
# Hydrogen: The obvious response to an economic imperative

By Dr. Fiona Simon on Jun 01, 2021

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Last week Informa and the Australian Hydrogen Council held the Australian Hydrogen Conference. Over two days we heard from 50 people and had the pleasure of being able to host 300 delegates in person in sunny Sydney.

I was supposed to open and close the conference, and to chair several sessions, and I was looking forward to it. But the timing was unfortunate: I caught a cold and couldn't travel or host the event. Everything went brilliantly of course – hydrogen and the Australian Hydrogen Council (AHC) is so much more than my contribution. Thank you to Informa and our speakers, sponsors and session chairs for a fantastic job.

The below is what I planned to say to open the event...

**Our economic reality**

I am going to talk today about a future hydrogen industry as an economic necessity.

I'm not going to talk about climate change. That's not because it isn't a fundamental existential issue, but because right now I don't have to talk about it. The economic arguments for hydrogen are already clear, by which I mean the need to see hydrogen as helping respond to an economic need.

So let me start by outlining our current economic reality.

First, Australia is a major exporter of coal and natural gas and our trading partners are moving to net zero.

In the 2020 financial year the combined export value of our LNG, coal and oil was just over A$86bn ($66.6bn) – about a third of the total resources and energy export value that year. The principal markets for these exports were Japan, China and South Korea; all countries with explicit net zero commitments.

We are also increasingly seeing financial institutions and investors turning away from oil and coal.

Even the International Energy Agency (IEA) – which was initially founded after the 1973 oil crisis and criticised for years for being pessimistic about renewables – is suggesting major change. According to the IEA in its recent report *Net Zero by 2050: a Roadmap for the Global Energy Sector*, reaching net zero by 2050 means no investment in new oil, gas and coal projects.

We will also see geopolitical consequences from the energy transition. Countries will have new choices because of the fundamental physical differences between fossil fuels and renewable technologies.

This means it is important that we recognise Australia will be competing in very different future markets. Perhaps the competition will be higher than we have experienced to date.

Of course, our export markets will not dry up tomorrow. This is a long-term transition. But the writing is on the wall. A meaningful response to the transition will also take time.

And, crucially, it's not just about export. The transition is well-progressed domestically, at least for electricity.

In its work on Australia's Integrated System Plan, the Australian Energy Market Operator (AEMO) has noted that Australia is experiencing what is acknowledged to be the world's fastest energy transition. AEMO has said that by 2035 there may be periods in which nearly 90% of demand is met by renewable generation. And we are apparently well ahead of the scenario which would see more than 90% renewables by 2040.

With this new reliance on variable renewable energy, AEMO notes that, depending on the scenario, the National Electricity Market will also need 6-19 gigawatts of new utility-scale resources. This is to provide firming for the system. It includes 'deep' storage for droughts of renewable electricity – those periods, possible extended, of insufficient sun or wind.

**Hydrogen helps meet the challenge**

So, these are two economic reasons why we need to be working toward a new and long-term energy solution:

1. We need a way of rethinking how we export energy.
2. We need to firm variable renewable electricity at scale, and over long periods. And this is an economic issue because our entire domestic economy uses electricity one way or another.

Each of these reasons relates to drivers that are already well underway and are not a matter of choice.

In each case, hydrogen provides a response, and really provides the best way to ensure economic security:

- On exports, hydrogen can be exported, and our trading partners are already asking for it. We are in a prime position to lead our region. That's been widely acknowledged.
- And hydrogen supports our energy security by providing a means of storing energy long term. It is a valid, and I would suggest better, alternative to pumped hydro, where there is less geographical limitation for hydrogen, and the benefits of more flexible response. And hydrogen storage has been estimated to be much cheaper than long duration grid-scale battery storage.

Let's unpack this a little.

The new hydrogen industry envisaged in Australia's National Hydrogen Strategy will be of significant scale.

There will also be a need for a renewable energy sector that can power the required electrolysers. This is on top of what we need to decarbonise domestic electricity use.

In his recent *Quarterly Essay*, Dr. Alan Finkel says that if we were to export as much hydrogen by energy value as the LNG we exported in the year to June 2020 (33 million tonnes) we would need about eight times the total electricity that was generated in Australia in 2019.

He says that if we used solar for that energy, we would need around 75 times Australia's installed solar capacity in 2019. At 2,200 terawatt-hours, this is more than the world's installed solar capacity.

However, while these are big numbers, Dr. Finkel says it's quite conceivable when spread over 30 years.

How do we build for this future?

We need the workforce.

The renewables opportunity alone is said to bring in as many as 45,000 new jobs.

Hydrogen jobs would be in addition to that. The National Hydrogen Strategy says there could be as many as 17,000 new jobs, many in regional areas.

**Green steel to grow manufacturing**

I want to note here that we've been hearing more and more about green steel recently, and the opportunities that hydrogen creates to add value to our primary commodities.

The idea here is that Australia is well-positioned to export green steel to certain countries, and that the benefits for the Australian economy will be vast.

Green steel is a manufacturing opportunity that could plausibly provide tens of thousands of jobs. Fortescue's Dr. Andrew Forrest says at least 40,000 jobs, which is if we captured only 10% of the world's steel market. This is a comparable number to the jobs in Australia's coal mining regions. These are also similar jobs in their skills requirements and pay.

I should note though, that when we add iron ore to make green steel the renewable electricity requirements increase again – and significantly – with further potential multiples of Australia's total electricity demand required.

The scale challenge is real.

There is also a political and local challenge. We have regional communities who depend on coal mining and who are understandably seeking assurances about their way of life. The industry will not disappear tomorrow, so it might seem reasonable to act for a while longer as if it will always be around.

But doing this isn't actually helping these communities, because the change they will need to make will also take time. It will take time to develop the alternative ways for these communities to work, live and thrive.

We are talking about long term culture change and workforce renewal. This requires policy and planning to support social infrastructure, and provide clear career pathways, supported by education and training.

**What's next?**

So we can see a huge opportunity here, and also a huge task to respond to this opportunity and to minimise Australia's losses as a fossil fuel exporter.

How far down the road are we in this task?

Work has of course begun. There is certainly activity on hydrogen – in fact an amazing surge of activity – that has continued through the pandemic. We have seen strategies, policies, research programs, pilot plants, demonstrations, hubs, clusters, and proposals for mega-projects. We have seen government funding announcements and a clear support for hydrogen.

This activity is getting the hydrogen ball rolling and will help us work out where the best opportunities lie. It may also identify some directions that are less prospective than we once thought. That's an innovation system at work.

However, we must take stock of our activities soon. We need to survey the global hydrogen scene and clarify our priorities.

The groundwork we're now doing is crucial of course, but a higher-level helicopter view would give us a more strategic view of the future.

The helicopter view should give us some answers to important questions. For example:

- For what uses will hydrogen demand grow earliest?
- What will be the right blend of centralised and distributed production – and of export and domestic use?
- At what rate – and where – do we need to build renewables to feed hydrogen production?
- How can we best connect Renewable Energy Zones, hydrogen hubs, and clusters with the regions that are more vulnerable to the energy transition?

These answers will help us build on the foundation laid in the National Hydrogen Strategy. They will give governments, businesses and regions guidance to sharpen their plans and make increasingly informed choices.

And answers to these questions will be vital to how we think about, and plan for, the energy transition more generally.

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**About the Australian Hydrogen Council**

The Australian Hydrogen Council is the peak industry body for Australia's emerging hydrogen industry. Our members are at the forefront of Australia's hydrogen industry, developing the technology, skills and partnerships necessary to build Australia's hydrogen economy.

Despite the effects of the pandemic on the global economy, the Australian Hydrogen Council has been fortunate enough to see a continuing growth in membership, with 25 new members since February this year.