New Energy Quarterly:

Hydrogen – No Longer a Pipe Dream

Autumn 2023

Hamilton Locke

Contents

Editorial

The global appetite for hydrogen projects, at least at the project proposal level, continues to grow. According to a report from the World Hydrogen Council (**WHC**), approximately 680 large-scale hydrogen project proposals were put forward, globally, in 2022. These projects amount to approximately USD $240 billion in direct investment over the next seven years, and reflect a 50% increase in investment since November 2021. Of these 680 projects, 45 (USD $29 billion) have progressed to the front-end engineering design phase, while a further 120 projects (USD $80 billion) are undergoing feasibility studies.

Despite the overwhelming potential for hydrogen to contribute to a decarbonised economy, there are significant challenges which must be overcome. Only 10% (USD $22 billion) of the projects put forward have reached final investment decision (**FID**), are under construction, or are operational. The rate of growth of projects reaching FID and beyond (USD $2 billion) is also slower than the rate of growth of project announcements. While the level of announced projects indicates tremendous enthusiasm for hydrogen development, most of that enthusiasm, unfortunately, remains on the drawing board.

The biggest reason for the gap between proposal and FID is demand visibility. According to the WHC, this lack of demand visibility stems from uncertainty about regulatory frameworks and funding incentives for long-term supply contracts. Long-term supply contracts are essential for unlocking financing and investment, without which, project developers struggle to obtain the necessary funding and investment for projects.

This lack of demand visibility has created a significant gap between the global demand for hydrogen (as perceived by project developers and reflected in the number of project proposals) and the development of infrastructure by those project developers to meet that demand.

The uncertain global economic outlook also explains the gap between hydrogen project proposals and hydrogen projects reaching FID. As interest rates continue to rise, financing projects becomes more expensive for project developers, and further, inflation has dramatically escalated the price of construction materials. In this context, project developers may be inclined to take a more conservative approach to agreeing FID.

Domestically, the renewable energy industry is also suffering from a shortage in skilled labour (see "Who Will Build Big Hydrogen in Australia?" below), which impacts the capacity of project developers to commit to (multiple) hydrogen projects. Domestic cost volatility is also a concern.

In recent months, we have seen an increasing number of investors willing to finance hydrogen projects but who cannot commit just yet as they need to ensure projects can generate a commercial return at a reasonable level of risk. To break hydrogen's FID bottleneck and inspire investor confidence, government and industry must commit to fostering confidence in the long-term feasibility and profitability of hydrogen development. There needs to be creation of clear, binding hydrogen regulatory regimes that will bridge the gap between hydrogen's economic potential and commercial viability. The introduction of funding support schemes and subsidies, tax credits, offtake agreements and an international standard for evaluating hydrogen's carbon footprint will also go a long way to bolstering investor confidence, driving more projects towards FID.

Compared to our international counterparts, the Australian hydrogen industry is nascent. Indeed, it is growing but it is growing too slowly. We need a coordinated approach from the state and federal governments so that Australia can step up and compete in what is now a global hydrogen 'arms race'.

Governments do not need to reinvent the wheel on energy policy or divert limited funds from oil and gas energy investments. While international public hydrogen investment must reach USD $700 billion by 2030 to ensure the world meets net zero carbon by 2050, this amounts to less than 15% of the funds that were committed to upstream oil and gas developments over the last ten years.

Once institutional frameworks and incentives are implemented to bolster investor confidence, industry must follow suit. Committing greater funding and resources to project deployments, investing in hydrogen supply chains to bolster scalability, and encouraging the development of cross-border hydrogen trading regimes is essential to capitalise on institutional incentives. Australia, in particular, should leverage its existing trade relationships established during its ramp-up production of LNG and CSG. Industry must also continue to invest in advancing hydrogen technology (in particular to increase capacity and carbon capture) so that this energy source is seen as a viable alternative to using fossil fuels.

Critical in the development of the hydrogen industry is the prioritisation of ESG. ESG has an enormous impact on the viability of projects across the globe as community buy in is a fundamental aspect of generating demand. By emphasising the local benefits around economic development, job creation and circular economy opportunities within the community, communities are more likely to get on board and support government initiatives. Working in tandem, public and private initiatives towards hydrogen development will address the hydrogen FID bottleneck, and ensure the world move towards a carbon free future.

In this New Energy Quarterly, we explore the current landscape for hydrogen development, including what needs to be done to ensure hydrogen can lead the charge in global decarbonisation (both in Australia and around the world).

While this New Energy Quarterly explores the challenges facing the development of hydrogen, it also makes clear that the future of hydrogen is just around the corner – so long as the public and private sectors can rise to these challenges.

Watt's happened at Hamilton Locke

- New Energy partner, Matt Baumgurtel, appointed as H2Q board member.
- **Hamilton Locke expands into New Zealand**

  The acquisition of Anderson Creagh Lai, an Auckland-based boutique commercial firm, signals Hamilton Locke's expansion as a truly Trans-Tasman, international law firm.

  With 6 Directors and 11 Lawyers in the new Auckland office, the Hamilton Locke New Zealand team's expertise includes corporate and commercial, litigation and dispute resolution, commercial property, construction and development, as well as private client services.

  Read more

Hamilton Locke Acquires Morrissey Law + Advisory

Hamilton Locke is continuing its expansion across Australia with the acquisition of Morrissey Law + Advisory (**Morrissey**). With offices in Newcastle and Sydney, Morrissey specialises in project delivery and advisory across the construction and infrastructure sectors.

Morrissey has expertise in all areas of construction and infrastructure, including major projects, contract drafting and negotiations, project delivery, dispute resolution, security of payment, and general commercial advisory. Morrissey also works closely with businesses across the transport, not-for-profit, financial services, and agribusiness sectors.

Read more

Hamilton Locke sponsors the inaugural Summit Leadership Retreat alongside Ansarada, MA Financial Group and Findex.

Read more

Hamilton Locke continues to be recognised in The Australian Financial Review (**AFR**) as Australia's fastest-growing law firm, with a 92.3% increase in partners since January 2022.

Read more

The Australian profiles Hamilton Locke as Australia's fastest-growing and top 30 law firm.

Read more

Matt Baumgurtel and Megan Chau speaking at Impact LIVE's Webinar as part of APAC Wind Energy Week 2023.

Read more

Matt Baumgurtel and Adriaan van der Merwe Lecture at the Australian National University's Climate Essentials for Farmers Course.

Read more

Matt Baumgurtel moderates Leader Associates IMPACT panel discussion on "How to Reinforce Australia's Leading Role in the Global Hydrogen Economy".

Watch here

Watt's new at Hamilton Locke?

New starters

Hamilton Locke recently acquired corporate and commercial law firm, Morrissey Law + Advisory. This acquisition adds 16 new people, an office in Newcastle and an increase to our construction, infrastructure and major projects offering.

Partners	Hamish Geddes Seema Sandhu Justin Fox Emily Cossgrove Sarah Roettgers Jeffrey Lai Phil Creagh Mihai Pascariu Paul Chambers Grant Sidnam
Special Counsel	Tony Britt Kaday Conteh Mairead Finn Kathryn May
Counsel	Gregory Shanahan
Senior Associate	Jaqui Pinto Clayton Edy Grania Clark Maggie Chang Gareth Howard Den Montag
Associate	Arthur Crawford Miranda Hing
Lawyer	Josh Mills Zara Coorey Nicholas Achurch Sorcha O'Rourke Clarisse Berenger Ramin Beigi Adam Rose
Solicitor	Mackenzie Grayson Paul Park Jennifer Murdoch
Graduate	Brendon Banks Kate Basta-Zima Raymond Deng Lucinda Tracy Krishna Nand Madeline Torrisi Luke Simperingham Leanne Chew
Paralegal / Law Clerk	Jasmine Sheng Eliana Nader Georgia Hughey Lloyd Rakei Saba Shirazi

Watt's happened in the Market

International Energy Agency released its Electricity Market Report 2023.

The NSW Department of Planning and Environment has released its Hydrogen Guideline: A guide to the NSW planning system.
You can read more here.

As of 17 February 2023, responsible entities for critical infrastructure assets have a range of new compliance benchmarks under the Security of Critical Infrastructure Act 2018 (Cth).
You can read more here.

Large scale solar summit

Hamilton Locke attended the Clean Energy Council's Australian Large Scale Solar Summit 2023 in Brisbane.

A central focus of the conference was how the industry can foster trust and gain community support for large scale solar projects, especially given the rapid mobilisation of the industry in recent years.

Market Recognition

Hamilton Locke has been ranked by Doyles as a Leading Energy and Resources Law Firm in Western Australia.

Read more

Chambers and Partners Recognises Hamilton Locke in their 2023 Asia Pacific Guide

Read more

The Australian Financial Review Continues to Rank Hamilton Locke as Australia's Fastest Growing Law Firm

Read more

Hamilton Locke Lawyers Recognised as Rising Stars by Australasian Lawyer

Read more

Hamilton Locke Ranked #1 in Australian Capital Markets Deals 2022

Read more

Hamilton Locke Recognised in Chambers and Partners 2023 Fintech Guide

Read more

Legal 500 Recognises Hamilton Locke's newly merged Fintech and Financial Services Regulatory team in the 2023 Asia-Pacific Guide

Read more

Watt's next? The next New Energy Quarterly – Water

Spotlight - Margot King

Margot King
Partner
Sydney
+61 406 056 651
margot.king@hamiltonlocke.com.au

Margot is a property partner with a multi-disciplinary energy, projects and corporate background. This gives her a unique skill set to assess issues from multiple angles and present commercial solutions to clients.

She has particular expertise in large scale urban regeneration property projects, renewable projects and infrastructure projects. Margot works primarily with developers and project sponsors across all property project interfaces to identify and manage potential gap risks.

Before moving to Sydney in 2014, Margot worked in London for Slaughter and May and Ashurst, in Bulgaria with CMS Cameron McKenna and with Allens in Western Australia. Margot has also worked inhouse for Walker Corporation, Lendlease and Rio Tinto. Prior to joining Hamilton Locke, Margot was the Head of Real Estate Sydney office at Piper Alderman.

Journey to becoming a lawyer

I took the long way round to becoming a lawyer!

Somewhat strangely, when I was a child, when people asked me what I wanted to be, I said 'a lawyer' (a bit precocious probably). I had visions of lawyers helping people, reading a lot and making a case in court. I loved reading and I loved debating a point! I also had a strong sense of social justice from an early age instilled by my parents.

My lofty childhood ambitions faded in adolescence and were overtaken by interests in media, culture and communications and I initially studied a Bachelor of Arts.

Reality set in — I found it difficult to break into the media sector. I decided I would return to uni to do a Bachelor of Laws, thinking, 'I need a real job!' Here I am 19 years later.

Specialisation

I have found a niche working on property issues in projects after starting life as a lawyer in the energy and resources and projects space.

When I returned to Sydney from London in 2013, I started working on the $6 billion Barangaroo South urban renewal project and this ended up being all consuming for the next four years, including some time spent inhouse with Lendlease on secondment.

I came out the other end a well-versed property projects lawyer and I worked in-house for Walker Corporation on the $2.8 billion Parramatta Square urban renewal project.

The interest in urban renewal comes from an interest in planning and design and how we make our cities a better place to live, and how we do so sustainably. My time living in the heart of Sofia, Bulgaria taught me the joy of living in a mixed-use city rather than a CBD only city.

In the past few years, my property development experience and my interest in sustainability and the environment coupled with my background in energy and resources has provided a natural segue to the focus on property issues in renewable energy projects. On projects, there is a real need for commercially focussed property lawyers that can 'connect the dots' between the property documents and the project documents.

Career highlights

Like all front end lawyers, I have some deals that really stick in my mind as being both challenging and rewarding – the BBC redevelopment site in London joint venture, the acquisition of Gala Coral casinos by a US private equity firm, the Belene nuclear power plant bid, to name a few.

I was also thrilled to be accepted into Oxford to do a Masters in Law and Finance – what an opportunity to stretch yourself by being surrounded by 1,100 years of history, academic pursuit and the best of minds from different disciplines.

But for me, the best moments of my career have been times shared with my colleagues and clients and being part of the profession – the admission speech from Chief Justice Spigelman, mentoring smart young grads and watching them develop into excellent lawyers, working as a team to get documents over the line at the end of a deal, mentorship from partner Bill Napier who I worked with at Jones Day and other inspiring partners along the way.

I also feel grateful for the opportunities that my career has given me to travel the world and learn different things.

Why I joined Hamilton Locke

I joined Hamilton Locke because I was looking for big law done differently, and to be part of a strong renewables practice.

Having worked in firms of all sizes here and overseas, as well as in house, I had become quite targeted in what I was looking for in my next move.

I was looking for values alignment, somewhere with collaborative values, flexibility, space to grow and be authentic, strong leadership values and opportunities to do interesting work at the top tier level.

I was particularly inspired by the thoughtful treatment of leadership from our Managing Partner Nick Humphrey in his book 'Summit Leadership'. As leaders in the firm, we actively strive to create a vibrant culture – to maximise our 'people experience' to drive the best possible client experience. We collaborate, we value diversity and we treat each other with respect. We fully live the firm values, they are not just mottos on a mousepad!

I am so pleased to have teamed up with Matt Baumgurtel and the rest of the New Energy team and have found that the promises of collaboration and great work have really been fulfilled!

Rising Star - Hannah Jones

Hannah Jones
Senior Associate
Sydney
hannah.jones@hamiltonlocke.com.au

Hannah enjoys a challenge and is passionate about working with a diverse team to gain a range of perspectives when solving complex issues. She is a dedicated team player and approaches her work in a friendly and diligent manner working towards a shared goal with her team and clients.

She specialises in a broad range of corporate transactions and M&A, including acquisition and disposal of shares and assets, private equity transactions and general corporate advisory across a range of sectors including renewable energy.

Prior to joining Hamilton Locke, Hannah worked at global law firm DLA Piper in Manchester where she worked on several high profile transactions before relocating to DLA Piper in Sydney. Hannah also spent time in Sydney for three months as part of the DLA Piper Global Secondment Development Programme.

Journey to becoming a lawyer

I'm from Lancashire in the North West of England where it rains 99% of the time! I studied law as an undergraduate degree at The University of Liverpool.

I started my legal practice course with a training contract lined up at law firm DLA Piper in Manchester and qualified as a solicitor in the corporate team in 2016.

DLA Piper ran a global secondment development programme and in April 2019 I travelled to Sydney for a 3-month secondment. I moved back to Australia in January 2020 and have lived and worked here ever since.

What are you most proud of in your career to date?

Being dual qualified in England and Wales and New South Wales. Living in Australia during COVID-19 was difficult (having left the UK when we lived in a pre-COVID world).

Working full time whilst studying and adjusting to life in Australia is something I am proud of, personally and professionally.

HPX Group Mentality

I am impressed with the opportunities I have been given. During my time at the firm, I have been given support to work with different clients and take the lead across multiple matters. The group also prioritises people experience, wellbeing and growth through its many social events and internal programs that promote personal and professional development.

Why I joined Hamilton Locke?

I decided to join Hamilton Locke because it is a young, fast-growing firm. It is an exciting place to work every day with a high performing and collaborative team. There is a work hard, play hard attitude and the culture is open and welcoming.

> "Working full time whilst studying and adjusting to life in Australia is something I am proud of, personally and professionally."

Watt is ARENA funding?

Program	Summary	Funding available	Closing Date
Advancing Renewables Program (ARP)	The ARP awards grants to a range of projects that seek to: - Optimise the transition to renewable electricity - Commercialise clean hydrogen - Support the transition to low emission metals	Up to AUD $50 million	Ongoing
Industrial Energy Transformation Studies Program (IETS)	IETS looks to assist large energy users in undertaking engineering and feasibility to identify ways to lower energy costs and reduce carbon emissions. Funding is available to companies and organisations in agriculture, mining, manufacturing, gas supply, water supply, waste services and data centre sectors. Funding will be provided in two Streams: - Feasibility Studies: to provide an independent assessment that examines all aspects of a project - Engineering Studies: to determine whether a EPC contract could be executed	AUD $43 Million	**Stream A:** March 2023 **Stream B:** July 2023
Regional Australia Microgrid Pilots Program (RAMPP)	RAMPP aims to improve the resilience and reliability of power supply for regional and remote communities. Grants between $1 million and $5 million are available to projects that have successfully completed a feasibility study. This is an open, non-competitive funding round, with funds available in two stages: 1. $30m until CY2022 2. $20m until CY2023	AUD $50 million	31 December 2026
Future Fuels Program (FFP)	FFP is designed to drive co-investment in charging and refuelling infrastructure projects for future transport needs. Intended to fund demonstration and deployment projects. Funding is available for: 1. **light vehicle fleet operators -** charging and electrical infrastructure; and 2. **heavy fleet operators -** enabling infrastructure and some vehicle costs.	AUD $250 million (expanded by a further AUD $177.7 million in 2021)	ongoing
Clean Energy Innovation Fund (CEIF)	Seeks to fund emerging Australian technologies and businesses to speed the nation's transition to a renewable economy.	Up to $5 million	ongoing

Check your eligibility here:
If one of the programs sparked your interest you can check your eligibility **here**.

2022 New Energy Predictions Scorecard

Prediction	Outcome
1. Large Energy Storage	
Large energy storage is key to solving the intermittency problem associated with renewable energy. As such 2022 will see a strong push towards gigawatt scale pumped hydro projects.	Pumped hydro saw 15 to 20 projects proposed in the last year. However, only one other project progressed to construction stage (the Kidston Pumped Storage Project). While enthusiasm remains high, FID is still slow to finalise.
2. Commercial & Industrial Rooftop Solar	
Following heavy investment in 2021, we are expecting to see the continued deployment of commercial and industrial rooftop solar. This is driven on the supply side by cost reductions in these systems and regulatory change that allow systems to be aggregated in wholesale markets. From a customer's demand perspective, the significant increase in retail energy costs lead to rooftop solar being a competitive alternative that provide significant savings.	Overall adoption of rooftop solar declined 14% in 2022 (due to supply side disruptions and inclement weather). However the second part of the year saw a marked increase in response to skyrocketing electricity prices. There are currently 3.36 million PV installations in Australia, with a combined capacity of 29.7 GW.
3. Global Supply Chain Issues	
Global supply chains for renewables will continue to tighten. Given the rise of new COVID variants, and China's COVID Zero policy, we are likely to see workforce shortages in China. This will have knock on effects for renewable projects in Australia and worldwide, as the Chinese supply of renewables equipment will continue to be delayed.	Supply chain issued remained central to the energy landscape in 2022 with the war in Ukraine driving the cost of traditional fossil fuels upwards. This has incentivised the adoption of renewables around the globe as nations seek sustainable prices and energy independence.
4. Offshore Wind Industry	
Australia's nascent offshore wind industry will continue to grow after the heavy regulatory changes introduced in 2021. If an AEMO hydrogen superpower scenario plays out, the offshore wind industry will play a massive role in contributing 256 GW of wind.	Regulatory changes continued to pave the way for offshore wind adoption in 2022, with the federal government introducing the *Offshore Electricity Infrastructure Regulations 2022* and the *Offshore Electricity Infrastructure (Regulatory Levies) Regulations 2022*, which encourage investment in offshore renewable energy projects.
5. Uptake in Floating Solar PV	
Expect an increased uptake in floating solar PV. Benefits of this technology include an increased electricity yield due to the cooling effect of water on solar PV panels, a reduction in water evaporation, a reduction in algal growth and an improvement in water quality.	According to a recent global study, Australia has a floating solar generation potential of 210 TWh (8th in the world). Relevantly, in 2022, Wannon Water announced it is planning Australia's largest floating solar PV plant, comprising 1,200 double-sided solar panels with the capacity to generate 500 kW of clean energy. It will reduce Wannon Water's greenhouse gas emissions by more than 600 tonnes per year.

Prediction	Outcome
6. Green Hydrogen	
After seeing significant public and private investment in green hydrogen projects in 2021, this year will see green hydrogen focused on the mobility market. Expect growth in hydrogen heavy haulage trucks and trains, and hydrogen fuel cell electric vehicles.	Passenger vehicles accounted for 80% of sales in hydrogen fuel cell electric vehicles, far outpacing transport adoption. However, market share for hydrogen transport vehicles is expected to continue to grow. Relevantly, on 3 March 2023, the NSW Government announced a commitment of $64 million to finance the development of a 10WM electrolyser at Port Kembla which will produce green hydrogen to be used at four refuelling stations.
7. EV Uptake	
Global sales of EVs are likely to increase drastically. Whilst Australia may be behind its Western counterparts, we should expect record electric car sales in 2022.	The number of electric vehicles being used in Australia almost doubled between 2021 and 2022, and further, in 2022, Australians purchased 33,410 new electric vehicles, approximately 3.1% of all new vehicle sales.
8. Electric Vehicle Charging	
An increase in EV charging stations can be expected to address the increase in EV usage. A rollout of publicly accessible EV charging stations will be seen, as well as an increase in EV charging stations on private properties.	Australia's network of public charging stations grew in 2022, bringing the total number of available ports nationwide to more than 3,700. The NSW Government also intends to install a further 600 public charging stations between 2023 and 2024.
9. Renewable Energy Zones	
The development of Renewable Energy Zones in New South Wales will create an increased demand for construction contractors. As this will occur in a construction market with a decreased appetite for renewable energy projects, developers should expect a more stringent contractual risk allocation compared to that encountered in the past.	The increase in demand for construction contractors resulted in a more contractor friendly risk allocation in project documents.
10. Behind the meter PPAs	
Expect an increase in the co-location of industrial energy off takers and energy generation assets. We especially expect to see an increase in the construction of data centres and crypto mining assets, as well as accompanying regulatory intervention.	We are continuing to see an increase in behind the meter PPA's. Notably, in November 2022, CleanPeak Energy announced it will construct a 5.4 MW behind the meter solar and battery installation on top of Arnott's Group's two largest Australian production facilities.

WATT's Next?
Energy Predictions for 2023 and Beyond

Over the last year, we've seen a tremendous amount of change in the New Energy sector. As public and private interest accelerates, and becomes more urgent, clients and colleagues frequently ask: "what comes next.?"

Hamilton Locke has specialist teams who assist clients to develop, finance, construct and operate New Energy projects. In this edition of 'WATT's Next', we make predictions as to the future of the Australian New Energy sector in 2023 and beyond.

	Prediction	Explanation
1	**Continued Increase in Wind Projects**	Offshore renewable energy projects, particularly offshore wind projects, are becoming increasingly popular. Already recognised by the International Energy Agency as one of the 'big three' sources of clean energy, and capable of producing both green electricity and hydrogen, offshore wind is fast proving itself as an emerging force in the renewable energy space. Since June 2022, Australia has witnessed the announcement of 25 offshore wind farms, and we expect this trend to continue into 2023
2	**Continued Progress in Hard-to-Abate Sectors**	In light of the proposed $1.9 billion 'Powering the Regions' fund, which will be designed to decarbonise existing industries and create new clean energy industries, we expect that traditionally hard-to-abate sectors (such as the heavy vehicle, shipping and aviation industries) will continue to transition towards renewable energy. This will predominantly take place through the use of hydrogen fuel cell technology and other clean sources of fuels (particularly biofuels and ammonia), as well as through the use of electric vehicles.
3	**Increasing Government Incentives to Drive Renewable Adoption**	In February 2023, British Petroleum announced that it would cut its emission reduction target by 5%, abandoning its 35% reduction goal by 2030. This followed Shell announcing it would not increase spending on renewable energy in 2023, as well as Exxon announcing that it would pull funding from its biofuel development. If significant players in the traditional energy industry do not take the lead to adopt renewable energy, then this responsibility will be left to public institutions that can provide the capital required to drive renewable adoption.
4	**Continued Push by Governments for Energy Independence**	The introduction of legislation to rapidly drive the uptake of renewable energy will be spurred on by an increasing urgency among nations to establish energy independence. Both Europe's reliance on Russian oil and America's reliance on a steady oil supply from OPEC are increasingly under threat by events that undermine the stability of global supply chains. We expect to see an increasing urgency among governments to ensure they can meet domestic energy demands through domestic generation.
5	**Global Co-operation**	In 2023, there will be greater collaboration (including via international agreements) to facilitate renewable energy trade as multiple nations recover from, or continue to mitigate, the effects of the global energy crisis set off by COVID-19 and exacerbated by Russia's invasion of Ukraine. These crises have illustrated that a nation's energy security is insecure if it is reliant on traditional sources of fuel (such as coal and gas), demonstrating the value of investing in more versatile and accessible sources of energy.
6	**Energy Prices are Going to Remain High**	Prices won't be coming down anytime soon. Supply chain disruptions from COVID-19 continue to linger and Russia's continuing threats to turn off the European tap are going to ensure prices remain high. Coupled with an uncertain global economic picture, the cost of energy, from either traditional or renewable sources, is going to remain high.
7	**Hydrogen Scalability is Going to Face Significant Hurtles**	Australia is going to struggle to become a global player in the race to mass produce hydrogen. In the wake of America's Inflation Reduction Act, the demand for electrolysers and other equipment required to produce hydrogen is being hoarded by would-be American hydrogen producers. By comparison, Australia is falling towards the back of the queue in acquiring the required equipment, which will have a resultant impact on our ability to be a global hydrogen leader.
8	**Increased cybersecurity compliance for renewable generation facilities**	In March 2022, the introduction of new compliance regimes under the Security of Critical Infrastructure Act 2018 (Cth) put the spotlight on cybersecurity compliance for companies that generate energy. The new obligations impose a swath of reporting and strategy obligations (including infrastructure risk management programs), and will compliment existing cybersecurity compliance laws which renewable energy companies are already subject to.
9	**Increased focus in the agricultural sector on renewable energy applications**	Agriculture remains one of the largest producers of carbon and has arguably implemented the fewest changes to reduce carbon output. We are likely to see significant changes in the industry approach over the next few years as producers look to take advantage of government incentives and introduce new technology which will cut production costs.
10	**Increased remote mine site renewable energy generation development**	In an effort to increase rates of decarbonisation, the mining industry will continue to make significant investments in providing carbon neutral equipment at remote mine sights.
11	**Modern Slavery and ESG will enjoy greater corporate attention**	The increasing prevalence of modern slavery compliance and ESG will continue, driven by both government regulation and social demand. Accordingly, companies are expected to adopt increasingly ambitious modern slavery and ESG standards.

Hamilton Locke New Energy Team

Partners

Matt Baumgurtel Sydney
Partner – Energy, Infrastructure and Resources
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/matt-baumgurtel

Grant Parker Sydney
Partner – Construction and Infrastructussre
+61 402 855 728
grant.parker@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/grant-parker

Michael Boyce Perth
Partner – Corporate, M&A and Private Equity; Energy and Resources
+61 400 142 494
michael.boyce@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/michael-boyce

James Simpson Sydney
Partner - Workplace and Employment
+61 407 061 641
james.simpson@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/james-simpson

Veno Panicker Sydney
Partner – Construction and Infrastructure
+61 409 495 242
veno.panicker@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/veno-panicker

Brit Ibanez Sydney
Partner, Litigation and Dispute Resolution - Practice Lead
+61 421 355 503
brit.ibanez@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/brit-ibanez

Tricia Moloney Melbourne
Partner – Finance
+61 434 154 180
tricia.moloney@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/tricia-moloney

Adam Jeffrey Sydney
Partner – Finance
+61 481 913 850
adam.jeffrey@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/adam-jeffrey

Special Counsel

Sandra Taran Sydney
Special Counsel - Capital Markets; Corporate, M&A and Private Equity
+61 2 8072 8271
sandra.taran@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/sandra-taran

Timothy Zahara Sydney
Special Counsel
+61 2 8072 8271
timothy.zahara@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/timothy.zahara

Senior Associates

Adriaan van der Merwe Sydney
Senior Associate – Energy, Infrastructure and Resources
+61 2 8072 8271
adriaan.vandermerwe@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/Adriaan-van-der-Merwe

David O'Carroll Sydney
Senior Associate - Energy, Infrastructure and Resources
+61 2 8072 8271
david.ocarroll@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/david-ocarroll

Gareth Howard Sydney
Senior Associate – Construction and Infrastructure
+61 2 8072 8271
gareth.howard@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/gareth-howard

Hannah Jones Sydney
Senior Associate – Corporate, M&A and Private Equity
+61 2 8072 8271
hannah.jones@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/hannah-jones

Eliza Buchanan Sydney
Senior Associate – Litigation and Dispute Resolution
+61 2 8072 8271
eliza.buchanan@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/eliza-buchanan

Lawyers

Beatrice Drumore Sydney
Lawyer – Corporate, M&A and Private Equity
+61 2 8072 8271
beatrice.drumore@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/beatrice-drumore

Camilla Vadas Sydney
Lawyer – Workplace and Employment
+61 2 8072 8271
camilla.vadas@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/camilla-vadas

Cormac Foley
Lawyer – Workplace and Employment
+61 2 8072 8271
cormac.foley@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/cormac-foley

Graduates

Alexander Bird Sydney
Graduate
+61 417 216 120
alexander.bird@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/alexander-bird

Ally Frizelle Sydney
Graduate
+61 2 8072 8271
ally.frizelle@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ally-frizelle

Megan Chau Sydney
Graduate
+61 2 8072 8271
megan.chau@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/megan-chau

Water and Electricity: Competing Land Use in Green Hydrogen Projects

Authors: Margot King
First published: 23 February 2023

Starting point – what land and water do we need?

Former Australian Government Chief Scientist, Alan Finkel, points out that the key challenge of hydrogen is 'producing it' and to do so 'takes a lot of electricity and a good deal of water'.[1]

Unlike other fuels, hydrogen must be produced – either through electrolysis or from fossil fuel.

Finkel calculates that we would need to produce 33 million tonnes of hydrogen for export to match 79 million tonnes of liquified natural gas produced (in the year to 2020) (hydrogen has a superior mass energy density to LNG so the raw number is less). Solar fields required to produce that electrical energy would cover about 20,000 square kilometres, or less if wind energy was also included because of the superior capacity factor of wind.[2] However, Finkel sees this as 'conceivable' and since his article, one announced project alone - the Western Green Energy Hub in WA – is expected to cover 15,000 square kilometres.

These two necessary elements for green hydrogen – land and water - bring us to first principles issues in any green hydrogen project - how do project proponents acquire the land that:

- has the right characteristics for solar or wind?
- has good access to water?
- can compete in economic terms against other uses – such as mining or agriculture?
- is not in a place which local communities will object to?

If we want hydrogen to have a grid stabilising role (to absorb excess or supply more electricity to the grid based on demand), we can add to this list – 'access to transmission lines' - although it is not essential for a hydrogen project since hydrogen is a fuel and can be contained in cells or liquified form.

Identifying optimal characteristics

When we look at the requirements for a hydrogen project a few things stand out.

- Sunny locations are often in arid locations. Quite often, this will make water a challenge. Although arid coastal locations such as the Pilbara in Western Australia or parts of South Australia can be close to sea water, these are often areas of high environmental sensitivity and may be subject to native title rights – an Indigenous Land Use Agreement with traditional owners will be required.
- Windy locations are often at high altitude or coastal. High altitude can make water a challenge (water flows downhill). Australia's population is concentrated on the coast - coastal locations are more likely to attract community objections, but offshore wind overcomes this.
- Water suitable for irrigation will likely be best preserved for agriculture. Water in some states is subject to its own licensing and ownership regime – it would be necessary to acquire rights to the land *and the water* and this may be costly as well as likely to attract criticism for impact on food security.
- Similarly, rights to land will compete against other uses and can become too costly to acquire if the other uses have a higher economic benefit or existing rights (such as a pastoral or mining lease).

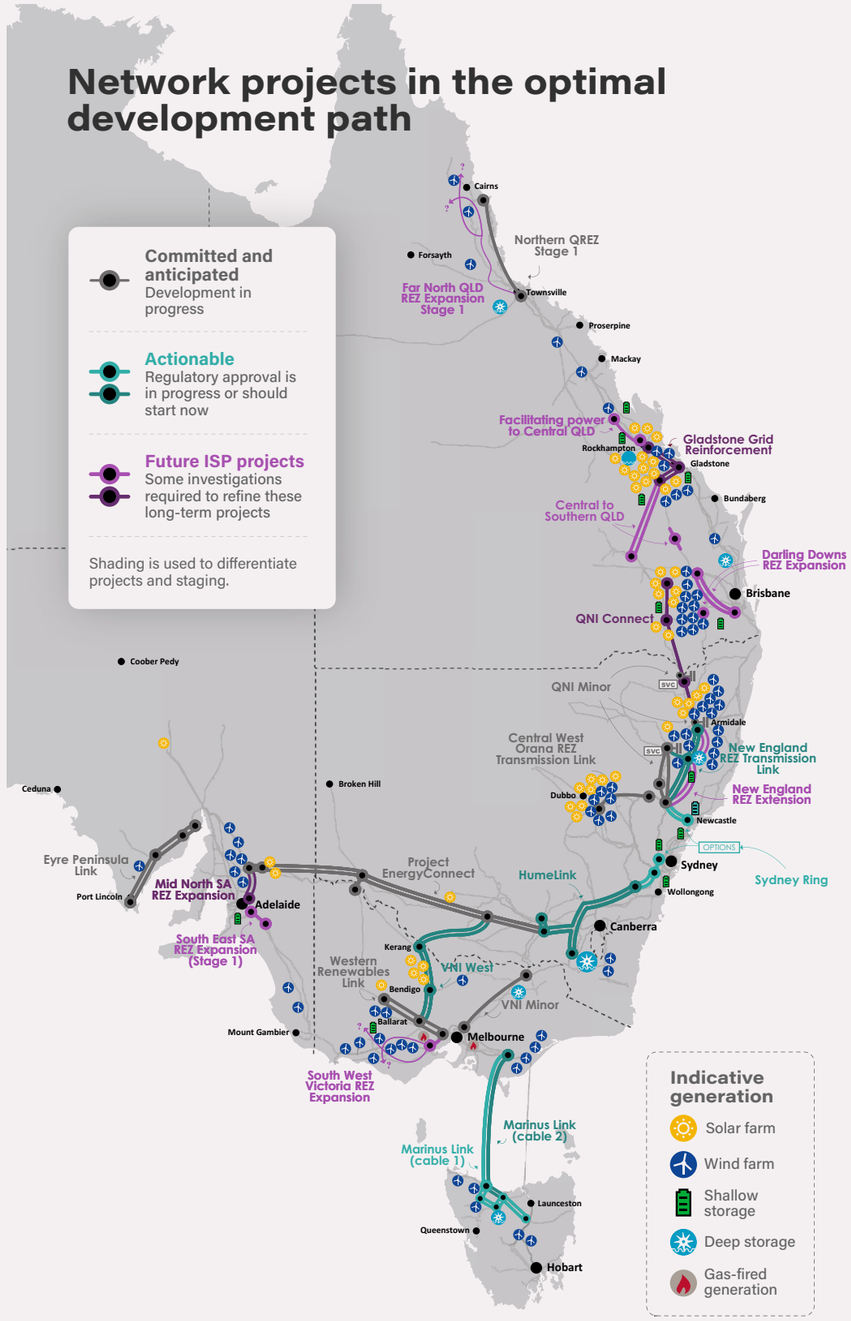
In relation to co-location of hydrogen and wind and solar, there are few points for debate.

- In light of the above observations, can we identify co-locations where there is suitable water available for hydrogen that is also adjacent to suitable locations for wind and solar?
- Finkel points out that hydrogen produces oxygen as a by-product and it would be 'a bonus' (but not fundamental) if this by-product could be used to for an industrial purpose, for example wastewater purification.[3] Are there opportunities to co-locate with an industrial process for closed loop production, for example, by drawing waste water for the electrolysis and using the oxygen in that same location to treat the water?
- Is it sufficient for green hydrogen to buy green electricity from the grid (recognising that grid electricity is a mix of sources) or must a green hydrogen project be co-located with a dedicated wind or solar project to count as 'green'?
- How can we create the legal architecture to permit concurrent uses of land?

Renewable Energy Zones in the NEM

In the National Electricity Market, the question of 'where' in the case of large scale solar and wind has been in part answered by 'Integrated System Plan' (ISP)[4] and the Renewable Energy Zones (REZs). REZs promote the grouping of projects to support transmission infrastructure feasibility and provide investment and planning certainty. But, the picture is more complex and less certain for hydrogen because of the need for water and because it does not necessarily need to be near a transmission line. In the ISP, AEMO mapped the network projects which are in the optimal development path, shown in the infographic below.

'Optimal Development Path' – see ISP 2022, page 14, page 62



Source: AEMO, Integrated System Plan for the National Electricity Market (June 2022), pg 14.

Diversification Leases – permit Concurrent Uses over a Large Scale

In Western Australia, the State Government has introduced amendments to the Land Administration Act 1997 (WA) that creates a framework for competing and concurrent land use – the proposed amendments include a new category of lease of Crown Land called a 'diversification lease'.[5]

The diversification lease is designed for large areas – broadscale use, similar to a pastoral lease. By contrast with a pastoral lease, the permitted use is flexible and may be set out in the lease as agreed by the parties. Permitted uses might include:

- renewable energy
- carbon farming
- aboriginal economic development and land management
- conservation purposes
- grazing livestock, horticulture or agriculture
- multiple concurrent uses.

Under the new proposed legislation, existing pastoral lease holders may apply to convert their lease to a diversification lease (but it is not compulsory).

A diversification lease will not permit exclusive possession – it is designed for multiple concurrent uses and rights will co-exist with other rights and interests such as mining rights, pastoral rights and native title rights and interests.[6] Although, some areas may be identified for 'exclusivity' – for example, areas with substantial structures and infrastructure such as solar panel arrays.

Diversification Leases and Native Title rights

Native rights and interests will not be extinguished. A proposed lessee will need to address the appropriate future act process under the *Native Title Act 1993* (Cth) before a diversification lease can be granted. This will most likely be negotiation of an Indigenous Land Use Agreement with native title holders or claimants and project proponents must meet the cost.

Diversification Lease and the Renewable Hydrogen Policy

The WA State Government has also just released a new policy framework for competing land use and hydrogen projects – 'Renewable Hydrogen Policy: Consideration of highest and best use' and 'Renewable Hydrogen Guidance: and tenure for large scale renewable hydrogen projects'.[7]

Under the policy, if there is more than one project proponent with an interest in the same area of Crown land, the project proponents and any existing interest holders are encouraged to enter into a 'Co-Existence Agreement' to agree on how the projects and interests can co-exist. The policy gives examples of an agreement allocating separate tenure for areas for locations of significant infrastructure or possibly sequential use of the land.[8]

If a Co-Existence Agreement cannot be reached, the Ministerial Taskforce through a Senior Officers Group will carry out a 'Highest and Best Use Assessment'.

The Highest and Best Use Assessment will consider various factors:

- alignment to Government Strategic Policy
- interaction of tenure types and potential for Co-existence
- financial capability
- engagement and record of previous engagement with Aboriginal people and social and economic benefits to Aboriginal people.

Way Forward

In WA, land acquisition costs because of competing uses have been prohibitive to project viability. In other states, competing use has also been an issue – food security and preserving primary agricultural land for agricultural use is important.

At common law, a defining feature of a lease is that it grants the tenant exclusive use and occupation. Currently, leases for renewables projects will often include a reservation of rights to the landowner to permit concurrent farming use on some parts of the land, but this has limitations. In WA, the 'diversification lease' on Crown land will permit concurrent permitted uses. These are likely to play a leading role in freeing up more flexible use of land in WA.

The Western Australian Green Energy Hub is an excellent example of a location with all the right geographical features for green hydrogen co-located with wind and solar. The right geographical features for hydrogen projects co-located with wind and solar projects will often be in arid and remote coastal locations. It will be essential to engage fully and fairly with Aboriginal communities and to meet environmental standards for ongoing social licence as well as to meet statutory requirements. Relationship and engagement generally with the local community and others with existing rights and interests such as pastoralists and miners will be crucial to project success.

In WA, it will be interesting to see how the market develops around Co-Existence Agreements and Highest and Best Use Applications – in house teams and their counsel will be developing standards around these documents but many elements will be site specific and bespoke to the parties. Conduct and Compensation Agreements are already used between mining companies and pastoralists in Queensland and these may be a useful starting point for Co-Existence Agreements. Concepts in Interface Agreements (often used between stakeholders in other development contexts) may also be helpful.

The potential for co-location with industrial processes and closed circle production is exciting. Many more opportunities will become viable as the demand side for hydrogen grows.

For more information, please contact:

Margot King
Partner
Sydney
+61 406 056 651
margot.king@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/margot-king

[1]Alan Finkel, 'Getting to Zero: Australia's Energy Transition' (2021), Issue 81, *Quarterly Essay*, 66.

[2]Ibid, 66-67.

[3]Ibid, 61.

[4]Australian Energy Market Operator, *Integrated System Plan for the National Electricity Market* (June 2022) https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en

[5]Land and Public Works Legislation Amendment Bill 2022 (23 November 2022), s41 inserting ss92A to 92I into the principal act, the Minister's power to grant a 'diversification lease' is in s92B and the conditions that may be included in a diversification lease are set out in 92C. For further information see: Land and Public Works Legislation Amendment Bill 2022 (www.wa.gov.au)

[6]Ibid, see s41 inserting s92D and 92E into the principal act.

[7]Government of Western Australia, Consideration of Highest and Best Use (December 2022), https://www.wa.gov.au/system/files/2022-12/221205_RenewableHydrogen-Policy_DIGITAL.pdf and Government of Western Australia 'Renewable Hydrogen Guidance: Land Tenure for Large Scale Renewable Hydrogen Projects' (December 2022) https://www.wa.gov.au/system/files/2022-12/221205_RenewableHydrogen-Guidance_DIGITAL.pdf

[8]Ibid, 4.

Who Will Build Big Hydrogen in Australia? All I Want for Christmas is Skilled Labour…

Authors: Veno Panicker
First published: 21 December 2022

It's no secret that the Australian construction industry has had an ongoing and acute skills shortage over the past few years. This was one of the factors that led to numerous state government infrastructure projects being shelved across Australia. So where will labour for big hydrogen projects come from in Australia? This problem is not going away in the short to medium term – there is an urgent need to recalibrate how labour risk is allocated on renewables projects.

The Problem

Nowhere is this unprecedented labour shortage more evident than in the renewables sector.

In August 2022, the Clean Energy Council issued its *Skilling the Energy Transition report*[1] recognising the extraordinary growth of the renewables sector and the plans for ongoing expansion. We are aiming to accelerate towards being a predominantly clean energy power system and be seen as a world leader in the sector.

The Report provides detailed plans, including university education programs, vocational training and transitioning from traditional industry to renewables and migration – but each only provides a medium to long-term solution (which, whilst important, does not fix the present impasse). So great are these issues in the long term that they could 'cripple' our ability to meet emissions reduction targets[2] – with particular trades and consultants, like electricians, engineers and construction managers, in already high demand across construction and infrastructure projects nationwide.

It has been estimated that as many as 15,000 new workers will be needed in the renewables industry within five years[3]. This is compounded by extraordinary wage increases given the shortages. This is further impacted by low levels of productivity – given interdependent trades are often not available and ongoing freight details and material shortages as a result of over-arching global issues.

So on larger hydrogen projects, particularly on the cutting edge of technology and innovation, how is labour going to keep up with projected demand? Further, how will parties incentive rapid movement into the industry and what can government do to support this?

Way forward

Firstly, fast-tracking skilled migration Federally is a no-brainer. This issue is not new – but never has it been more acute a shortage.

Secondly, in circumstances where everyone knows there is a serious shortage of skilled labour, it is time to revisit simply having a principal put this risk solely on a head contractor. Looking at the recent write downs of several major head contractors and Clough's recent entry into administration, it is clear overly simplistic pass throughs of labour risk will not create a sustainable or productive industry. What is needed is some form of genuine risk share. Depending on the project, this could include:

- sub-subcontractor availability and/or insolvency risk being shared between the Principal and Head Contractor in respect of key trades;
- rather than a lump sum, consideration of a target cost range for key sub-subcontractor works packages as a hedge for such labour risks; and
- a target range for labour costs – rather than a fixed schedule of rates – given current fluctuations.

Far from being altruistic, such mechanisms could improve productivity and ultimately give greater price certainty as part of encouraging scarce labour resources into clean energy projects over lucrative similar roles in resources and infrastructure. For government projects, this should be immediate – as the industry (and funders) will follow suit if they see project risk sharing succeed.

The call to arms from industry has been 'disrupt or die' – 'there is a vital need to substantially change the way the industry operates'[4].

Risk allocation needs to be sustainable and supportive of a renewables industry seeking rapidly expand in Australia. This leadership starts with contract models and delivery structures which are sustainable and profitable down the contractual chain.

It's far from an insurmountable challenge. Australia seeks to be a world leader in hydrogen projects – pragmatic risk allocation in respect of known risks such as labour shortages – will only serve to provide greater certainty for industry participants. Increased engagement and better project outcomes will follow sensible risk allocation – which fosters more collaborative and less adversarial cultures on Projects.

For more information, please contact:

Veno Panicker
Partner
Sydney
+61 409 495 242
veno.panicker@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/veno-panicker

[1] https://assets.cleanenergycouncil.org.au/documents/CEC_Skilling-the-Energy-Transition-2022.pdf

[2] https://www.abc.net.au/news/2022-11-20/electricians-tradie-shortage-renewable-energy-boom/101670258?mkt_tok=NjM5LVpFUS05MzYAAAGINlmuumRDPTpw7cXJqwNvgFOR9Mgqckdn2zk0kM0d3byxTAPk-pPf49yUfXlDyhgK-TRMfZvGqPhS78pS6Fqq51tFXGxYX4zasr6oWOJV

[3] Chris Briggs, Research Director for the University of Sydney's Institute for Sustainable Futures

[4] Jon Davies, CEO, Australian Constructors Association

Generating Demand for Green Hydrogen – Progress Since 2022

Authors: Megan Chau and Adriaan van der Merwe

Introduction

In our article on green hydrogen (**GH2**) published a year ago, we discussed the existing initiatives and proposed methods for generating demand for GH2 as a sustainable clean energy fuel in commercial and domestic markets. Specifically, we examined the NSW Hydrogen Strategy that was released by the Department of Planning, Industry and Environment (**DPIE**) in October 2021 to incentivise the production of GH2 and drive large scale investment into GH2 and other gas blending projects, support the development of GH2 refueling networks in the heavy vehicle industry and achieve the conversion of 20% of the NSW Government heavy vehicle fleet to GH2-fuelled vehicles by 2030. We also discussed the obstacles to further development of the GH2 industry such as high production costs and limited strategies to generate supply and demand for GH2, despite its potential application in transportation and domestic industries.

Now, one year later, we revisit this topic and discuss the progress that the industry has made into transforming GH2 into a legitimate, alternative source of clean energy fuel in an international and domestic context, and the status of supply and demand for this renewable resource.

Production and Investment

As at the time of the October 2022-23 federal budget, the Australian government had planned investments of up to $526 million to support the rollout and development of regional hydrogen hubs across Australia under the Regional Hydrogen Hubs Program. This will support the development of projects currently in the pipeline such as the Tasmanian Government's Tasmanian Green Hydrogen Hub ($70 million) and the ENGIE Pilbara Green Hydrogen Hub in Western Australia ($3 million).

A number of developments in the GH2 space have also been recognised in domestic legislation, further advancing the support for GH2 projects and increased GH2 production.

Hydrogen-gas blending

'Hydrogen blending' refers to the process of injecting clean hydrogen into natural gas pipelines to create a unique hydrogen-gas blend that can be used to generate heat and power with a lower emissions cost compared to natural gas alone. In October 2022 Australia's Energy Ministers agreed to amendments to the National Gas Law and Regulations to bring hydrogen blends under the gas regulatory framework, resulting in greater certainty around securing investment to support such projects and the reform of existing consumer protections to cater to the incorporation of hydrogen into the gas network. This supports both hydrogen-gas blending projects currently in operation and in construction.

For example, Hydrogen Park in South Australia is the first Australian project to produce a blended, renewable hydrogen gas for more than 700 customers on the existing gas network in Mitchell Park. The hydrogen blend is produced from water and renewable electricity using a 1.25MW Siemens electrolyser. By 2023, the project may expand the project area to cover 3000 more gas connections and supply hydrogen gas to the transport sector, domestic households, businesses and schools. Corresponding Hydrogen Park projects are also planned for Queensland and Victoria.

Another project in the early stages of development is the proposed dual-fuel (gas and green hydrogen) Power Station at Port Kembla in New South Wales. If approved, this Power Station will operate on 50% green hydrogen and 50% natural gas (and 100% green hydrogen by 2030) to produce low-emission electricity. This project was shortlisted by the Commonwealth Underwriting New Generation Investment scheme, meaning that, pending final commercial terms, the project will be funded by a combination of private equity and bank debt, underwritten by the Commonwealth.

GH2 Refueling Networks and the Heavy Vehicle Industry

In September 2022, New South Wales and Victoria entered the Hume Hydrogen Highway Initiative, a joint initiative for the design and development of renewable hydrogen refueling network along the Hume Highway between Melbourne and Sydney. The project aims to develop at least 4 refueling stations on the highway and support approximately 25 hydrogen-powered heavy freight vehicles to adopt zero-emission technology to encourage greater sustainability in a hard-to-abate industry. Applications for up to $20 million in funding under the project closed last month with outcomes to be announced in 2023.

Further research into transitioning the heavy vehicle fleet to hydrogen fuel cell technology is currently being undertaken. Transport for NSW has partnered with the Australia Road Research Board and Mov3ment to identify the key segments of the heavy vehicle industry that are likely to transition to hydrogen fuel cell technology and prepare a roadmap for the NSW government to navigate and facilitate this transition as part of the NSW Net Zero Emissions Freight Policy.

Overcoming Obstacles

Cost

While the costs of renewable power generation have been coming down, historically, this is not the case for the cost of hydrogen production. GH2, specifically, is made by separating water into hydrogen and oxygen through a process called electrolysis. Considering the costs of production and transportation, the current cost of GH2 is not commercially competitive, being potentially 2 to 4 times the price of more conventional petroleum products such as oil.

According to the Australian Energy Market Commission, a combination of cost reductions in electricity and electrolysers, combined with increased efficiency and operating lifetime, can deliver an 80% reduction in hydrogen cost. Pursuing new and cheaper ways to store and transport hydrogen – such as via ammonia or other liquid form as we explored in our previous article here – can also help to drive down costs. Through these methods, green hydrogen has the potential to become cheaper than any other low carbon alternative fuel by 2040.[1]

Strategies to Generate Supply and Demand – Global Partnerships

In 2021, the State of Hydrogen 2021 report by the Department of Industry, Science, Energy and Resources[2] showed that the hydrogen industry in Australia was advancing quickly in areas such as hydrogen investment, power generation and cost-competitiveness; but experienced comparatively slower growth in its exports, mining, light and heavy transport, steel and electric grid support.

One method to address this issue is to establish and maintain global trading partners.

Australia has two key existing partnerships with Japan and Korea under the Clean Hydrogen Trade Program and Low and Zero Emissions Technology Partnership respectively. Under these agreements, Australia exports clean hydrogen and ammonia to further each country's goal of achieving carbon neutral economic growth in exchange for private investment in Australia's GH2 sector.

Australia's national hydrogen strategy predicts high potential growth trajectories for global hydrogen demand of between 2 and 9 million tonnes by 2030 and up to 230 million tonnes by 2050. As demand continues to grow, Australia's own growing GH2 sector means it will be well placed to become a hydrogen export superpower.

In the future, Australia may wish to extend trade partnerships to other countries in Southeast Asia – such as Vietnam, Cambodia, Indonesia and Thailand, all of whom have shown an appetite and set targets for the clean energy transition, but who may require additional investment and resources to support the transition of their respective economies. A 2022 report by the International Renewable Energy Agency identified foreign support and investment as being key to facilitate the clean energy transformation and achieve sustainable economic growth in ASEAN member states.[3] Accordingly, should Australia meet this demand, there is potential for a mutual benefit for both parties and greater scope for building strong international relations.

Conclusion

In the span of one year, Australia has proactively taken on and progressed multiple new hydrogen initiatives, from hydrogen-gas blending projects and corresponding regulatory changes, to GH2 refueling networks and conducting research into the development of future hydrogen strategies. While the hydrogen industry still faces challenges in higher production costs and disproportionate supply and demand, we are making strides to overcome these obstacles and ensure GH2 achieves the status of a legitimate, alternative source of energy fuel, capable of leading Australia to a cleaner and more sustainable future.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Adriaan van der Merwe
Senior Associate
Sydney
+61 2 8072 8271
adriaan.vandermerwe@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/adriaan-van-der-merwe

David O'Carroll
Senior Associate
Sydney
+61 2 8072 8271
david.ocarroll@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/david-ocarroll

[1]Australian Energy Market Commission, Hydrogen: the new Australian manufacturing export industry and the implications for the National Electricity Market (NEM): https://www.aemc.gov.au/hydrogen-new-australian-manufacturing-export-industry-and-implications-national-electricity-market

[2]Department of Industry, Science, Energy and Resources, 'State of Hydrogen 2021' (2021) 6 - https://www.dcceew.gov.au/sites/default/files/documents/state-of-hydrogen-2021.pdf

[3]International Renewable Energy Agency, 'Renewable Energy Outlook for ASEAN: Towards a Regional Transition' (2022) https://www.irena.org/publications/2022/Sep/Renewable-Energy-Outlook-for-ASEAN-2nd-edition

2023 Outlook: Investment in Hydrogen and Renewables

Authors: Matt Baumgurtel, Hannah Jones, Adriaan van der Merwe, Beatrice Drumore and Megan Chau

This article is part of our New Energy Insights series, focusing on the increasing M&A potential across the energy, infrastructure and carbon market sectors. Stay tuned for regular updates and commentary on topical issues across the sector.

2022 Recap

In 2022, investment in renewable energy remained a global topic. 137 countries and 700 of the 2000 largest publicly traded companies worldwide either considered or implemented net zero targets and commitments.[1] There was also increasing interest in utilizing green hydrogen to decarbonise both hard-to-abate sectors, such as long-haul shipping and aviation, as well as hard-to-electrify sectors, such as basic chemical and steel production. Currently, more than 60 countries have developed or are in the process of developing hydrogen strategies.[2]

In Australia, several developments took place in 2022 to drive interest and facilitate greater investment in renewables including:

- **Funding** – the Australian Government committed approximately $25 billion to clean energy and fulfilling Australia's net zero commitments as part of its budget for October 2022-2023. This amount will be put towards the subsidy of electric cars, financing the development of Australia's electricity grid whilst also deploying Community Batteries to ease excess pressure on the grid, and creating more clean energy jobs;
- **Legislation** – new legislation in 2022 formally enshrined the 2050 net zero and emissions reduction target and introduced more comprehensive offshore wind regulations. In Western Australia (WA), the Land and Public Works Legislation Amendment Bill 2022 proposes to introduce a non-exclusive leasehold tenure to support the development of new, large-scale clean energy projects and carbon farming in WA, with this Bill projected to be passed in early 2023.
- **International Partnerships** – in October 2022, Australia signed the Green Economy Agreement and the Critical Minerals Partnership Agreement with Singapore and Japan respectively. These agreements establish and strengthen existing trade and supply chains and investment in clean energy industries by way of reducing non-tariff barriers and supporting the sharing of information, research, technology and commercial resources.

Outside of these developments, the Clean Energy Finance Corporation reached a significant milestone of securing $10 billion in lifetime investment commitments in March 2022, demonstrating there is still a strong appetite for investment in renewable energy industries.[3]

2023 Outlook

Australia is well placed to attract investment in hydrogen and other renewable energy projects. In particular, according to Austrade,[4] Australia's natural environment offers extensive opportunities in:

- clean hydrogen;
- renewable energy – wind, solar, energy storage;
- microgrids and storage solutions; and
- future fuel technologies.

Investment is predicted to remain steady given the Australian Government alone committed $21 billion in investments up to 2030.[5] Additionally, the private sector will likely drive-up investments into renewable industries while it is incentivised by the global push and interest in reaching net zero.

Companies looking to attract investments are encouraged to focus on their Environmental, Social and Governance (**ESG**) status. ESG is currently touted as a 'business imperative' and often a key M&A due diligence item due to its increasing importance to investors looking to buy in accordance with their values and with consideration to their social and environmental impact.[6]

Both companies and investors looking to take advantage of the current market should reach out to advisors to capitalize on what will no doubt be plenty and various upcoming opportunities in 2023.

The Hamilton Locke team advises across the energy project life cycle – from project development, grid connection, financing, construction, including the buying and selling of development and operating projects.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Hannah Jones
Senior Associate
Sydney
+61 2 8072 8271
hannah.jones@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/hannah-jones

Adriaan van der Merwe
Senior Associate
Sydney
+61 2 8072 8271
adriaan.vandermerwe@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/adriaan-van-der-merwe

Beatrice Drumore
Lawyer
Sydney
+61 2 8072 8271
beatrice.drumore@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/beatrice-drumore

Megan Chau
Lawyer
Sydney
+61 2 8072 8271
megan.chau@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/megan-chau

[1] IRENA, 'Renewable Energy Targets in 2022: A Guide to Design' (2022): https://mc-cd8320d4-36a1-40ac-83cc-3389-cdn-endpoint.azureedge.net/-/media/Files/IRENA/Agency/Publication/2022/Nov/IRENA_RE_targets_2022.pdf?rev=f39ae339801e4853a2a0ebdb4d167f83

[2] IRENA, 'Renewable Energy Targets in 2022: A Guide to Design' (2022): https://mc-cd8320d4-36a1-40ac-83cc-3389-cdn-endpoint.azureedge.net/-/media/Files/IRENA/Agency/Publication/2022/Nov/IRENA_RE_targets_2022.pdf?rev=f39ae339801e4853a2a0ebdb4d167f83

[3] Clean Energy Finance Corporation, 'Australia's 'green bank' marks $10 billion in lifetime investment commitments in pursuit of net zero emissions' (18 March 2022): https://www.cefc.com.au/media/media-release/australia-s-green-bank-marks-10-billion-in-lifetime-investment-commitments-in-pursuit-of-net-zero-emissions/

[4] Australian Trade and Investment Commission, 'Australian Budget commits A$25bn to clean energy and renewables projects' (31 October 2022): https://www.austrade.gov.au/international/invest/investor-updates/australian-budget-commits-a-25bn-to-clean-energy-and-renewables-projects

[5] Mark Ludlow, 'Smart money still flowing to renewable energy' Australian Financial Review (25 March 2022): https://www.afr.com/companies/energy/smart-money-still-flowing-to-renewable-energy-20220321-p5a6gj

[6] Macquarie Capital, '2022 Year in Review and 2023 Outlook' (7 December 2022): https://www.macquarie.com/au/en/perspectives/2022-year-in-review-and-2023-outlook.html

Australian Hydrogen Funding: The State(s) of Play

Authors: Matt Baumgurtel, Ally Frizelle and Alexander Bird

According to Australia's national hydrogen strategy, hydrogen energy production could be worth as much as $26 billion to the national economy by 2050. However, a significant increase in national public funding is required if Australia is to have a globally competitive hydrogen industry.

As with any emerging technology, there will be an advantage for countries that prioritises early investment. Whether Australia will be part of this and develop a 'big' hydrogen industry that provides local jobs at all stages of the production chain while at the same time contributing to Australia's international emissions reduction commitments will, in significant part, be a function of government support of early large-scale projects – as was the case with the Solar Flagships program for large scale solar projects in Australia.

To understand where the nation may be heading, we need to look at what infrastructure is currently in place to drive hydrogen investment. Over the last few years, Australian states have made significant progress in establishing government funding programs to drive hydrogen scalability on the state and federal level. In this article, we look at the efforts of the Australian states to tackle the hydrogen opportunity.

South Australia

In South Australia, state has had significant progress in implementing its Hydrogen Action Plan to capture the state's potential for hydrogen production. Since the plan's introduction in 2019, the strategy has:

- Committed up to $70 million to the Port Bonython Hydrogen Hub;
- Speared the creation of a South Australian Hydrogen Export Modelling tool and a pre-feasibility study into large-scale clean hydrogen production in South Australia for export to prospective markets in Asia;
- Resulted in hydrogen begin declared a regulated substance under the *South Australian Petroleum and Geothermal Energy (PGE) Act* 2000; and
- Fostered a joint investment between the State and Commonwealth government of $1.08 billion in the State Energy and Emissions Reduction Deal. A key component of the deal includes AUD$400 million in Commonwealth funding for investment in priority areas, with hydrogen included among a range of emissions reduction technologies.

In June 2022, the state announced the Hydrogen Jobs Plan, allocating $593 million over four years for the establishment of a new hydrogen facility in the Whyalla region.

New South Wales

In 2021, the New South Wales government announced the state Hydrogen Strategy. The project is backed by is backed by up to $3 billion worth of incentives to grow the hydrogen industry, particularly in the Illawarra and Hunter hydrogen hubs. These incentives – which are hoped to attract between $50 and $80 billion worth of investment – include:

- Exemptions for green hydrogen production from government charges;
- A 90% exemption from electricity network charges for green hydrogen producers who connect to parts of the network with spare capacity;
- Incentives for green hydrogen production; and
- A hydrogen refuelling station network to be rolled out across the State.

The NSW Hydrogen Strategy will play an integral role in the development of the budding GH2 to the industry in Australia as we aim to scale up GH2 production and tap into various export opportunities. More importantly, the Strategy is reflective of the growing support for hydrogen from state and federal institutions.

The October 2022-23 federal budget (Federal Budget) allocated up to $41 million to the Port of Newcastle's Hydrogen Hub and up to $41 million to Origin Energy's Hunter Valley H2 Hub. Further, the New Low Carbon Industry Foundations was established, supported by up to $150 million of grant funding to develop hydrogen hubs in the Hunter and Illawarra regions.

Queensland

Queensland hydrogen efforts have been driven by the state's Hydrogen Industry Strategy 2019-2024. According to this strategy, Queensland intends to move to the "forefront of renewable hydrogen production in Australia, supplying an established domestic market and export partners with a safe, sustainable and reliable supply of hydrogen" by 2030. Since the announcement of the strategy in 2019, Queensland has made significant investment in its hydrogen efforts, establishing a development fund intended to distribute $19 million over a four-year period to support hydrogen development in Queensland.

In July 2022, the state announced the Hydrogen Industry Workforce Development Roadmap 2022-2032. The roadmap identifies four key focus areas and includes a list of investments in skills and training facilities important to the future of hydrogen development in the state:

- AUD$20 million for upgrades to the Queensland Apprenticeships Centre, including a new Hydrogen Training Centre at Beenleigh, which was officially opened in November 2022;
- AUD$17 million to build the Pinkenba Renewable Energy Training Facility for training in solar and other renewable energy equipment;
- AUD$10.6 million to build a hydrogen and renewable energy training facility in Townsville;
- AUD$2 million to upgrade facilities at Gladstone State High School to prepare students for entry into the hydrogen industry; and
- AUD$4 million for an energy training and skills strategy, consisting of electric vehicle skills fund, hydrogen skills fund and TAFE renewable energy strategy.

From 2022-23, the QLD Government will provide $71.9 million to deliver a new green hydrogen hub in Townsville. Further, the Queensland Apprenticeships Centre reopened in November 2022 following a $40 million upgrade.

Victoria

While the state did not announce any significant hydrogen investment util 2021, Victoria has made a substantive investment in hydrogen development. In May 2021, the state announced its Climate Change Strategy and Zero Emissions Vehicle (ZEV) Roadmap. The ZEV support package includes the following programs open to hydrogen:

- AUD$46 million for Australia's first public ZEV subsidy program, which will support Victorian residents and businesses to purchase new ZEVs, including hydrogen fuel cell electric vehicles;
- AUD$20 million will fund a ZEV public transport bus trial, with a target for all public transport bus purchases to be ZEVs from 2025;
- AUD$10 million will fund the replacement of the Victorian Government Fleet with ZEVs; and
- AUD$5 million to establish a Commercial Sector ZEV Innovation fund.

Further, the state has allocated $9 million to establish the Hycel Technology Hub at Deakin University. The facility will specialise in the development and manufacturing of hydrogen fuel technology. Areas of research will include fuel cells for transport, especially for heavy vehicles, as well as assessing the suitability for natural gas pipelines to carry hydrogen for housing and industry.

In particular, the state has made substantive investment over the course of 2022, Including

- Awarding $6.6 million through the Renewable Hydrogen Commercialisation Pathways Fund; and
- Awarding $600,000 through the Renewable Hydrogen Business Ready Fund.

In addition, the Federal Budget committed $2.98m to the Victorian based project Zero Degrees Rosella 1 La Trobe Valley Blue Hydrogen

Western Australia

Western Australia's hydrogen strategy stems from the Western Australia Renewable Hydrogen Strategy. The Goals of the strategy are to develop and implement:

By 2022:

- A project is approved to export renewable hydrogen from Western Australia;
- Renewable hydrogen is being used in one remote location in Western Australia;
- Renewable hydrogen is distributed in a Western Australian gas network; and
- A refuelling facility for hydrogen vehicles is available in Western Australia.

By 2030:

- Western Australia's market share in global hydrogen exports is similar to its share in LNG today;
- Western Australia's gas pipelines and networks contain up to 10 per cent renewable hydrogen blend;
- Renewable hydrogen is widely used in mining haulage vehicles; and
- Renewable hydrogen is a significant fuel source for transportation in regional Western Australia.

The state has moved towards this goal through the implementation of various projects including funding various feasibility studies and providing $10 million for Hydrogen Fuelled Transport Program. The program provides financial support to a project that includes the procurement and operation of hydrogen or green ammonia fuelled transport, and the installation of one or more refuelling stations. In addition, WA has committed $5.5 million for new planning and studies in support of development of the Mid-West Hydrogen Hub.

Tasmania

In 2020, Tasmania announced the Renewable Hydrogen Action plan. The plan aims to boost Tasmania's export ability by:

- exploring the opportunities for using locally produced renewable hydrogen in Tasmania and for export;
- providing financial support for renewable hydrogen projects for export and domestic use, and continuing investment attraction activities including with international trade partners; and
- ensuring a robust and supportive regulatory framework and assessing supporting infrastructure.

In May 2020, the Tasmanian Government established the Tasmanian Renewable Hydrogen Industry Development Funding Program. This provides $50 million in competitive programming designed to provide key support measures for hydrogen-related initiatives, including:

- an AUD$20 million Tasmanian Renewable Hydrogen Fund;
- up to AUD$10 million in support services including financial assistance for renewable electricity supply; and
- AUD$20 million in concessional loans.

In addition, the state has committed $5.5 million for new planning and studies in support of development of the Mid West Hydrogen Hub.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Global Hydrogen Leaders

Authors: Matt Baumgurtel, Adriaan Van der Merwe, Rahul Tijoriwala and Alexander Bird

2022 saw several promising developments for hydrogen, both domestically and internationally. As governments develop new energy policies in a post pandemic landscape, it's encouraging to see countries expressing a growing enthusiasm for developing and funding dynamic renewable energy strategies in which hydrogen plays an essential role.

2022 Review – the Global Perspective

Global restrictions on energy supply chains have ignited a newfound enthusiasm for energy independence – and for hydrogen. As of writing, there are 26 national strategies that have committed their respective nations to scaling hydrogen as an alternative fuel source. Many of these countries have begun to turn these strategies into concrete policy, introducing legislation that promotes the commercial viability of hydrogen by subsidizing scalability and sale.

There are three nations that are taking significant steps to reach the new energy horizon:

The United States of America

In August 2022, the United States passed the *Inflation Reduction Act of 2022* (**the Act**), an $738 billion spending package intended to stimulate the American economy in the wake of economic fallout stemming from the COVID-19 pandemic. Despite its name, the Act is in fact the largest piece of American legislation passed to address climate change, setting aside $391 billion to infrastructure and energy modernization. More importantly, it places hydrogen investment front and center.

The Act provides for a $3 tax credit for every kilogram of hydrogen produced in the United States. As of writing, it currently costs between $2.60-$3.75 to produce a kilogram of hydrogen in the United States. Based on current production trends, the $3 tax credit could virtually eliminate the production cost for hydrogen, as modelling by Morgan Stanley estimates that after applying the credit green hydrogen costs could reach sub-$1/kg, making it commercially viable against grey and blue hydrogen.

Germany

A consistent global leader in hydrogen, Germany continued to progress its national shift towards integrating more high-level hydrogen-based projects over the course of 2022. A key breakthrough included the introduction of the first fleet of hydrogen fuel cell trains which began operating in August 2022 in Lower Saxony.

In March 2022, Germany announced the HyGATE program, a partner project with the Australian government developed to foster hydrogen value chains between the two nations. The program dedicates roughly AUD$130,000,000 to develop a range of projects across the hydrogen supply chain. The first of three initiatives created by the Australia-Germany Hydrogen Accord signed in 2021, the HyGATE program is not only indicative of Germany's commitment to reach net-zero by 2050, but of hydrogen's central role in meeting that goal for Germany.

India

India is well positioned to become a clean hydrogen powerhouse. This is in part due to the National Hydrogen Mission, which will see a significant expansion of India's hydrogen production, setting a target of an annual production capacity of 5 million tonnes by 2030 and 25 million tonnes by 2047. The government has noted that these figures could be revised upwards as the nation scales hydrogen production technology.

In the wake of the mission, some of India's top industrialists have announced plans to facilitate the construction of green hydrogen plants. In 2022, the state-run Indian Oil Corporation announced a partnership with clean energy producer ReNew Power and engineering conglomerate Larsen and Toubro to facilitate scaling the nation's green hydrogen capacity. These partnerships are expected to tap into the RS$60 billion the Indian government has put forward to incentivize domestic production.

The Indian Oil Corporation has also announced plans to build a green hydrogen plant at its Mathura refinery in Uttar Pradesh. It is expected that the development may help the nation reach its goal of hitting an 8GW capacity in green hydrogen production by 2025.

What next?

While many countries are having early successes, it is important that momentum for hydrogen expansion is maintained.

While there is an ever increasing hydrogen pipeline, actual deployment is lagging. Of the 680 large-scale project proposals (worth USD$240 billion) that have been put forward, only about 10% of capital has been put to use in final investment decision. While Europe leads in proposed investments (~30%), China is slightly ahead on actual deployment of electrolyzers (200 MW), while Japan and South Korea are leading in fuel cells (with more than half of the world's 11 GW manufacturing capacity).

The global energy crisis has underpinned the necessity to ensure that energy security needs align with climate change goals. That coupled with the invasion of Ukraine and a need to rebound to pre-COVID levels have shown how crucial it is to ensure that project proposals are turned into deployed projects.

For more information, please contact Hamilton Locke New Energy Partner Matt Baumgurtel.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Adriaan van der Merwe
Senior Associate
Sydney
+61 2 8072 8271
adriaan.vandermerwe@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/adriaan-van-der-merwe

Developments to Australia's Hydrogen Guarantee of Origin Scheme

Authors: Matt Baumgurtel, Adriaan van der Merwe, David O'Carroll, Alexander Bird and Ally Frizelle
First Published: 23 February 2023

This article is part of our New Energy Insights series from our New Energy team. Stay tuned for regular updates and commentary on topical issues across the sector.

In light of recent emphasis on global emissions reduction, the Australian Government has been developing a Guarantee of Origin (**GO**) scheme to measure, track and verify greenhouse gas emissions, initially for hydrogen, hydrogen derivatives and renewable electricity production. Following consultation on a proposed GO scheme throughout 2021 and 2022, the Government is now seeking to apply these learnings to a much broader, voluntary GO scheme for renewable electricity and various other products across supply chains. In this article, we have set out a brief summary of the new developments to Australia's GO scheme following the release of the new consultation papers.

The proposed GO scheme

In our article, Fifty Shades of Green, we considered the need for a GO scheme to boost the credibility and business case of renewable hydrogen producers, and consequently, increase demand for green hydrogen. Consumers are now not only wishing to select the low emissions energy resource, but consumers are also seeking to substantiate emissions claims associated with the products and energy used.

The GO scheme is proposed to track and verify emissions related to hydrogen and other low emission products manufactured in Australia, as well as provide an enduring certificate mechanism for renewable electricity which could support a variety of renewable energy claims. The scheme ensures consistent measurement and transparency of the carbon intensity of a product, consequently supporting sales nationally and internationally.

In 2021, the Government released two discussion papers on a proposed GO scheme design and following consultation on these papers, several hydrogen projects across Australia signed up to trial the scheme (see more in Ready Steady GO!). In these trials, stakeholders running some of Australia's most cutting-edge hydrogen projects joined forces to test design components like metering systems, reporting frameworks, and ways for calculating emission intensity.

Most recently, in December 2022, the Government released two additional policy position papers which outline an updated proposed design for Australia's GO scheme:

- Australia's Guarantee of Origin Scheme – Policy position paper (**GO Scheme Paper**); and
- Renewable Electricity Certification – Policy position paper for renewable electricity certification under the Guarantee of Origin scheme and for economy-wide use (**Renewable Electricity Paper**).

The Government has opened consultation until 3 February 2023 on these policy papers for a broader GO scheme, with further consultation on draft legislation and methodologies to follow.

New developments from the consultation papers

The Clean Energy Regulator (**CER**) will be responsible for overseeing the scheme, which will soon be implemented as new legislation with supporting instruments for methodologies, processes and sources for measuring emissions. The scheme intends to simplify reporting emissions data and lay the groundwork for participation in new markets, with the scheme based on internationally standardised emissions accounting procedures.

The GO scheme will create two new types of certificates to be housed on public registers managed by the CER:

- **Product GOs** – these certificates will verify the carbon intensity of products across the product's lifecycle, capturing emissions produced in the well-to-user system boundary (i.e. the supply of raw materials, production, transport, storage and consumption of the product); and
- **Renewable Electricity GOs** – these certificates will provide a mechanism for tracking and verifying renewable electricity use both as an input into Product GOs and more broadly, to support renewable claims.

Importantly, the GO scheme framework acknowledges the existence of several schemes with a purpose or foundation in emissions accounting (for example, the Green Hydrogen Standard and Zero Carbon Certification scheme). The proposed GO scheme is designed to complement these schemes and can be differentiated as:

- it is product-based, whereas many other emissions accounting-based schemes are facility or company based; and
- it considers a broader level of coverage, the well-to-user system boundary, rather than only small sections of the supply chain.

Next steps

The Government will embark on several workstreams throughout 2023 to finalise the development of the GO scheme following consultation on the GO Scheme Paper and Renewable Electricity Paper. Specifically, the Government will undertake the following next steps:

- summarise feedback on the policy papers and develop legislation to give effect to the GO scheme;
- work with international forums to continue developing internationally aligned methodologies;
- continue to test the international methodologies through the GO trials; and
- develop domestic applications of the international methodologies into subordinate legislation.

Continual testing and refining of the proposed GO scheme is an important step in ensuring its long-term success. Naturally, the scheme will evolve over time to include additional hydrogen production pathways and components of the hydrogen value chain. If successful, the GO scheme will help unlock economic opportunities for the Australian industry to satisfy domestic and international demand for verified renewable energy and clean products.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Adriaan van der Merwe
Senior Associate
Sydney
+61 2 8072 8271
adriaan.vandermerwe@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/adriaan-van-der-merwe

The Birthplace of Batteries and other Rare Minerals: Opportunities for Australia - Part 1

Authors: Matt Baumgurtel, Michael Boyce, Megan Chau and David O'Carroll
First published: 08 April 2022

Increasing demand for New Energy technologies – predominantly battery storage – is an ongoing, common trend in many industries including electric vehicles (**EVs**), heavy haulage, public transport and renewable generation projects. As this demand increases, so too does the demand for the metals and minerals which form these technologies, and the pressure on the mining sector to provide a constant supply.

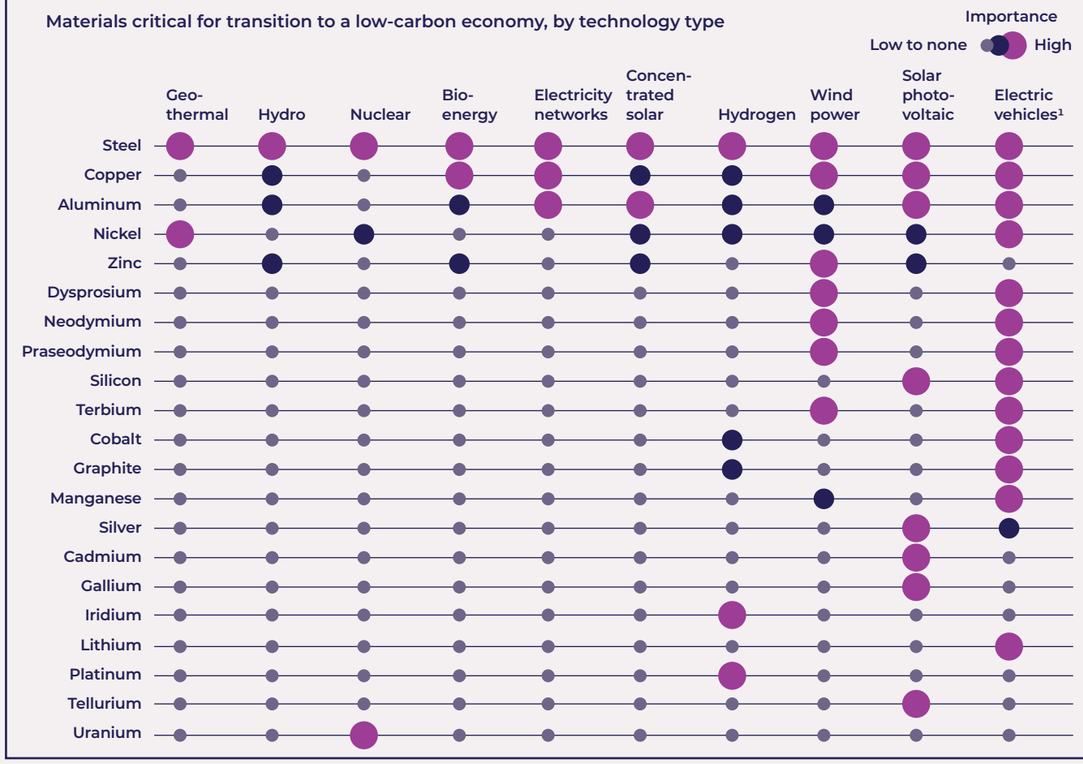
In this article, we identify the materials that are in high demand and the fundamental role played by the mining sector in the New Energy transition. We also consider the key issues facing this transition, mainly in the form of supply chain shortages, and look at some of the steps to achieve market balance for these materials in the future.

The Building Blocks of the New Energy Transition

Several raw materials are at the core of enabling the New Energy transition. Copper is a valuable material in bioenergy, electricity networks, wind power and solar photovoltaic technologies and in the manufacture of EVs. Wind, solar and electricity-powered technologies are also highly reliant on a range of other raw materials including aluminium, and neodymium. The required pace of transition means that the availability of these materials will need to be scaled up within a relatively short time scale and, in certain cases, at volumes ten times or more than the current market size to prevent shortages and keep new technology costs competitive.

While steel will be crucial as an infrastructure enabler for all technological transition, specific elements will play an important role in each technology.

Materials critical for transition to a low-carbon economy, by technology type



[1]Includes energy storage.
Source: Critical raw materials for strategic technologies and sectors in the EU, A foresight study, European Commission, Mar 9, 2020; *The role of critical minerals in clean energy transitions,* IEA, May 2021; McKinsey analysis

Certain metals and raw materials increase the performance of these technologies for longer periods of time, which in turn maximises efficiency and sustainability while reducing waste. Lithium metal anode, for example, is used to boost energy density in batteries, allowing the battery to perform better and for longer compared to a graphite anode alternative.

Battery Manufacturing

The following minerals are used in battery manufacturing:

Lithium – a key ingredient to produce traction batteries used in EVs and other consumer electronics; it is also used in energy storage and air mobility technology.

Cobalt and nickel – cobalt prices peaked at $100,000 / metric ton in 2018, leading to a switch to nickel, which similarly grew more expensive and proved ineffective in facilitating maximum design capacity. Currently, both materials are less commonly used.

Manganese – a useful alternative to cobalt and nickel for its sheer abundance in global production and supply (4-5x greater than nickel production and 140x greater than cobalt productioni), plus reserves.

Supply Chain Issues

In the short-term, the outbreak of war in Ukraine and the ongoing energy crisis have forced countries around the world to reassess their reliance on fossil fuels, particularly when imported from overseas. Renewables, most notably in the form of wind and solar power coupled with battery storage and/or green hydrogen production, are going to be increasingly important in providing energy security.

Therefore, while increasing renewable energy capacity seems an obvious solution, high prices, the challenges in bringing projects to production, the cost of new technology and uncertainty in the supply chain are growing concerns for the New Energy sector.

These supply issues may also be exacerbated due to other factors such as:

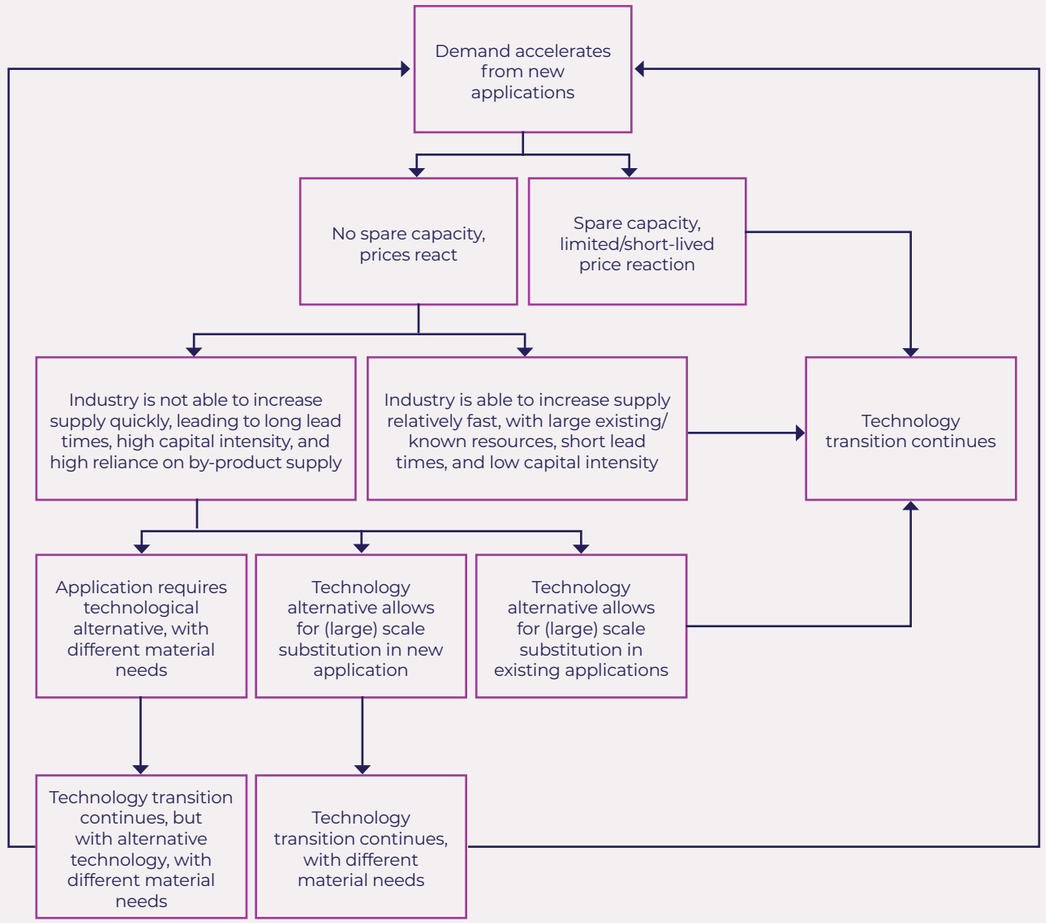
- Environmental trends favouring certain renewable energy generation – for example, where solar panels may not be performing well due to weather or seasonal changes, there may be a shift towards wind-generated power and accordingly, an increased demand for neodymium; and
- Greater volume of raw materials for sustainable technologies compared to fossil fuel-based alternatives – renewable energy capacity is generally lower than its fossil fuel-based counterpart (eg an EV needs about six times more minerals than a petrol-powered car), therefore more raw materials are needed to generate the same amount of energy.

One method of achieving future market balance in supply and demand is refining the existing methods for extracting raw materials and being willing to explore alternative extraction sites. This method can help to balance future supply and demand by maximising the safe intake of raw materials from each site and reducing supply time delays, leading to lower financial and environmental costs in the long-term. However, this depends on a number of factors including the location of the relevant sites and the technology required to be applied, which is often new and developing. An example of this is in China, where companies have invested in new hard rock and brine lithium projects over the past few years, but there remains a question mark as to the quality of these resources and their ability to produce battery-grade product.

Alternatively, technological innovation may accelerate to the point of being able to make material substitutions in the case of any deficit, reducing the pressure to supply one specific material altogether. In either case, sufficient capital investments both at Government and industry level will be necessary for these innovative measures.

The table below illustrates the supply and demand imbalance issue in more detail, including potential solutions:

Supply, demand, and price reactions will lead to feedback loops, resulting in supply reactions, technology shifts, and material substitution.



McKinsey & Company

Australia's Prime Position

The supply chains for critical minerals will be dominated by the switch to renewables. The International Energy Agency's most conservative forecasts expect demand for lithium to grow 13-fold in the 20 years to 2040, rare earth demand to triple, copper to double and cobalt is expected to increase at least six times.

Whilst acknowledging the recent press from some of the investment banks in relation to a lithium over-supply as a result of the number of projects potentially being brought to production, the broader industry view appears to reflect a position that any balance in the supply and demand of lithium, and in particular battery-grade product, is more likely to be some years away.

Australia is well positioned to supply these critical minerals and in doing so can make a huge contribution to combat climate change globally. For instance, Australia has rapidly become the world's biggest exporter of lithium by producing almost half of the worldwide supply.

As Australia still exports the majority of its critical minerals overseas, there is an opportunity for midstream processing to be undertaken locally. At present, particularly in rare earths, this midstream processing market is heavily dominated by China. Countries including Australia have begun to make a concerted effort to encourage midstream processing onshore, with grants and other incentives being offered in a bid to create an industry and additional jobs. For instance, a $120 million deal for a commercial-scale processing facility was recently struck between Australia's Lynas Rare Earths and the U.S Department of Defence, to operate in Texas by 2025. This deal is particularly significant as it creates a secondary supply chain for the processing of heavy rare earths elements outside of China.

Australia's mining industry also has a strong incentive to adhere to strict environmental standards and technological advancement is on foot to develop new methods that allow us to mine these important minerals sustainably.

Government Assistance

On 4 April 2022, the Federal Government approved a $1.25 billion loan to Iluka Resources to develop Australia's first integrated rare earths refinery in Western Australia. This is a crucial step under the Government's Critical Minerals Strategy, which aims to turn Australia into a global critical minerals powerhouse by 2030.

The refinery will produce rare earth oxide products such as neodymium and terbium, which are used in the manufacture of EVs, clean energy generation and defence technologies. The refinery project is projected to secure Australia's manufacturing capability and provide a range of job and economic opportunities in the New Energy space.

In the future, the refinery project will be further supported and sustained under the Government's Modern Manufacturing Strategy, which will seek to explore potential offtake and investment opportunities to continue meeting the increasing global demand for critical minerals. As part of this strategy, the Federal Government has announced a series of grants through its $1.3 billion Modern Manufacturing Initiative which aims to support midstream projects.

A Sustainable Transition

The transition to a net-zero, clean energy-based economy will be heavily reliant on rare earths and critical minerals. A rush to make the switch will place a strain on critical mineral reserves, resulting in a range of issues from disproportionate supply and demand to material shortages and high costs for products. However, with technological innovation, advances in extraction methods and sufficient Government and private capital investment, the transition to a New Energy society should be secured.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Michael Boyce
Partner
Perth
+61 400 142 494
michael.boyce@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/michael-boyce

Iveta Sceales
Special Counsel
Perth
+61 8 6311 9160
iveta.sceales@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/iveta-sceales

David O'Carroll
Senior Associate
Sydney
+61 2 8072 8271
david.ocarroll@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/david-ocarroll

Megan Chau
Lawyer
Sydney
+61 2 8072 8271
megan.chau@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/megan-chau

Marcelo Azevedo, Magdalena Baczyńska, Ken Hoffman, Patricia Bingoto, Greg Callaway and Oliver Ramsbottom, "The Raw-Materials Challenge: How the Metals and Mining Sector will be at the Core of Enabling the Energy Transition" (10 January 2021), https://www.mckinsey.com/industries/metals-and-mining/our-insights/the-raw-materials-challenge-how-the-metals-and-mining-sector-will-be-at-the-core-of-enabling-the-energy-transition

The Birthplace of Batteries and other Rare Minerals: Opportunities for Australia - Part 2

Authors: Jacob Pfeffer (alumnus), Chemonica Niranjan, David O'Carroll, Alexander Bird and Matt Baumgurtel

Part 2

Earlier this year, we identified materials that are in high demand for New Energy technologies, discussed the fundamental role played by the mining section in the New Energy transition and explored the key issues facing this transition.

With Hamilton Locke acting on two recent capital raising in the critical mineral sector, we're revising our findings in our April 2022 article, outlining the trends that we expect to see in relation to future capital raisings in this sector.

Recent Rare Mineral Capital Raisings

Global Lithium Resources Limited

Hamilton Locke recently acted as counsel for the joint lead managers for Global Lithium Resources Limited's (**Global Lithium**) placement of approximately A$121.5 million (**Global Lithium Placement**). Proceeds from the Global Lithium Placement will be used for the cash costs associated with Global Lithium's acquisition of the underlying tenements and remaining 20% in the Manna Lithium Project.

Global Lithium is a lithium exploration, development and production company with a focus on two highly prospective 100%-owned Western Australian projects – the Marble Bar Lithium Project in the Pilbara region and the Manna Lithium Project in the Goldfields region. Global Lithium produces high quality and consistent lithium that is made from spodumene concentrate.[1]

Lithium, unsurprisingly, is a critical component of lithium-ion batteries due its reactivity, lightness and ability to be recharged. Lithium batteries are used to power a range of devices from phones and laptops to electric vehicles (**EVs**). Lithium batteries are capable of storing energy created by renewable sources during high production times and releasing this stored energy according to demand if power production drops.

Mincor Resources NL

Hamilton Locke recently acted as counsel for the lead manager for Mincor Resources NL's (**Mincor**) placement of approximately A$55 million (**Mincor Placement**) in addition to a share purchase plan of an additional A$5 million. Part of the proceeds from the Mincor Placement will be used by Mincor to discover additional nickel mineralisation within its Gold Mile Development and accelerate its Kambalda Nickel Operations.

Mincor is involved in the exploration, development and production of mineral deposits. In 2020, Mincor completed a Definitive Feasibility Study, which confirmed its potential to develop a 5-year operation producing 63,000 tonnes of recovered nickel-in-concentrate through its Kambalda Nickel Operation. Mincor seeks to produce sustainable, high-grade nickel.

Nickel is a good conductor of heat and electricity. Products containing nickel have more strength at high and low temperatures and have greater corrosion resistance compared with other materials. The vast majority of nickel produced is used to manufacture stainless and heat-resistant steels though nickel is increasingly being used in lithium-ion batteries for EVs and energy storage.

According to the International Energy Agency, approximately half of the growth in demand for critical minerals like lithium or nickel will be the result of the further deployment of New Energy technologies over the next two decades and will be driven by demand for EVs and battery storage.[2] Lithium and nickel's critical role in relation to EVs and energy storage means these critical minerals will be crucial to the New Energy transition.

Expected Critical Minerals Capital Raisings Future Trends

These two successful capital raisings are indicative of in the increasing importance industry is placing on the acquisition and allocation of rare minerals. With several European countries already signalling future bans on the sale of new internal combustion engine vehicles and the switch by policymakers from fossil fuels to renewable energy, the demand for New Energy technologies is only expected to rise over the next few decades.

Indeed, the International Energy Association argues that, for the globe to meet the sustainable development scenarios stemming from the Paris Agreement, consumption of copper must rise 40%, nickel and cobalt production between 60 – 70%, and lithium nearly 90%.

This dramatic rise stems from the tremendous amount of rare minerals required to facilitate the clean energy transition. According to the International Energy Association, a typical electric car requires six times the amount of mineral inputs required by a conventional combustion vehicle. For its part, a turbine wind farm requires nine times more mineral resources than a gas-fired power plant. For this reason, investors agree that the demand for critical minerals, including lithium and nickel, is likely remain strong for the foreseeable future due to the baked-in needs of end-users of these materials amid a shift to EVs and more renewable energy.

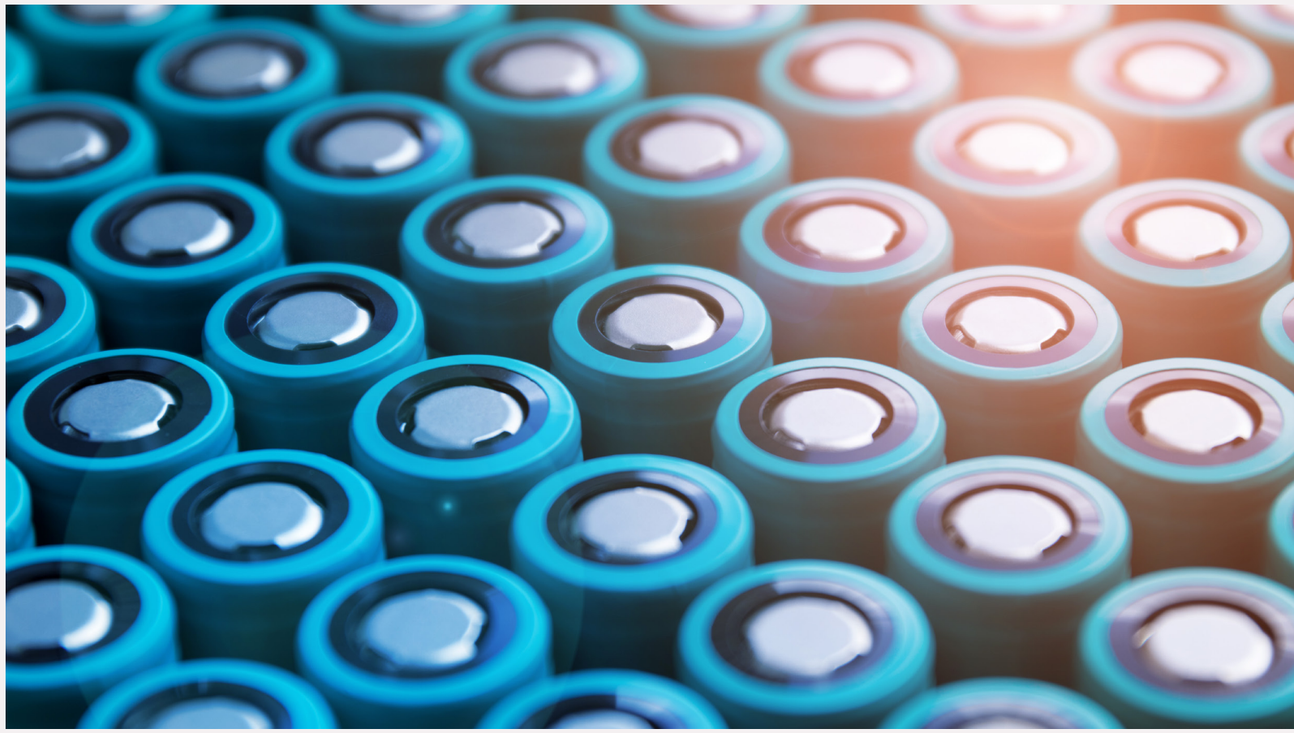
We're already seeing that demand play out in Australia. According to the Commonwealth Minister for Resources, the value of lithium exports are due to increase more than 10-fold over the next two years with almost $14 billion in lithium slated for export over the course of this fiscal year. Further, in the 2022/23 budget, the Albanese government allocated $50.1 million over three years to the Critical Minerals Development Program for competitive grants to support early and mid-stage critical minerals projects. This builds on the $49.7 million committed in September 2022 to various projects already in development across the country.

In light of the above, we anticipate larger volumes and increases in the value of capital raisings in the critical minerals sector which Australian companies and ASX listed entities will be able to take advantage of with their significant experience in the sector.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

David O'Carroll
Senior Associate
Sydney
+61 2 8072 8271
david.ocarroll@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/david-ocarroll



[1]Spodumene is a mineral that contains one of the highest lithium contents. SGS Minerals Services, "Hard Rock Lithium Processing": https://www.sgs.com/-/media/sgscorp/documents/corporate/brochures/sgs-min-wa109-hard-rock-lithium-processing-en.cdn.en.pdf

[2]International Energy Agency, "Mineral requirements for clean energy transition": https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/mineral-requirements-for-clean-energy-transitions.

IMPACT Panel Discussion: How to Reinforce Australia's Leading Role in the Global Hydrogen Economy

Authors: Matt Baumgurtel, Adriaan van der Merwe, David O'Carroll and Alexander Bird

In October 2022, Matt Baumgurtel, Partner and New Energy Lead at Hamilton Locke, moderated a discussion on "Mapping Australia's Hydrogen Ambition" for Leader Associates' IMPACT panel series.

Joining Matt on the panel were Phil Richardson, General Manager, Stanwell Corporation; Dr Amy Philbrook, Future Fuel Division, ATCO Australia, Harry Sunarko, Lead Port and Marine Engineering, Fortescue Future Industries; Warner Priest, Midstream Energy Director, InterContinental Energy.

This article is based on the panel's discussion that day.

How big is the hydrogen opportunity for Australia?

For every nation, the hydrogen opportunity is defined by two metrics: domestic production and international export. Australia is in a unique position in that it has the ability to produce huge quantities of green hydrogen without necessarily harming traditional domestic industry and has the potential to become a global green hydrogen exporter. On the domestic side, there is a lot of discussion about the role hydrogen can play along the value chain in industrial application, particularly in mining. Mineral extraction is one of Australia's most important industries – and the largest contributor to the nation's carbon footprint. Green hydrogen has the potential to not only significantly reduce this footprint but, with scalability, make one of Australia's most important industries less reliant on energy imports.

In terms of export, everyone is looking at Australia – the nation's stable political system and strong connection with large energy importers like Japan and Korea give the nation a first mover advantage in becoming a global green hydrogen supplier. There are of course competitors on the global stage – Canada for one is making significant investment in hydrogen export infrastructure. However, there is a focus on blue hydrogen in these other markets rather than the green hydrogen that is going to fuel international demand and global sustainability in the long run.

What key challenges do green hydrogen projects face in securing final investment decision (FID) funding? In other words, what makes these projects bankable?

The landscape for hydrogen FID is challenging at the moment. We're seeing big issues with electricity supply and cost volatility in the National Electricity Market (NEM). Reliable grid capacity and sustainable pricing is essential to fostering investor confidence. If you don't have the resources required and can't confidently say that cost will stay within an established range, then a given project will exceed the level of acceptable risk most investors are willing to take on.

Currently, we are seeing this scenario play out quite often with small scale projects– the returns from small scale projects are simply not enough to attract investment in this volatile climate. The picture is slightly different with larger, export focused projects where the chance of significant returns is greater.

Key to this attraction is offtake agreements - securing offtake to ensure that what is produced will in fact generate a return is central. However, there are also relevant environmental considerations that play an increasingly important role in FID. It is tremendously important we do the right thing for the environment. Access to sustainable resourcing, for example knowing where the water for electrolysis comes from, builds investor confidence in the environmental viability of the project, something that is as important as securing offtake for strong financial returns.

Does Australia face significant procurement challenges when it comes to securing the equipment necessary to foster a robust hydrogen industry?

Australia does face an uphill battle when it comes to acquiring the equipment needed to scale our domestic hydrogen industry. The passing of massive stimulus packages in the United States and Europe to incentivise hydrogen production has created a rush for equipment that is putting Australia at the back of the queue when it comes to sourcing electrolysers and other vital production equipment.

One solution is to scale domestic manufacturing of this equipment, particularly electrolysers. If you look at your standard electrolyser stack it has a lifespan of about 8 to 10 years. Under current estimates, a 50-gigawatt hydrogen project would take 20 to 25 years to build out. By the time we get 10 to 12 years into building the first few stages of the project, we already need to be able to replace old electrolysers with new. This is something we can't afford to wait in line for – we're going to need electrolyser factories here in Australia that are constantly producing these assets. Domestic production also helps combat risk (i.e. time and cost).

Is there a role for government to play in fostering both FID and domestic equipment production for hydrogen?

Government engagement is critical at this juncture. We've discussed FID - it is difficult to downplay the role government support schemes play in fostering FID. The H2-global scheme in Germany, the work the Japanese government is currently doing around similar schemes – this kind of involvement is going to be critical to help bank these initial intermediate scale projects. Once the industry gets big enough, then it will operate more like the broader resources industry. In other words, risk will not have to be artificially reined in by government intervention, the market can disperse it naturally.

While Australia has a relatively strong grants program, the federal government is not providing the robust financial support required to effectively foster a self-sufficient hydrogen industry. In Canada you have a redistributive carbon tax, the United States Inflation Reduction Act virtually eliminates the market advantages held by traditional fossil fuels. Schemes across the European Union are accomplishing the same. Australian state and federal governments cannot expect to meet the nation's hydrogen ambition without substantial fiscal programs that make hydrogen an attractive investment to both producers and consumers.

Is there value in the concept of a 'green premium' for hydrogen? Would this kind of certification scheme harm or enhance hydrogen's commercial viability?

For a certification scheme like the 'green premium' concept, you must have a strong level of confidence that compliance with certification requirements will be maintained and enforced. Further, you need to ensure that existing mechanisms to ensure quality like carbon credits and renewable energy targets are compatible with any new compliance regimes like a 'green premium' certification scheme.

Internationally, Australia is known for its strong regulatory framework. It is likely that a certification scheme backed by the Australian government would have currency with both domestic and international consumers. However, the utility of such a scheme may be limited in the current energy climate – while renewability is a primary concern, so is reliability. Considering the disruption that we're experiencing globally, particularly in the liquid natural gas market, there is perhaps a premium placed on the dependability of supply over it meeting a sufficient quality criteria. While a certification scheme would be meaningful, it may not be the most effective way to drive consumer adoption of hydrogen in this climate.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Adriaan van der Merwe
Senior Associate
Sydney
+61 2 8072 8271
adriaan.vandermerwe@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/adriaan-van-der-merwe

David O'Carroll
Senior Associate
Sydney
+61 2 8072 8271
david.ocarroll@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/david-ocarroll

Alexander Bird
Graduate
Sydney
+61 417 216 120
alexander.bird@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/alexander-bird

Hamilton Locke and H2Q: 2022 Year in Review

Authors: Matt Baumgurtel, David O'Carroll, Adriaan van der Merwe and Alexander Bird

July 2022
Hamilton Locke partners with H2Q

Hamilton Locke partners with H2Q Hydrogen Queensland (**H2Q**), a not-for-profit organisation dedicated to securing the economic, environmental and social opportunities hydrogen offers Queensland and Australia.

According to New Energy Partner Matt Baumgurtel, the partnership allows Hamilton Locke to assist H2Q to accelerate the development of domestic hydrogen supply chains by providing the legal expertise required to navigate the nation's rapidly evolving energy landscape.

September 2022
Hydrogen Connect

H2Q hosted the three-day Hydrogen Connect Summit in Brisbane. Joining other presenters from key members of the Australian and international hydrogen community Matt Baumgurtel moderated a panel discussion on *Financing 'Bankable' Hydrogen: Invigorating hydrogen finance, investment and funding: Determining bankability, risks and rewards*. The panel included several key members of Australia's hydrogen development community, including Dr Cameron Kelly, General Counsel, Australian Renewable Energy Agency (ARENA); Rupert Maloney, Head of Hydrogen, Clean Energy Finance Corporation (CEFC); and Sam Reynolds, Managing Director, Octopus Australia.

The conversation explored the opportunities and obstacles facing scalable hydrogen investment in Australia, and looked at how Australia can make hydrogen a commercially viable alternative to conventional fossil fuels, particularly in the eyes of the investors essential to industry success.

You can read more about the Summit and the key take ways from Matt's panel here.

November 2022
Matt Baumgurtel appointed to the H2Q Board of Directors

December 2022
End of Year Industry Showcase

H2Q hosted its End of Year Industry Showcase at the Customs House in Brisbane. Joined by members of Queensland's rapidly expanding hydrogen community, the Showcase celebrated the various accomplishments of Australia's hydrogen industry in 2022 and discussed the potential for continued development and achievement in 2023.

The Minister for Energy, Renewables and Hydrogen and Minister for Public Works and Procurement, Mick de Brenni MP, and Deputy Director-General for Hydrogen, Chris Shaw, attended to give address participants on the state of play for Hydrogen in Australia.

Hamilton Locke sponsored the *Industry Choice – Hydrogen Start-up* award, which went to Endua for its efforts in pioneering new hydrogen generation and storage technologies that can deliver affordable and reliable renewable energy.

2023

With a solid foundation laid in 2022, this year promises to yield further meaningful collaboration between H2Q and its partners as it works to grow the national dialogue around Hydrogen.

In September 2023, H2Q will host the 2023 Hydrogen Summit. Building on the success of 2022's year summit, this year will explore the challenges around scaling-up in order to accelerate a price-competitive, demand driven hydrogen economy.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Adriaan van der Merwe
Senior Associate
Sydney
+61 2 8072 8271
adriaan.vandermerwe@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/adriaan-van-der-merwe

Inaugural New Energy Associates Network event

On 3 November 2022 the Hamilton Locke New Energy team hosted the New Energy Associates Network's (NEAN) inaugural event at our Sydney office.

NEAN is a newly established network for junior to mid-level professionals in the new energy sector, aimed at building connections and sharing industry knowledge among members.

Keynote speaker, Mike Jefferies (Investment Manager with Octopus Investments Australia) sparked an engaging and insightful discussion on the topic of energy security. Some highlights included:

- Australia is not immune from Europe's energy crisis
- Energy security is driving the adoption of renewables
- Governments are stepping up to incentivise the uptake in renewables
- Green hydrogen is a long-term alternative fuel solution

A very big thank you to our keynote speaker and to all the energy professionals who joined!

To stay in the loop and join us for future NEAN events, please click here to join the network.

Developments in the Australian Hydrogen market – Jean-Louis Salinas (Siemens Energy)

Authors: Adriaan van der Merwe and Megan Chau
First published: 16 November 2022

In this New Energy Expert Insights, we sat down with Jean-Louis Salinas, Hydrogen & Decarbonisation Solutions Lead at Siemens Energy, to discuss his views on developments in the Australian hydrogen market.

What does Siemens Energy see as the opportunities for hydrogen in Australia?

Australia has two complementary advantages in the hydrogen race, one being access to inexpensive green power and the second being its abundance of natural resources. Other countries typically only have one of these advantages. Given that energy makes up 60% of the cost of producing hydrogen, the winner of the green hydrogen race will be the country with low-cost, clean and reliable electricity.

Other advantages include Australia's stable political environment and its status as an established trade partner – you can bank on Australia. Finally, the people have an innovative and entrepreneurial mindset, which coupled with business ambition and technological advancement makes the outlook for Australia very positive.

Where do you see Siemens Energy's involvement in the hydrogen market?

Our smallest PEM electrolyser size currently stands at 17.5MW. While there are manufacturers with smaller electrolysers, we see the opportunity geared towards utility-scale facilities. With Siemens Energy's wide-ranging portfolio (from electrolysers, clean generation, compression and transmission), we have the ability to provide integrated offerings which many others are unable to. Our presence on the ground also puts us ahead when it comes to being able to service and maintain our Australian customers' assets.

Why has Siemens Energy been successful in the energy market?

Our 150-year legacy is a testament in itself – its longevity is a vote of confidence echoed by financiers who see our technology as bankable. It is interesting to note that currently there are around 40 companies manufacturing electrolysers, many of which are new market entrants. They would therefore need significant investment to be successful. However, such investment is often difficult to come by when a company is only a few years old.

Another plus factor is Siemens Energy's proven scalability of production. We understand the need to scale up hydrogen infrastructure and equipment as soon as possible. At the moment, we are building a multi-gigawatt factory in Berlin that will eventually manufacture 3GW of electrolysers per year.

With Siemens Energy's broad market offerings, we can also bring together different parts of the value chain to provide flexible solutions to our customers. Our internal tools help us to create a "digital twin" of a plant and optimise the sizing and technology mix to meet our customers' needs.

Australia started out ahead in the hydrogen export race but seems to be falling behind. Why do you think this is and how can we speed up our hydrogen ambitions?

Australia was one of the first countries to establish a national hydrogen strategy. There was a clear plan, and various states expanded on this with their own strategies. It however took some time for Australia to implement these strategies.

Important requirements for a hydrogen market include sufficient port and water infrastructure, transmission infrastructure, and access to overseas consumers (such as in Asia and Europe). For hydrogen to truly take off as a global commodity, trade and policy frameworks (e.g., offtake agreements) need to be developed concurrently as well.

From an energy perspective, an important focus should be the construction of low-cost renewable generation facilities. As there is no pool value for hydrogen at this point, both the demand and supply side need to be built together.

What factors are important in the successful deployment of hydrogen equipment?

A crucial consideration is the availability of service capability in the country where the equipment is being deployed. There also needs to be a stock of components onshore. In long run we may even see some manufacturers move more components of the value chain onshore.

Given that the industry is still in its infancy, the equipment used to build a facility today will not look the same in 20 years. Investment in research and development remains important and will determine the ultimate winners.

What do you see happening in the hydrogen equipment supply chain in the short to medium term?

The market has moved past the point of demonstration projects (of which there has been quite a few in Australia). Players now want to build commercial projects according to technical specifications and safety requirements.

Currently there are a lot of players in the market, and it is likely that not all will be successful. While some developers may secure land access for premium facility locations, many entities will not be able to secure financing to develop projects. We therefore expect to see a consolidation of market participants in the medium term.

We are also seeing a lot of traditional IPPs and oil and gas companies expanding into green hydrogen production, and there will consequently be a merger of energy and hydrogen generation projects.

What would you like to see in terms of policy developments for hydrogen in the NEM?

The certification of hydrogen is crucial to get the market off the ground. Policy intervention to ensure the blending of gas is also important, as gas pipelines can absorb up to 10% hydrogen. This will help unlock a large market for hydrogen and help build a competitive export supply chain.

Policy intervention to create hydrogen hubs (similar to the current REZ) will help bring down connection costs and allow Australian projects to be globally competitive.

Do you see consumers willing to pay a premium for green hydrogen?

Honestly, renewables don't come for free. The path to net zero will involve higher prices and consumers will have to face new paradigms that come with conscious consumption.

While the end goal is green hydrogen, the development of projects producing all the colours of the hydrogen rainbow should be pursued in parallel, as any colour that reduces emissions is a step in the right direction.

Australia's efforts to certify green hydrogen is being watched intently by the international community. In comparison, Europe and the US are more advanced in putting certification systems in place, and we are seeing that consumers in these jurisdictions are willing to pay a green premium. Asia is not far behind.

Did the Ukraine crises contribute to the renewed hydrogen acceleration?

The Ukraine crises is showing the importance of a stable and secure supply chain for resources and energy. This is the same realisation that consumers came to during COVID when supply was restricted. Now, more than ever, consumers are placing continuity and certainty as the top priority.

Where do you think the people that will build the hydrogen infrastructure will come from? Are the skills gained in other parts of the energy sector transferrable?

There are many parallels between hydrogen and the existing energy sector such as LNG. Skills relating to pressurisation, pipelines, general energy sector experience and coupling between electricity generation and hydrogen production are crucial. Siemens Energy is working with the Australian Hydrogen Council to ensure the necessary local skillsets are being developed and jobs are being created.

For more information, please contact:

Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

Adriaan van der Merwe
Senior Associate
Sydney
+61 2 8072 8271
adriaan.vandermerwe@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/adriaan-van-der-merwe

New Energy Expert Insights

GRS & E22

Authors: Matt Baumgurtel and David O'Carroll
First published: 14 December 2022

In this New Energy Expert Insights, we sat down with Javier Garcia Sanchez of GRS and Fernando Plaza Martinez of Energy Storage Solutions (known as E22) to discuss their experience in developing, constructing and integrating energy storage technologies and the current state of play in the energy storage market in Australia.

Part of the Spain-based Gransolar Group, GRS is a market leading EPC Contractor, specialising in the construction of photovoltaic plants and their connection to the grid. E22, its sister company, is a utility-scale energy storage systems designer, supplier and installer.

What opportunities are you seeing in the energy storage market both in Australia and abroad?

From a development point of view, there is a huge need for batteries due to the rapid rise in electricity demand. The reliance on electricity as both a source and product of renewable energy far outpaces what the conventional grid structure is built to handle. While the grid upgrades are now coming, batteries offer an excellent tool to help facilitate that transition to meet current demand.

At the core of Australia's potential is a question regarding infrastructure: is there a grid system in place that can accommodate the inclusion of mass energy storage facilities? In the case of places like the United Kingdom and USA, the answer is yes – they can handle bringing these systems online without too much additional external build. However, that question remains to be answered for places like Australia which requires a lot more investment in infrastructure before a significant expansion of energy storage technology can occur.

What about the risks?

Utility-scale energy storage projects have the potential to provide a number of ancillary services to support the grid, such as frequency regulation and voltage support. However, it is difficult to monetize these services at present in overseas markets as they are not currently recognised in the wholesale electricity markets. Their revenue streams are therefore uncertain and difficult to accurately forecast over the life of the asset. As a consequence, bankability is still a key concern for lenders although we are seeing lenders starting to finance storage projects with merchant risk.

In terms of technology, GRS has made significant upfront investment in the core technologies and resources required to get these projects off the ground. In Australia GRS has traditionally been an engineering, procurement and construction (**EPC**) company. We know the most important players in the industry and felt well positioned to move into battery storage development through E22. While that's provided us a front row seat to development, the industry still faces a lot of unknowns.

Supply chain issues and the rising costs of procuring the raw minerals to supply integrated lithium-ion battery storage solutions remains a big issue, as the demand for lithium batteries coming from EV manufacturers is increasing dramatically. However, we are now seeing a lot of projects and developers look at strategies to mitigate these issues, like signing volume purchase agreements with suppliers or looking at alternative technologies.

GRS has a strong track record of fostering investor confidence. What is it about the GRS approach that gives investor confidence in putting their capital in battery storage projects?

Our ability to wrap the full design, supply and construction of a renewables project instils confidence in potential investors. Because we intend to carry out the EPC and be the system integrator, we are able to develop projects in a way that we know is going to be feasible. We develop the project to build it ourselves. We know what technology we want to use, what kind of solution we intend to implement. We undertake everything from the geotech studies to ensuring the BESS is fully integrated with the project and connected to the grid.

This adds an attractive element of uniformity to our projects. And that translates well for investors. Having control of any given project from the very beginning is tremendously useful and provides a significant advantage in a market that tends to take a piecemeal approach to project contracting. It gives investors a sense of certainty that is often lacking elsewhere in the market.

Could you provide an overview of the technologies that are shaping the energy storage market at the moment?

Over the last few years, we have seen massive investment in storage technologies. In terms of what we're currently implementing, we are mostly focused on integration and EPC services for large scale lithium-battery projects, although we have some small storage units coming online in Western Australia in the coming months utilising vanadium redox flow batteries (**VRFB**) manufactured by E22 in Spain. These are one of our specialities and are proving popular as they offer a high level of safety compared to other battery technologies, last longer and are reusable at the end of their lifespan.

Lithium batteries continue to drive the market – they remain popular and, due to that demand and investment, are very cost competitive. They were first intended for shorter storage applications, frequency control and other ancillary services. However, we are also seeing lithium batteries being used in some 8-hour duration energy storage projects, where VRFB (or other long duration solutions) may be better suited technically, mainly because they are much more cost competitive at the moment.

Do you see lithium remaining the main choice for battery technologies?

Potentially, however the price of lithium is rising, and supply constraints are increasingly putting pressure on lithium's accessibility. It is certainly a very good technology. But we are seeing increasing investor willingness to work on vanadium projects in the wake of a rapidly changing supply landscape. Of course, vanadium is also subject to rising prices, but it is not rising as fast as lithium and that gives us confidence vanadium may emerge as a strong alternative to lithium batteries in the wake of the continuing energy crisis.

For our part, we are very confident in VRFB technology. We have batteries running from 2018 without any issues. This is an unusually long lifespan and provides historical data indicating strong performance over more than a decade. Further, vanadium can be recovered and reused at the end of a battery's lifecycle. Lithium batteries are simply used up. From an investor's perspective, that's an attractive element – even after a decade of use, the materials of the battery still have a market value.

However, there is no technology that is completely dominant at the moment. While lithium is most cost competitive and most widely known, we have found that educating clients about vanadium redox flow technology tends to place the two technologies on an even playing field.

What are energy regulators saying about vanadium batteries?

Currently, regulators appear to be mainly focused on inverters, and they are less concerned about what's connected to the DC side of the inverter. They may not yet necessarily have the in-depth knowledge about the storage technologies that are coming onto the grid. Of course, this may change as regulators gain more knowledge about energy storage and grid infrastructure upgrades begin.

There is a clear preference among regulators for grid forming inverters as they can provide enhanced ancillary services like synthetic inertia and black-start capabilities than can improve the operation of the networks and allow for more renewables to be installed. The great thing about grid forming inverters is that you do not have to install completely new inverters – some inverter manufacturers only need to do a firmware upgrade for existing inverters to start providing this functionality to assist in upgrading the existing energy infrastructure.

What changes in the market do you think would help facilitate the introduction of more batteries into the grid?

Making legislation consistent across the Australian states and territories would be a big step in the right direction. Some states have a more difficult regime than others to navigate – they don't always provide clear guidelines on process. Every state wants to build batteries to reenforce the grid. Without making their regulatory regimes easier to navigate, it will not be possible to provide energy storage in a timely, cost-effective manner.

How do you see the market developing over the next few years?

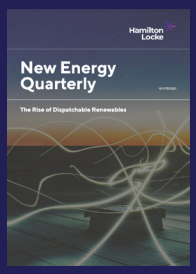
We think it is going to become far more competitive. The number of battery suppliers is increasing. However, we remain an industry leader and have the ability to consistently deliver due to our experience as an integrated EPC company. We believe we will continue to maintain our first mover advantage as new opportunities emerge.

For more information, please contact:

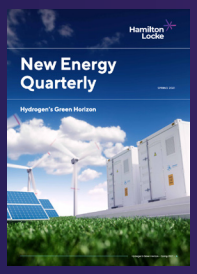
Matt Baumgurtel
Partner
Sydney
+61 459 900 080
matt.baumgurtel@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/ matt-baumgurtel

David O'Carroll
Senior Associate
Sydney
+61 2 8072 8271
david.ocarroll@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/david-ocarroll

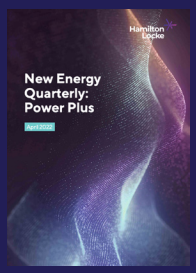
Missed our previous Quarterlies? No dramas – read them here:



New Energy Quarterly - The Rise of Dispatchable Renewables >>

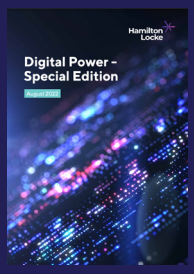


New Energy Quarterly – Hydrogen's Green Horizon >>



New Energy Quarterly – Power Plus >>

New Energy Quarterly – Mobile Power >>



Digital Power Publication – Special Edition >>

New Energy Quarterly – Energy Security >>

Missed our previous Expert Insights? No dramas – read them here:

SIEMENS energy · octopus investments · GHD · green peak energy · ENERGY SYNAPSE · CBRE · QuintasGroup MANAGING POWER · FLUENCE A Siemens and AES Company · BETACARBON™ · GRS · E22