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National Hydrogen Strategy Taskforce

Department of Industry, Innovation and Science

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National Hydrogen Strategy Issues Papers

AGL Energy (**AGL**) welcomes the opportunity to make a submission in response to the Hydrogen Strategy Taskforce's National Hydrogen Strategy Issues Papers (**Issues Papers**).

AGL is one of Australia's largest integrated energy companies and the largest ASX listed owner, operator and developer of renewable generation. Our diverse power generation portfolio includes base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources. AGL is also a significant retailer of energy, providing energy solutions to around 3.5 million customers throughout eastern Australia.

In addition, AGL is continually innovating our suite of distributed energy services and solutions for customers of all sizes. These behind-the-meter energy solutions involve new and emerging technologies such as energy storage, electric vehicles, solar PV systems, digital meters, and home energy management services delivered through digital applications.

The commitment by the COAG Energy Council in December 2018 to establish a dedicated working group, chaired by the Chief Scientist Dr Alan Finkel, is a welcome step in progressing the development of a clean, innovative, and competitive hydrogen industry that may create significant opportunities to further integrate energy markets with emissions reduction obligations, provide alternative energy sources for customers, and provide significant value to Australia's economy through both export revenue, domestic industrial development, and mobility fuels.

Although the development of a large-scale hydrogen industry is in its infancy, the long-term benefits of utilising an abundant and clean fuel source are clear if the transition can occur in a cost-effective and efficient manner. As the Hydrogen Strategy Taskforce recognises, however, there are a number of initial issues that must be overcome for this transition to be realised.

Nevertheless, we consider that the potential long-term value of hydrogen opportunities to the Australian economy and energy sector are considerable, and therefore worth exploring in some detail. We therefore look forward to continuing to work with the Hydrogen Strategy Taskforce to further develop and inform the direction of the roadmap.

We have provided more detailed responses on these matters in Attachment A.

Should you have any questions in relation to this submission, please contact Aleks Smits, Manager Policy & Research on 03 8633 7146, or myself on 03 8633 7252.

Yours sincerely,

Eleanor McCracken-Hewson

Senior Manager Policy, Research & Stakeholder Engagement, AGL Energy

Attachment A – Further detailed response

The benefits of hydrogen as a fuel source are clear if they can be realised at low cost. Hydrogen is universally abundant, and when used as a fuel source produces no environmentally harmful emissions. However, while technologies to isolate hydrogen have been available for a considerable period of time, the cost to do so has not yet proven competitive against other energy sources. Additionally, historic safety concerns have caused some apprehension with the utilisation of hydrogen as a fuel for consumer products and appliances.

The Hydrogen Strategy Group's briefing paper *Hydrogen for Australia's Future*, presented to the COAG Energy Council in August 2018, and the CSIRO's *National Hydrogen Roadmap* provide useful overviews of these issues along with the current status of hydrogen production technologies and the challenges and opportunities associated with expanding this production in Australia. The Taskforce's Issues Papers consider many of these issues again in considerable detail.

As a participant in the Hydrogen Energy Supply Chain (**HESC**) project, AGL is already well aware of these technical and operational challenges, and advanced in its consideration of the value of developing a hydrogen supply chain.

The HESC project is a world-first initiative where brown coal from the AGL Loy Yang mine will be converted to gaseous hydrogen at the Loy Yang Complex and then transported by road to a liquefication terminal at the Port of Hastings. The gas will then be shipped to Japan for use predominantly in the transport industry.[1] AGL's support for the pilot project includes land, energy and water for the plant and up to 160 tonnes of brown coal. With support from the Australian, Japanese, and Victorian governments, the HESC Project includes leading Japanese energy and heavy industries corporations including Kawasaki Heavy Industries, J-Power, Iwatani, and Marubeni Corporation.

During commercial operations, HESC will require a Carbon Capture Utilisation and Storage (**CCUS**) solution. CCUS will not be a feature of the HESC pilot phase, due to the low volumes of carbon dioxide involved, which is equivalent to the annual emissions of about 20 cars. Carbon offsets will instead be used to mitigate emissions for the pilot phase. However, if the pilot is successful, CCUS will be an essential component of the commercial phase, a factor which has been recognised by both the CSIRO and Hydrogen Strategy Taskforce's Issues Papers.

While AGL is involved in the production of hydrogen from brown coal, we are also interested in how hydrogen could support existing electricity and natural gas markets and assist in meeting Australia's international commitments to reduce emissions.

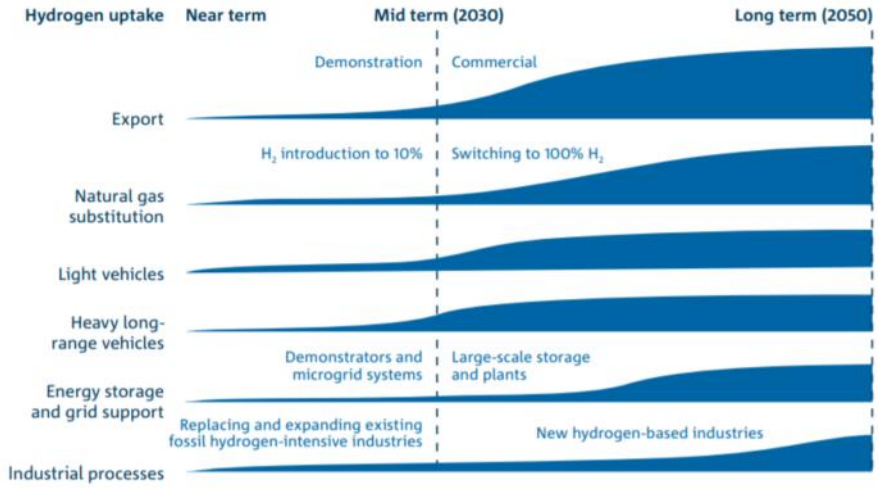
As noted by the *Hydrogen for Australia's Future* briefing paper, electricity requirements for hydrogen production from electrolysis could provide a useful level of demand for low-cost generation that is not being dispatched into the grid. This may assist with utilisation rates and provide flexible opportunities for generators to manage their operations.

Similarly, we note the initial discussions regarding the replacement of natural gas with hydrogen in the existing natural gas supply chain. In our view, the partial replacement of the existing natural gas supply chain with hydrogen may be an effective way of both introducing additional gas supply and reducing emissions, but we consider that more work needs to occur to understand the full costs and implications of this proposal.

[1] For more information on the HESC project, see https://hydrogenenergysupplychain.com/

In a decarbonising sector with increasing renewables and aging thermal assets, the development of hydrogen has been gaining momentum in part because of its proposed use in a broad range of areas, including: supporting electricity grid stability, enabling an export market, as a green industrial feedstock, enabling gas network decarbonisation, and as an alternate transport fuel.

While each of these outcomes could provide significant long-term value, it is important to note at this stage that although much larger growth in the hydrogen supply sector is expected as commercial viability is proven and technologies reduce cost, the National Hydrogen Strategy Taskforce projects that hydrogen will remain small to mid-scale through to 2030, due largely to the high costs with producing hydrogen using current technologies.



Source: COAG Hydrogen White Paper

Major advances in the long-term will therefore rely heavily on technological improvements to reduce production and transport costs and address existing limitations to expanding the scale of hydrogen development.

While all opportunities presented by hydrogen should be investigated, the focus should therefore remain at this early stage on analysis and research, including pilot projects, rather than significant commitments to long-term infrastructure build or fixed development pathways.

Nevertheless, Japan and South Korea in particular have bold plans to realise a Hydrogen Society so as to meet their domestic targets under the Paris Agreement. These plans have prompted and fostered significant government and private sector research into the creation and utilisation of hydrogen. The HESC project discussed above is an example of this ambition.

Some see hydrogen on a similar development pathway to LNG in the late 1970s. Technological advancements in the shipping of LNG meant that it could become a truly global energy commodity. Similarly, for Australia to capitalise on a global hydrogen market it may need to first develop cost effective hydrogen technologies for export (e.g., generation, transport, handling, or utilisation), or induce or develop suitable hydrogen transport technologies to unlock the value of domestically produced hydrogen.

Ocean going transportation of hydrogen remains an outstanding issue for the acceleration of a sustainable global hydrogen market. In this respect, much can be learned from the current landscape of international LNG development and transport.

In additional to technological advancements, competing on cost, safety, and reliability of supply are required for a successful industry. Principally, costs must be equal to or better than substitute fuels, and hydrogen and associated waste products must be produced, stored, transported and utilised in a safe manner.

Safety considerations by gas facilities are generally very well managed, however, within Australia the absence of specific, suitable and complete hydrogen standards may hold back an acceleration of industry growth. Progress towards appropriate regulation as well as domestic and International Standards may therefore support the development of a complete supply chain of safe generation, transport, handling and utilisation of hydrogen, and the management of associated waste streams.

By way of example, the introduction of alternate fuels (such as phasing out of lead-based petroleum, or the introduction of ethanol blends or LPG) required concerted research, the development of standards, and their application within multiple industrial and transport sectors. Similarly, the application of standards at an early stage that do not impede development options would be useful to guide the industry to scale.

Safety and environmental impacts should be a primary consideration when considering the manufacturing and utilisation of hydrogen. Communities should feel confident and comfortable with hydrogen generation, storage, transport and utilisation.

Finally, while the development of hydrogen presents significant opportunities, we consider that on an overall basis Governments should promote all equivalent technologies on an equal scale, and not favour one technology over another by the use of artificial targets or subsidies. For example, energy sourced from renewable electricity may in many respects be comparable to energy sourced from hydrogen. We therefore consider that, as much as possible, policy for long-term renewable energy sources must be technologically neutral and should consider how different technologies can complement each other rather than promoting one energy source over another.