q5. What else can you tell us about the implications of decarbonisation pathways for the electricity generation, transmission and distribution networks?**

Gasses such as hydrogen or ammonia can be used as fuel for the generation of electricity via combustion in gas turbines.

Gas turbines have the advantage of providing power very quickly when demand is high, and switching off when demand is low.

**Q6. How can the use of Victoria's existing gas infrastructure be optimised during the transition to net zero emissions, over the short (10 years), medium (20 years) and long-term (30+ years)? How can the Victorian Government assist in this?**

Molecular hydrogen (H<sub>2</sub>) has different physical properties to methane (CH<sub>4</sub>) so it is likely that existing gas infrastructure will need engineering modifications and considerable verification to ensure that it can safely deliver pure hydrogen.

It is likely that existing natural gas appliances will need to have their jets modified or changed to ensure that heating appliances deliver safe and reliable hydrogen flame.

**Q7. What principles should apply or what measures will be needed to manage the impacts of gas decarbonisation on households and businesses?**

It will not be possible to simply "switch" Victoria's reticulated gas supply from methane to hydrogen.

We need progressive implementation, that is (notionally) "one suburb at a time" until the entire State has made the switch. This will require careful planning, public consultations and monitoring to ensure the "switch" is safe and effective.

**Q8. What policies, programs and/or regulations should the Victorian Government consider or expand to encourage households, commercial buildings and small businesses to reduce their gas use?**

Government should provide generous incentives for the installation of insulation, and other efficiencies, which would reduce the demand for gas fuels (of every kind). The size of the opportunities here, especially in the domestic context, could be enormous.

**Q9. What policies, regulations or other support, if any, do you think are needed to support industrial users to switch from natural gas to lower emissions energy sources or chemical feedstocks?**

It is likely that each industrial user of gas would have bespoke requirements with respect to conversion from methane to hydrogen. Governments should provide financial and broad technical support for each and every one of these conversions.

**How would you like your submission treated?**

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