Hamilton Locke

New Energy Quarterly: Power Plus

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Editorial: Power PLUS

Authors: Matt Baumgurtel, Adriaan van der Merwe

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Is Energy Generation enough to Future Proof your Business?

Traditionally economic growth and energy demand went hand in hand. This means that the wealthier a country, the more electricity it generated and the more CO^2 it emitted. This culminates in the world's two energy problems. Firstly, that the bulk of our energy generation produce carbon dioxide emissions, with Asia Pacific accounting for 52% of global emissions in 2030. And secondly that about 770 million people still lack access to electricity, which means that we will see an 80% increase in generation capacity by 2040.

Addressing these seemingly opposing energy dilemmas of increasing electricity supply and decreasing CO^2 emissions creates a tremendous opportunity for business, especially as the cost of renewable generation technology have decreased significantly in recent years. For example, the cost of solar generation has fallen by a staggering 80% since 2010. This has accelerated the uptake of renewable energy by generators in large scale generation, and also by households installing rooftop generation.

The realisation of business opportunity in renewable energy is evident. The NSW New England Renewable Energy Zone for instance attracted 4 times more applications than it can accommodate, and the NSW hydrogen hub scheme eight times the state's target.

The effect of this high uptake of renewable technologies have however caused a substantial shift in the NEM's energy demand profile. As explored in our article on the electricity duck curve, there is now a time of day when electricity is, for all practical purposes, free.

While this predicament erodes profits for some generators, it does lead to lower electricity prices benefitting parts of an economy. It also holds a tremendous opportunity for generators willing to innovate. To a large extent we are still operating in an energy market where generators were designed to follow load, but we are transitioning to a market where load can follow generation. In such a market the ability to shift one's demand profile is key, and possible due to technological advances and storage solutions.

Interestingly we are also beginning to see a decoupling of economic growth and energy demand. This does not mean that the world requires less energy, but rather that the growth in electricity demand will be flatter as efficient technologies require less energy to undertake the same work.

The message to generators is clear – there will be a point in time for some where the business of generating electricity alone will not be enough. Generators will have to explore the synergies that their generation facility has with other industries, determine what opportunities exist beyond their core business and find their Power PLUS.

The starting point when finding your Power PLUS is the realisation that electricity is the central input to making our lives modern. It is a necessary input to our food, water, transport and materials. And as examined in this Quarterly – it can play an even bigger and more profitable role. This role sees an abundance energy move an economy from selling electrons to selling tomatoes, from selling iron ore to selling steel and from selling wool to selling cloth.

The role of energy security in international relations

In recent weeks the world has seen how international diplomacy is limited by a country's dependence on energy. One can only speculate how the international response to the Russian invasion of Ukraine would have been different if countries were not reliant on Russian oil and gas. In a world where cheap, decentralised solar and wind generation can be coupled with storage solutions and hydrogen transport, the sanctions countries are willing to impose may be different in future.

After the invasion we have seen various announcements to decrease European reliance on Russian oil and gas by increasing hydrogen terminal capacity. When coupled with COVID recovery measures which heavily invested in renewable generation, this may be the coming to fruition of an offtake market.

It is clear that the first mover advantage will benefit various projects in development in Australia. How this global shift in energy dependence will play out remains to be seen. The message is however clear: greater energy independence and energy security is possible. And as we explore in this quarterly – with that independence come water and food security as well.

Business driving the Green Economic Recovery

Australia's climate commitments have come under intense scrutiny once again following the recent floods in Queensland and New South Wales. This came on the back of COP26 (the UN Climate Change Conference in Glasgow) in October and November 2021, at which the Australian Government, despite setting a target of net zero emissions by 2050, received criticism from many nations for declining to revise its existing interim target of reducing emissions by 26-28% by 2030 to a level necessary to meet the Paris Agreement goal of limiting global warming to 1.5°C by the end of this century.

While important, the reality is that the commitment to net zero emissions and the transition to a lower carbon economy is no longer primarily driven by governments.

This has been a distinct shift which has occurred largely in the last 24 months – a hidden transition as COVID-19 has dominated global attention. At the same time, however, the pandemic has itself accelerated this shift, as governments and businesses collectively focus on 'building back better' in a new world.

We attribute the role of business in the green economic recovery to:

1. environmental, social and governance concerns (ESG);
2. decreased cost of generation; and
3. energy security.

This quarterly includes a three-part series addressing the drivers of economic recovery, as well as demystifying the Australian carbon market and focusing on the distinction between net zero and carbon neutral, greenwashing and Australia's potential as a carbon sink.

This Quarterly

The purpose of this New Energy Quarterly is to inspire you to think broader than your current business and provide a platform from which you can benefit from the energy transition. To aid in this, we carved up this edition in the following categories:

Power PLUS agriculture

Future proofing agriculture and securing additional revenue streams are at the forefront of every farmer's mind. The solution to these dilemmas may be the generation of electricity alongside existing operations. The sharp decline in generation cost has made the electricity generation business an attractive opportunity for anyone with sufficient space to locate generation facilities. The electricity generated can then be used to cut down on electricity bills, be sold in the market or used to venture into new industries such as vertical closed loop farming or production.

To this end we explore how Agrivoltaics can reduce the competition between farmland and energy generation, mitigate severe weather events and increase production seasons. We highlight the opportunities that come from installing solar panels over irrigation canals and shed light on the benefits of using floating solar facilities in conjunction with aquaculture. We also explore how farmers can expand into the adjacent industry of carbon farming and how evaporation of irrigation canals can be reduced by the installation of solar panels.

In the coming months we will also be publishing on vertical closed loop farming in office buildings and the creation of water with dehumidifying technology and desalination – all which are only possible with an abundance of cheap energy.

Power PLUS digital

The market value of the global digital asset ecosystem is approximately AUD$2.8 trillion, with over 221 million users having engaged with cryptocurrencies or used a blockchain based application. We focus on the deep connection between power and the digital economy. Throughout the series, we explore the opportunities that data centres and crypto miners bring to the National Electricity Market (NEM), important digital security considerations for energy asset holders, the 'tokenisation' of energy related projects and relevant ESG considerations when acquiring a digital assets business.

Power PLUS mining

The Australian mining sector is definitely alive to the necessity to have a greener approach to resource extraction and beneficiation. To this end we have seen various commitments to use renewable generation to power mining operations. Not only does his make sense from an ESG perspective, but it also utilises the opportunities of declining generation costs, decentralised generation technologies, the rise of storage technologies and potential of additional revenue streams.

In this article we discuss the greening drivers of the mining industry and available technologies to realise this. We also touch on the opportunities for the beneficiation industry through initiatives such as green steel and green aluminium.

Power PLUS industry

The market has realised that traditional commercial and industrial electricity customers can now play a role in generation by simply installing PV panels on the roofs of their premises. We ask if C&I is the next big generator, but also what other opportunities exist. Options like lampposts for EV charging, covering water canals with PV panels and retrofitting high-rises and greenhouses with transparent PV panels all provide exciting opportunities.

Power PLUS market developments

We outline the some of the more recent dramas in the market, such as the ever-increasing duck curve and the misalignment between the ISP and AEMO, and show how not planning for an energy transition means having to accept the market created by market participants.

We also introduce our three-part series on the business drivers for Australia's green economic recovery.

We hope you enjoy reading this edition as much as we did writing it.

https://ourworldindata.org/worlds-energy-problem
https://www.weforum.org/agenda/2021/11/renewable-energy-cost-fallen/

Watt's happened

The New Energy Team published their energy predictions for 2022

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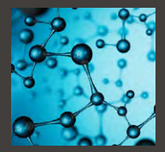

Lawyer's weekly featured insights of our New Energy Quarterly – Hydrogen's Green Horizon

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New Energy Team attended the Smart Energy Virtual Conference and Exhibition

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Watt's new in the Market

New Energy Bulletins:

ARENA launched the second round of its Future Fuels Program, allocating $127.9 million in funding to support fleets to shift to new zero emissions vehicles over the next four years.

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Funding Boost for Queensland Green Hydrogen Demonstration Plant.

View Article

EOI for NSW's 700MW Waratah Super Battery.

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Australian government's Critical Minerals Strategy Announcement

View Article

AEMC publishes draft report on changes to energy and gas retail rules to allow for hydrogen and renewable gases.

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The Federal Government has announced the introduction of concessional tax treatment, which will apply to revenue generated by primary producers from the sale of Australian Carbon Credits (ACCUs) and biodiversity certificates.

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The Clean Energy Council published its 2022 Clean Energy Australia Report. Some of the key findings of the report includes:

- 32.5% of Australia's total electricity generation came from clean energy in 2021, an increase of 4.8% in 2020.
- 27 large-scale projects were completed in 2021, adding 2955 MW of new large-scale renewable energy capacity to the grid.
- 68 large-scale projects were under construction at the end of 2021, representing more than 9 GW of new capacity and employing over 35,000 Australian workers.
- Australia's largest battery was commissioned in 2021 and a further 30 large-scale batteries were under construction at the end of the year with a combined capacity and storage duration of 921 MW/1169 MWh.

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A new deal between Fortescue Future Industries and E.ON will see the Australian company deliver 5 million tons of green hydrogen to Germany, the Netherlands, and multiple cities in Europe by 2030.

Greenpeace launches its Green Electricity Guide, indicating which retailers provide the greenest energy.

USA Department of Energy establishes Bipartisan Infrastructure Law's $9.5 Billion Clean Hydrogen Initiatives.

Australia's largest coal-fired power station, Eraring, to close in 2025, seven years early.

The conflict in Ukraine sees fuel prices soaring and Europe scrambling to ensure its energy security.

Australian researchers claim its patented capillary-fed electrolysis cells achieve 95% efficiency, adding to the competitiveness of hydrogen.

The Intergovernmental Panel on Climate Change (IPCC) published its sixth assessment report www.ipcc.ch/report/ar6/wg2/. The report highlighted some key risks for Australia:

- Disruption and decline in agricultural production.
- Cascading, compounding and aggregate impacts on cities, settlements, infrastructure, supply-chains and services due to wildfires, floods, droughts, heatwaves, storms and sea-level rise.
- Inability of institutions and governance systems to manage climate risks.

$100million of the 2022 Federal Budget being invested in the Port of Newcastle to ensure it is hydrogen ready.

Applications for the ARENA Large Scale Solar Battery Storage Funding Round closed on 31 March 2022.

AEMO Quarterly Energy Dynamics for Q4 2021 observations:

- Average renewable penetration levels for the quarter increased from 31.6% in Q3 to 34.9% in Q4.
- Black coal-fired generation fell to its lowest Q4 average since NEM start, with both Queensland and New South Wales contributing to the decline.
- Record uptake of distributed PV capacity (estimated to be approximately 3.2 GW in 2021) drove quarterly output to new highs in Q4, contributing to substantial daytime demand reductions.

AGL rejected the takeover bid from Mike Cannon-Brookes and Brookfield. While not going ahead, the bid did send a strong market signal that the private sector is driving the renewable economy and that the days of business as usual at coal generators have come to an end.

Watt's new at Hamilton Locke

Hamilton Locke Launches Perth Office and Expands Firm with Six New Partners

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New starters

Brett Heading
Partner and Chairman of Partners

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Adriaan van der Merwe
Senior Associate

View Profile

Grant Parker
Partner

View Profile

Cedric von Duering
Lawyer

View Profile

Chris Hood
Partner

View Profile

Nasreen Jahan
Lawyer

View Profile

Michael Boyce
Partner

View Profile

John Hibbard
Lawyer

View Profile

Catherine Johns
Special Counsel

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Claudia Bertone
Lawyer

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Market Recognition

AFR Features Hamilton Locke – One of the Largest Increases to Law Firm Partnerships in Australia

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Legal 500 Recognises Hamilton Locke in 2022 Asia-Pacific Guide

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Hamilton Locke Recognised In Doyle's 2021 NSW Guide

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Chambers and Partners Recognises Hamilton Locke in 2022 Global Guide

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Watt's next

Announcements by Origin and AGL on sooner than expected coal-fired power plant closures makes one wonder if more such announcements are to follow.

All things mobility will be the topic of our next quarterly publication.

Australian Energy Week 2022: 7 to 9 June 2022

Connecting Green Hydrogen APAC 2022: 25 to 26 July 2022

Solar Energy Future Australia 2022: 25 to 26 July 2022

Australian Clean Energy Summit 2022: 19 to 20 July 2022

Spotlight - Adriaan van der Merwe

Adriaan is a senior associate in Hamilton Locke's New Energy team. He advises the public and private sector on infrastructure development, power projects, construction, regulatory matters and energy related disputes. He has extensive experience advising on the technologies of wind, solar PV, CSP, landfill, biomass, nuclear and hydro. Adriaan's other work includes battery storage, transmission, distribution and procurement related assignments.

Journey to becoming a lawyer

I always knew that I wanted to be involved in building infrastructure. Part of this is due to the unintended conditioning of my father (an electrical engineer) who revelled in explaining transmission losses and electricity pricing structures to me from an early age. I started as a graduate in the Projects and Infrastructure team at Cliffe Dekker Hofmeyr Inc in South Africa at a time when the renewable industry was taking off. I moved to Australia in 2019 to expand my construction experience and joined MinterEllison in Sydney.

Proudest career moment

Without a doubt I am proudest of being part of the team that advised Eskom Holdings SOC Ltd (the South African energy utility) as buyer, national transmission company and system operator in its participation in the South African Renewable Energy IPP Procurement Program (REIPPPP). The REIPPPP is a flagship public-private partnership program that was designed to contribute towards socio-economic and environmentally sustainable growth, and to start and stimulate the renewable energy industry in South Africa.

The program included the following technologies: onshore wind, CSP, solar PV, biomass, biogas, landfill gas and small hydro. Part of this mandate included contract and claims management for 94 renewable energy projects, as well as the resolution of disputes and all ancillary processes contemplated under the project documents.

Why I joined Hamilton Locke

The New Energy team's focus on renewable energy aligns perfectly with my world view. I resonated with the idea of working in new and innovative ways and doing the kind of work that will leave the world better than we found it. It is a privilege to be part of a firm that has as its foundation a focus to serve its clients, its employees and its community.

The Halo Group mentality

At Hamilton Locke the sense of collaboration is palpable and very real. It is not strange to see colleagues walk across the floor to spit ball ideas and discuss adjacent areas of law. It adds a collegial element to work which means that we can add that extra nuance to all our matters. In the end - if our clients succeed, we succeed.

New Energy Predictions 2022

The New Energy team at Hamilton Locke has a front seat to the energy transition. Relevant insight and knowledge of the sector has allowed us to advise on the development, financing, construction and operation of solar, wind, hydrogen and storage projects across the Asia Pacific region.

Here are our 2022 New Energy predictions. You can also access the video here.

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.

2. Commercial & Industrial Rooftop Solar

Following heavy investment in 2021, we are expecting to see the 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.

3. 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 vehicles.

4. 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.

5. 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.

6. Behind the meter PPA's

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 centers and crypto mining assets, as well as accompanying regulatory intervention.

7. 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.

8. 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.

9. 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.

10. 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.

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

Hydrogen's Green Horizon >>

The Rise of Dispatchable Renewables >>

Watt is ARENA funding?

Program	Summary	Funding available	Closing Date
Ultra Low Cost Solar PV Research and Development Round (ULCS)	ULCS is split into two Streams: 1. cells and modules; and 2. balance of system, operations and maintenance. ULCS aims to support the cost-effective production of green hydrogen and low emissions steel and aluminium. Includes funding for research groups.	AUD 40 million	11 April 2022
German-Australian Hydrogen Innovation and Technology Incubator (HyGATE)	HyGATE is an initiative to support real-world pilot, trial and demonstration projects along the hydrogen supply chain. The objective of HyGATE is to strengthen Australian-German cooperation on reducing hydrogen production costs and stimulate the innovation process in both countries.	€ 50 million and AUD 50 million	3 May 2022
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 ound, with funds available in two stages: 1. $30m until CY2022; and 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 177.7 million	ongoing

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

Hamilton Locke New Energy Team

Partners

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

Grant Parker
Partner – Construction and Infrastructussre
Sydney
0402 855 728
grant.parker@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/grant-parker

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

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

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

Special Counsel

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

Senior Associates

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

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

Associates

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

Lawyers

Andrew Smith
Lawyer – Energy, Infrastructure and Resources
Sydney
+61 2 8072 8271
andrew.smith@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/andrew-smith

Cedric von Duering
Lawyer – Energy, Infrastructure and Resources
Sydney
+61 411 320 631
cedric.vonduering@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/cedric-von-duering

Nasreen Jahan
Lawyer - Construction
Sydney
+61 2 8072 8271
nasreen.jahan@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/nasreen-jahan

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

John Hibbard
Lawyer – Construction and Infrastructure
Sydney
+61 2 8072 8271
john.hibbard@hamiltonlocke.com.au
hamiltonlocke.com.au/our-team/john-hibbard

Agrivoltaics: The Future of Australian Farming?

Authors: Matt Baumgurtel
First published: 10 March 2022

The pressures on the Australian agriculture sector are increasing, not least so due to the effects of climate change. In order to ensure that this vital sector remains profitable, and therefore sustainable, new ways of land utilisation need to be explored.

Agrivoltaics, being the simultaneous use of land for both solar photovoltaic power generation and agriculture, was first proposed back in 1981. In its original form, it envisaged installing solar panels above crops or on the roofs of greenhouses, and by 2019 developed to also mean agricultural activity between solar panels, such as grazing.

While there is still a lot of groundwork to be done, Australia seems to be uniquely positioned to benefit from, and pioneer, this method of co-location farming.

How does it work?

The scientific premise of Agrivoltaics is that different crops have different light saturation points, meaning that there is a maximum amount of light that plants can absorb. The light not being used by crops can therefore be used for other purposes, such as electricity generation.

Facility construction generally entails photovoltaic solar panels being spaced in-between crops, installed on arrays above crops (allowing machine access and crop growing), installed on top of greenhouses or installed in such a way that grazing is possible underneath.

While panels were originally installed with space in-between to allow optimum light access, advances in panel transparency, sun tracking and crop monitoring means that panel placing options are ever increasing.

Advantages

While the benefits of deriving an additional income stream from agricultural land is self-evident, the benefits go even further:

- The competition for flat, well-located land for agriculture or energy generation is eliminated by co-locating activities.
- Providing shade coverage leads to water efficiency and the creation of microclimates that extend growing seasons and mitigate the impact of heatwaves, droughts, frost and storms.
- Increased PV panel performance due to lower soil temperatures.
- Decentralised electricity generation.
- Increased land value and risk mitigation through diversification of income streams.
- Increased energy security.

Disadvantages

- Agrivoltaics is not suited for crops that require high light intensity and may lead to decreased yields for some shade tolerant crops.
- Slightly higher installation costs for arrays and greenhouses.
- Excessive crop shading leads to a greater risk of bacterial pathogens developing, which causes a reduced shipping and shelf life for products.

International uptake

The Italian government is investing €1.1 billion to support 2 GW's of Agrivoltaics as part of its post-COVID recovery plan. French president, Emmanuel Macron, recently announced that Agrivoltaics will become one of the main pillars of France's energy system. The German federal government is also supportive of Agrivoltaics and have released plans to support the co-location of photovoltaic systems and agricultural land.

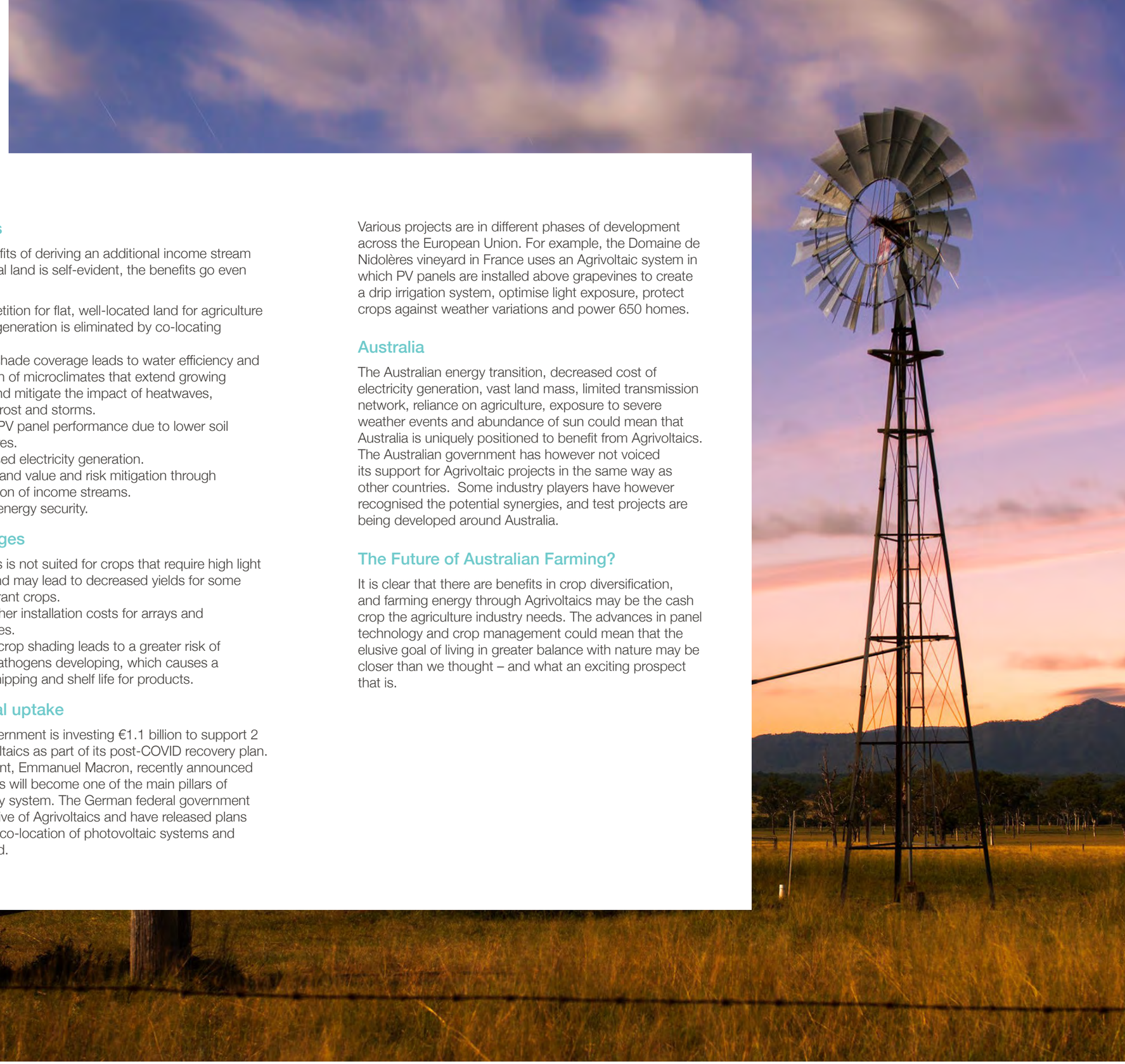
Various projects are in different phases of development across the European Union. For example, the Domaine de Nidolères vineyard in France uses an Agrivoltaic system in which PV panels are installed above grapevines to create a drip irrigation system, optimise light exposure, protect crops against weather variations and power 650 homes.

Australia

The Australian energy transition, decreased cost of electricity generation, vast land mass, limited transmission network, reliance on agriculture, exposure to severe weather events and abundance of sun could mean that Australia is uniquely positioned to benefit from Agrivoltaics. The Australian government has however not voiced its support for Agrivoltaic projects in the same way as other countries. Some industry players have however recognised the potential synergies, and test projects are being developed around Australia.

The Future of Australian Farming?

It is clear that there are benefits in crop diversification, and farming energy through Agrivoltaics may be the cash crop the agriculture industry needs. The advances in panel technology and crop management could mean that the elusive goal of living in greater balance with nature may be closer than we thought – and what an exciting prospect that is.



Panel your Canal

Authors: Matt Baumgurtel, Brett Heading, Peter Williams , Andrew Smith
First published: 29 March 2022

In a world that is shifting away from the use of fossil fuels, a top priority is finding new, innovative ways to conserve and create energy in the renewable energy space. Solar canals are one of the latest innovations driving positive change in the race to net-zero by 2050, and various countries are eagerly getting on board.

The case for Solar Canals

In response to what is shaping up to be the worst megadrought in the U.S for the last 1,200 years, researchers at the University of California have developed the 'solar-canal solution'. Project Nexus is a $20 million project to build solar panel canopies over the Turlock Irrigation District canals, expected to be complete in 2024.

Described as "covering canals with solar panels", the University's 2021 study found solar canals can result in multiple benefits for water and energy infrastructure. Most notably, in the context of California, solar canals may reduce evaporation of water canals by up to 82%, or approximately 286 billion litres of water a year. This is enough water to irrigate 50,000 acres of farmland or provide 2 million people with an adequate water supply. At the same time, the solar panels can generate enough energy to account for a sixth of the state's total energy needs.

While a potential disadvantage of solar panels is the cost of installation and upkeep, the design of solar canals ensure they are a long-term investment. The canal creates a cooler microclimate for the solar panels, allowing them to perform at maximum capacity for a longer period.

Solar canals may also relieve concerns that renewable energy infrastructure takes up land that may be used for other purposes, such as farming or residential homes. Instead of separate solar farms, panels are installed directly over canals, thus maximising efficient use of space.

International context

Countries such as India and France, and even companies such as Coca-Cola have implemented solar canals as part of their renewable energy schemes and infrastructure.

The French are buying into the solar canal innovation with Societe du Canal de Province and the energy provider Sergies signing a partnership agreement to jointly finance, build and operate four solar PV systems with an aggregate capacity of 12 MW on the Provence Canal. The Provence Canal provides water to 110 municipalities in the southern French regions of Bouches-du-Rhone and the Var which include major cities such as Marseille and Toulon. The two companies have estimated that the Provence Canal could potentially play host to approximately 40 MW of solar PV capacity.[1]

In India, the Jharkhand Energy Development Agency is tendering for a MW scale solar canal project with the successful proponent expected to conduct site surveys for canals that can be utilised for grid-connected solar PV. In 2012, Gujarat State Electricity Corporation and Sardar Sarovar Narmada Nigam Limited commissioned a solar canal project that included a 1 MW plant covering 750 metres of the Narmada canal. It was projected that the solar PV panels would prevent the evaporation of approximately 9 million litres of water per year.[2]

Australia's irrigation canal system

The World Resources Institute ranks Australia as a country with medium to high water stress.[3] One does not have to look far to see the devastating effects of water scarcity that parts of Australia has endured during certain periods in our history. Water scarcity can have a significant impact on our agricultural sector, much of which is reliant upon the health of our water systems and the major irrigation areas that such systems feed. Australia is home to extensive canal systems that supply water to Australia's largest irrigation areas. The Murrumbidgee Irrigation Area has about 3,500km of canals, the Murray Irrigation includes 3,000km of canals and the Goulburn Murray Water area in Victoria has about 7,000km of canals.[4] Leakage, seepage, and evaporation from delivery canals all contribute to significant amounts of off-farm water losses, which is estimated to be 130 billion litres per year in the Murrumbidgee valley alone.[5] Investment in piping or lining canals could help prevent off-farm evaporation, but the costs of undertaking such improvements are prohibitively expensive. This provides an opportunity to implement proven solar canal technology to reduce canal water evaporation and improve solar PV panel efficiency.

The development of solar canals marks the newest chapter of innovative renewable energy solutions and demonstrates the world's capacity and resilience to innovate our way to net-zero by 2050. The message is clear – Australia should draw on international experience in solar canal development and capitalise on the vastness of our in-land waterways to increase renewable generation and conserve scare water resources.

[1] https://www.pv-magazine.com/2022/02/23/frances-provence-canal-to-host-12mw-of-solar/?utm_source=dlvr.it&utm_medium=linkedin
[2] https://arena.gov.au/assets/2016/01/Opportunities-for-renewable-energy-in-the-Australian-water-sector.pdf page 5
[3] wri.org/aqueduct
[4] CSIRO, "Water – Science and Solutions for Australia", page 113
[5] Ibid

Soil carbon

Authors: Matt Baumgurtel, Grant Parker, Andrew Smith, Ally Frizelle
First published: 08 April 2022

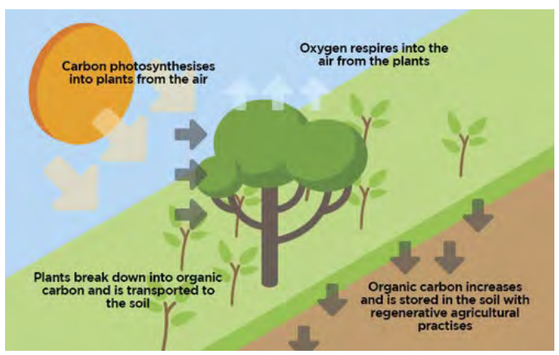
The profit margins of utility-scale solar farms continue to shrink, putting financial pressure on an industry that has a critical role to play in the race to net-zero. To alleviate this financial pressure, it is important for developers of solar farms to access new revenue streams. Solar farm developers should consider implementing carbon farming projects that utilise the land under and between solar PV panels to generate Australian Carbon Credit Units (ACCUs) under the Emissions Reduction Fund (ERF). These ACCUs could then be sold to generate additional revenue for solar farm projects.

What is carbon farming and soil carbon?

Carbon farming is an approach to optimising carbon capture on working landscapes by implementing farming practices that are known to improve the rate at which CO2 is removed from the atmosphere and stored in plant material and/or soil organic matter. In short, carbon farming is farming in a way that reduces GHG emissions or captures and holds carbon in vegetation and soils.

Soil carbon projects remove carbon from the atmosphere by storing it in soil. The soil carbon method is one of the many accredited methods under the ERF that can be implemented to offset or remove CO2 from the atmosphere. This can be achieved by increasing the amount of decomposing plant material and microbes in the soil. A soil carbon project will involve the establishment of specific project management activities and management actions that change agricultural soil conditions to improve crop and pasture growth.1

The below diagram sets out how plants and soil sequester carbon from the atmosphere:



Source: https://carbonfarmersofaustralia.com.au/

Can solar farm projects participate in soil carbon projects that generate ACCUs?

Whether project land may qualify to be an “eligible offsets project” and be entitled to generate ACCUs is governed by the following Federal legislation:

1. Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth) (the Act);
2. Carbon Credits (Carbon Farming Initiative) Regulations 2011 (Cth) (the Regulation)
3. Carbon Credits (Carbon Farming Initiative) Rule 2015 (the Rule); and
4. Carbon Credits (Carbon Farm Initiative – Estimation of Soil Organic Carbon Sequestration Using Measurement and Models) Methodology Determination 2021 (the Methodology).

The Act, the Regulation, the Rule and the Methodology all set out a number of eligibility criteria and processes that must be followed by a soil carbon project. First, to be entitled to ACCUs, the project proponent must apply to the Clean Energy Regulator (the Regulator) for a declaration that the soil carbon project is an “eligible offsets project”. The Act sets out a number of criteria that must be satisfied before the Regulator can declare that a soil carbon project is an “eligible offsets project”. Careful consideration of these criteria must be had to ensure that any potential soil carbon project that proposes to use the land between and under solar PV panels is declared an “eligible offsets project”.

One of these criteria is that a soil carbon project satisfies the requirements of the Methodology. The Methodology sets out a number of threshold criteria that a project must meet to be an “eligible offsets project”.

The Methodology sets out what is “eligible land”. To be eligible land the project area must satisfy the following criteria:

1 the land must have been used for pasture, cropping or bare fallow during the whole baseline period;

2. there must be no dwellings or structures on the land;

3. as at the end of the baseline period, it was reasonable to expect that carrying out eligible management activities proposed by the relevant land management strategies will increase the carbon sequestered in the land; and

4. it is possible to sample the soil on the land consistent with the requirements of the Methodology.

It is possible that the land between and under solar PV panels would be considered to have been used for pasture, cropping or bare fallow during the whole baseline period. The baseline period is defined as the 5 year period immediately before the application to be an eligible offsets project is made.

The Methodology defines “structure” as an object that is made of several parts, that prevents pasture or cropping from occurring underneath more than 5% of the ground area of the object. The Explanatory Memorandum for the Methodology makes it clear that the term “structures” in limb (b) is not intended to include “fences, solar panels or other structures under which agricultural activities may still occur and soil sampling can take place.”

Status of ACCU market

It is estimated that the total value of the secondary market grew to $150 million during 2021 which was a 170% increase on 2020 and a 120% increase on 2019.2 This is a positive signal for solar developers as the Regulator has historically been the largest purchaser of ACCUs, under ERF contracts.

It is important that solar farm project developers do not “self-select” themselves out of being an “eligible offsets project”. Therefore, we strongly recommend solar farm project developers seek out professional advisors to help assess their carbon farming project’s suitability under Federal legislation. We at Hamilton Locke are already engaging with our clients in relation to co-locating carbon farming and solar farm projects. Please get in touch with our New Energy lead, Matt Baumgurtel, should you wish to discuss.

Renewing the Mining Industry

Authors: Matt Baumgurtel, Michael Boyce, Adriaan van der Merwe, David O'Carroll, Alexandra Frizelle

First published: 07 April 2022

In this article, we examine the greening drivers in the mining industry and discuss why renewable generation technologies are well placed to realise these goals.

The old ways are no longer fit for purpose

Mines play a crucial role in the domestic and global economy, providing the raw materials necessary to produce many different products. However, the nature of mining operations is that they are often found in remote places with little or no access to the electricity grid. Mining operations consume large amounts of electricity and, since a reliable power supply is critical, mining companies have traditionally relied on diesel and gas generation as the baseload power supply.

Whilst gas and diesel generators are reliable, they can be very expensive to operate and market conditions cause gas and diesel costs to be highly variable - the current environment is an excellent example of this. There are also additional costs with companies spending significant capital to build infrastructure and on logistics, not to mention the various health and environmental impacts.

The mining industry is also facing other significant challenges. For example, diesel generators can produce around 1kg of CO2 for every kWh generated. Increasing pressure from activists to stop projects harmful to the environment and the abandonment of coal stocks from investment portfolios, therefore, come as no surprise. In addition, stakeholders and directors of companies are requiring an increased focus on ESG and, in particular, ESG issues are often a critical part of the assessment process of financiers that provide the capital that enables mining projects to be funded and developed.

The infrastructure required for the renewables revolution to proceed is however heavily reliant on the mining industry to provide the necessary raw minerals for its construction and continued operation. This means that sustainable solutions are required to offset the deleterious environmental impacts of the mining industry while remaining economically viable and attractive to investors.

The Australian mining sector is alive to the necessity to have a greener approach to resource extraction and beneficiation. To this end, we have seen various commitments to use renewable generation to power mining operations. For instance, Fortescue Metals Group has committed to build the multi-billion-dollar Uaroo Renewable Energy Hub in the state's Pilbara region in Western Australia which will use alternative energy sources to power its Pilbara mining operations. The company has said that it hopes the project will inspire others to implement similar solutions as they too target net-zero operations.

Not only does this make sense from an ESG perspective, but it also utilises the opportunities of declining generation costs, decentralised generation technologies, the rise of storage technologies and potential additional revenue streams.

Switching to renewable technologies

Australia is fortunate to have world leading solar and wind resources. Solar PV or wind turbines, when coupled with storage technology, can be deployed to provide low-cost zero emissions power to sites that would otherwise need significant capital expenditure to connect to the grid or be forced to rely on fossil fuelled generators. Rapid advancements in energy storage technologies are improving efficiency and providing the solution to the renewable intermittency problem (i.e. that renewable energy is only generated when the sun shines or the wind blows).

Take for instance the development of mineshaft energy storage by companies such as Green Gravity, which deploy super-heavy weights in legacy unused mine shafts (estimated at nearly 100,000 across Australia) to capture and release energy. The weights are raised at times of the day when energy prices are cheap (or on-site surplus generation is available) and then lowered at the precise moment the power is wanted - either for an industrial purpose or simply because energy prices in the grid make it an attractive time to dispatch. Importantly, the environmental footprint of such an operation is very small even when compared to alternative energy storage technologies such as lithium-ion batteries.

While becoming fully independent from diesel or gas is difficult for a mine, energy costs can be reduced drastically when renewable generation is added to the energy mix and various other ESG related benefits can be derived. Crucially, renewable generation is not linked to the volatile prices of diesel and gas, making it easier to budget for energy costs.

Mining companies can also combine different energy generation technologies in microgrids, improving resilience while reducing electricity costs and meeting ESG objectives. For instance, the Agnew Renewable Energy Microgrid project will consist of five wind turbines delivering an 18 MW wind farm, a 10,000 panel 4 MW solar farm and a 13 MW / 4 MWh battery storage system with security and reliability of the microgrid underpinned by a 16 MW gas engine power station.

As adding renewable generation to a mine site is an upfront capex costs, the operational costs of these facilities are drastically lower than diesel powered sites. This is because sunlight and wind are free and the design life of renewable generation facilities can often exceed 25 years with relatively minimal maintenance costs. Batteries have a comparatively shorter service design life and mining companies can expect to change batteries twice during the service life of the solar or wind farm. However, batteries are a less mature technology and cost reductions and service life increases can be expected in the short term.

The Role of Green Hydrogen

Mining projects are well placed to provide an important demand side industry for green hydrogen (GH2). GH2 can be used to store renewable energy to generate electricity. It can also power equipment and trucks and cars, and it can even be used in certain traditionally hard-to-abate sectors such as steelmaking as a reducing agent. At the moment, hydrogen is only used as a part-replacement for coal or coke in steel operations, but in these large-scale undertakings, even a partial replacement of a large amount of carbon can make a significant impact.

The cost of electrolysers is currently the main issue when it comes to scaling up and utilising GH2 economically. While electrolysers are not yet at a price point where they can be deployed at scale to produce the amount of GH2 required for these large mining projects, as the technology advances and demand through industries the resources sector grows, electrolysers costs are expected to reduce accordingly.

Carbon Neutrality by 2050

As Australia pivots towards carbon neutrality by 2050, resource companies are already eyeing energy as an area where relatively easy gains can be made. Efforts are well underway to decarbonise operations and supply chains across Australia. In Western Australia alone, almost half of all electricity generated in the state is used outside of power grids by resources companies operating in remote areas.

As referenced above, along with a solar farm and a battery, five giant wind turbines are powering much of the operations at the Agnew gold project, about 1,000 kilometres north-east of Perth. Energy company EDL, which built the Agnew power system, estimates there is about 2 gigawatts of "off-grid" power demand in Australia. And other major players, including Rio Tinto, BHP and Woodside, have unveiled plans to spend billions of dollars on wind turbines and solar panels as they seek to go green.

It is clear that the mining and renewable energy industries have and will continue to have a very close relationship. Ultimately, mines and resource projects will need to have a holistic approach when it comes to decarbonising, namely one that combines electrification, energy efficiency, batteries and green hydrogen in order to make the best use of potential synergies.

We will be examining the opportunities for the beneficiation industry through initiatives such as green steel and green aluminium in a follow up to this article.

C&I Solar – the Rooftop Race has Begun, and the First to Scale Will Win

Authors: Matt Baumgurtel, Hannah Jones, Beatrice Drumore
First published: 08 December 2021

In our previous article, we looked at the increasing potential for investment in the C&I solar market, with CBRE IM's investment into Green Peak Energy highlighting the rapidly progressing nature of the C&I sector both in Australia and internationally.

Matt Baumgurtel - New Energy lead at law firm Hamilton Locke, sat down with the key individuals who lead the CBRE | Green Peak Energy transaction; CBRE Investment Management ("CBRE") Managing Director, Direct Private Infrastructure Investments Asif Hussain and Director David Xu, Green Peak Energy ("GPE") CEO Myles Carrucan and General Counsel Anthony Headlam, and Pottinger CEO John Sheehy and Senior Vice President Rodrigo Arias.

In this second half of our discussion with GPE, CBRE IM and Pottinger we explore the opportunities currently available in the C&I solar market, map how the sector is evolving (both in Australia and internationally) and discuss how investors and developers can stay ahead of the curve to capitalise on the impending growth of the sector.

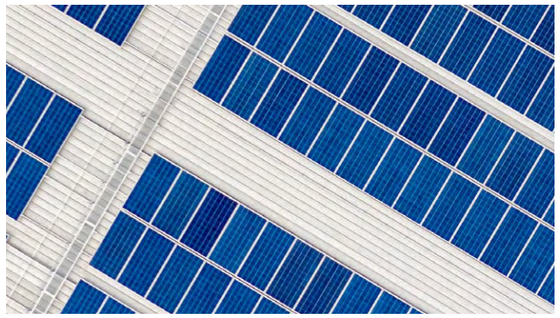
Power prices, regulatory change, ESG goals, energy security, equipment and installation costs (including large batteries), all point in one direction – the C&I market is primed for exponential growth to become the next dominant influence in the National Electricity Market.

So how can you get into the C&I solar market?

Investors, developers, and customers alike can take advantage of the rapidly developing opportunities that are arising in the C&I solar sector. Where C&I solar has previously lagged behind residential and utility scale solar, a shifting perception of clean energy, uncertainty in wholesale electricity prices and a lack of resources available to build larger PV projects is driving investors (and customers) towards C&I solar.

Customers

Much of the C&I solar journey over the last four years has been focused on educating customers on the attractiveness of roof top solar and selling the benefits. Now that customers generally understand the benefits and want to have a system installed, the customer "sale" can focus on designing the best system for the customer at the best price, in the best contractual and commercial structure. The competition between providers is fierce making the customer experience and supplier reputation and experience key factors for customers when choosing the best supplier partner for them.



Consequently, C&I solar developers are now focused on providing a tailored, bespoke service to customers, including increased system design, product development and better after-sales service.

"It's that depth of familiarity across all of those stakeholders, and as that familiarity grows, you can jump to the important commercial issues and system design issues without needing to talk through the fundamentals of solar energy," says Anthony Headlam, "When people understand what we're doing we can jump straight to what we should be talking about - how do we make this deal, and how do we tailor it for you?"

Increased familiarity with the solar market can also assist customers in their negotiations with landlords. "Customer" often includes tenants and their landlords, both with external legal advisors, and in trying to tailor discussions to one party, it is possible to alienate another.

By educating landlords as to the benefits of C&I solar, Anthony Headlam proposes, "a lot of your issues with the customers fall away because ultimately, you're developing a good renewable energy product."

According to Myles Carrucan, discussions can vary depending on the complexity of a customer's business, however, increased knowledge of solar roof top products is benefitting all stakeholders, with customer engagement becoming less educational and more commercial. Myles notes "We recently signed our biggest project to date in three weeks from our initial conversation to signatures on a page, so that open-to close window is definitely trending down."

And potential customers interested in the benefits that solar can provide are encouraged to take advantage of the economic savings now. "Green Peak Energy is a true long term energy partner," says Myles Carrucan, "Electricity should be boring, from a customer perspective – it's been around for a while, it's not a new invention."

For many customers, navigating the changing landscapes in terms of pricing, energy security, and environmental impact can be quite disruptive to business operations. By outsourcing that part of their business to forward focused developers such as Green Peak Energy, when market conditions and economics change, customers can trust that their provider will make those choices and come back to them with appropriate solutions.

Developers

Solar energy businesses looking to capitalize on the opportunities that are developing in the C&I solar sector will need to follow Green Peak Energy's lead to address the main barrier to success in this sector – scale.

Every C&I solar developer will tell you scale is key, and that it will be scale that drives efficiencies, which reduces costs, resulting in further scale and increased efficiencies. However, successfully achieving C&I scale is challenging. Whereas utility scale solar developers can generate substantial revenue with only one or two large volume PPAs, C&I solar developers may need to enter over 400 individual PPAs to generate the same revenue.

Similarly, it is much easier to manage a single 200-acre piece of land with a single solar farm that has been designed and built to operate as a single plant. To achieve the same scale, a C&I solar owner may be managing 6000 geographically spread roof top sites with different installed equipment or varying age, and then some roofs are sunnier than others…

Being able to negotiate PPAs with hundreds of different counterparties, install solar products of high quality on to hundreds of different roofs and continually operate, maintain, and manage that portfolio efficiently, and regularly (even in real time) report to those customers is the key to success. Process, systems and automation are also key, and data management and analytics are fundamental to success. Scale requires systems, but systems are only economic at scale.

Myles Carrucan attributes Green Peak Energy's success in this regard to several factors including product offering, project execution and operational capabilities "having the right people with the right market knowledge and the right market connections" is critical. Deploying roof top systems at scale is key; however, managing and maintaining those systems so that they continue to save customers money (and make the owner money) is critical. Happy customers are repeat customers (i.e. system deployment across multiple sites) and customer referral is a critical origination stream.

Hence a high level of customer service using scalable systems, including remote monitoring and artificial intelligence is critical to continued growth in a fragmented and competitive market. Innovative commercial structures to meet evolving customer requirements also differentiates competitors in a crowded market.

Consequently, generating scale requires developers to address several key requirements including:

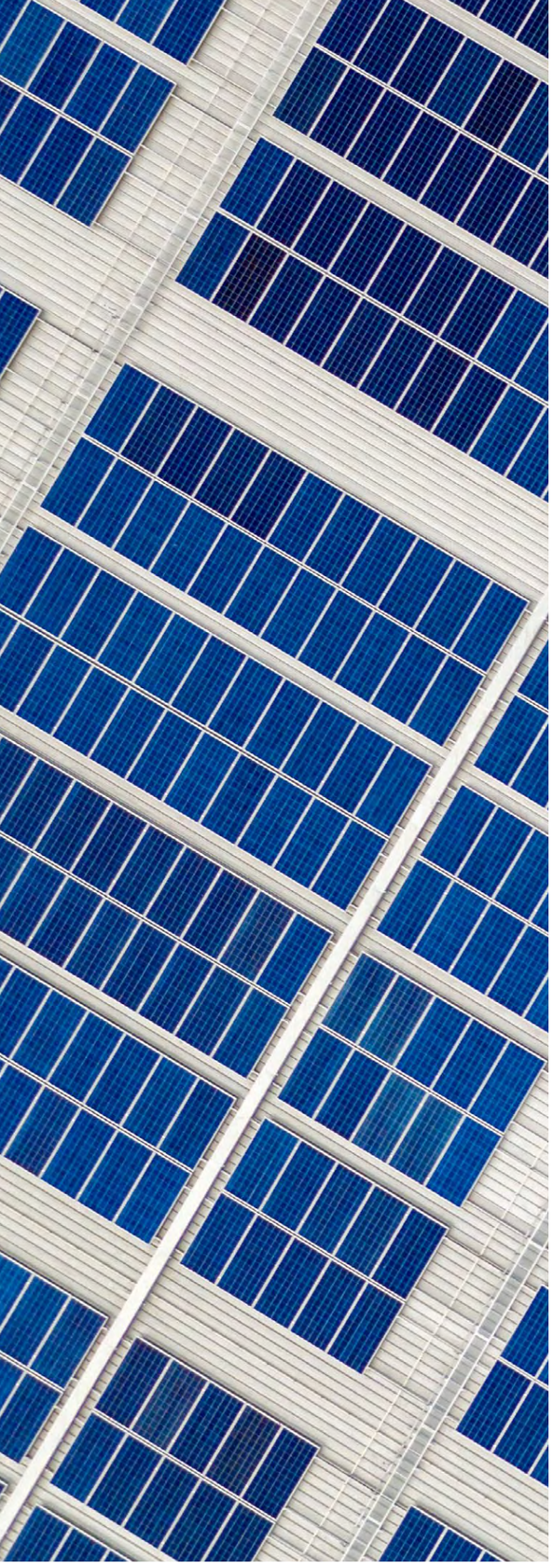
- originating a strong customer base;
- delivering a cost-effective solution; and
- having flexibility in commercial and economic project structuring - offering different solutions to meet different customer needs.

GPE's development over the last four years is a case study in these requirements. Myles Carrucan notes, "much of the last four years of our journey has just been educating our customers on the attractiveness of the PPA product and the benefits to their business," he says, "You've got to have the ability to build a flexible, competitively-priced product, develop a distribution network to get it in front of potential customers and then be able explain it to them in a compelling way."

A roof top solar transaction can be inherently quite complex, so developers need to build a flexible product that can be adapted to the various property and commercial arrangements that might arise. By offering a flexible product, tailoring it to a particular customer's unique circumstances and thereby presenting a compelling customer solution, C&I solar developers can capitalise on a broader customer base and begin to generate the scale needed to offer a more bespoke service.

Presenting this product to customers can be a challenge though. C&I solar takes all the elements of a sophisticated utility scale deal with financing, PPAs and long-term commercial contracts but needs to be presented and packaged in a simple way to customers who don't have energy at the core of their business. C&I customers aren't buying energy every day, so developers need to understand the inherent information asymmetry and present straightforward offerings which make the long-term benefits of a roof top solar system easily understood and simple to measure over time.

Anthony Headlam, General Counsel for GPE, is confident that GPE has excelled in this regard, "I think that's where GPE, over the journey that we've been on over last four years, have succeeded. We've refined our product into one that simplifies the process for customers. But that's one of the inherent difficulties in this space."



Equity Investors

Institutional investors are moving from interest to execution at an increasing pace; however, investors are finding that bridging the gap between seeing the macro opportunity and finding the right C&I business is challenging. By partnering with GPE, CBRE IM have successfully navigated this opportunity and bridged this gap.

This is a key challenge for institutional investors – what is the right system, and can it be scaled? Rightfully, investors are looking to invest in established specialist C&I developers/owners, with those businesses that have invested heavily in scalable systems and technology (like GPE) seen to be the most likely winner in the impending C&I scale war.

Investors need a C&I partner who can both grow their customer base organically by the origination of green field sites and customers and have the skills to identify and assess project acquisition opportunities. Being able to technically assess systems and projects built by others is a skill that is in high demand, with investors partnering with experienced players to access that deep market knowledge and current, directly applicable C&I experience.

Once those opportunities have been identified and assessed, efficient transaction execution is critical. Smart due diligence is key, particularly the use of artificial intelligence and data analytics to assess documents and data across what can be hundreds of different sites with different equipment or varying age, with different PPA terms and customer profiles. Overall portfolio assessment is the goal however, identifying the outliers (and how they affect the standard deviation) is critical. This is where diligence not only informs the acquisition but provides a road map for successful implementation and integration.

Perhaps more so than most M&A transactions, the implementation and integration of acquired C&I assets are critical. The acquirer's systems need to be able to absorb new projects efficiently and then assess and improve site performance. While acquisitions to create scale can produce cost efficiencies, it is improvements in site performance that really drive returns from acquisitions – and technology is the key.

Debt Financiers

Debt financing is slowly coming to the C&I party. Historically, access to funds has been tricky, and the process is still rapidly evolving.

"The use of project finance is, certainly for the larger banks, still a bit of an education process," says John Sheehy. "Three or four years ago, the only way to get C&I projects debt-financed was through 'mission-aligned' debt providers. Equity interest around that time was smaller scale and there weren't waves of institutional equity going into these sorts of businesses."

Now, once they reach a scale of production that can generate 10 to 20 megawatts, that's when C&I developers really start to capture the imagination of project finance teams. This level of scale produces consistent, reliable revenue streams that investors and financiers want to see, and have come to expect from the renewable energy market, as evidenced by the CleanPeak Energy acquisition of the Enwave Australia distributed energy business last year.

Batteries, VPPs and hydrogen – what's next for the C&I solar market?

Batteries, like they are in utility scale solar market, are turning C&I solar on its head. The ability to economically store homegrown electricity potentially substantially reduces the amount of energy a C&I customer draws from the grid. And the economics are arguably easier than utility scale as energy produced, stored and consumed behind the meter avoids transmission charges completely – a 30% free kick straight off the top.

And the opportunity to "over build" roof top solar systems does not end there. Regulatory changes will promote the aggregation of C&I solar systems into virtual power plants – see our comments on energy reforms here. This is perhaps the largest opportunity of all for C&I developers and investors.

Often C&I solar sites will only use a portion of the roof space available to them because the energy generation from the system during the day only requires a certain amount of offsetting usage during the day. GPE is looking to push these limits, "right now, we can typically deliver a customer approximately 20 to 30% of their energy use over the course of a 12-month period," says Myles Carrucan, "we'd like to substantially increase that in coming years."

By allowing the consumption of energy produced by the solar system at times when the sun is not shining, energy storage allows larger solar systems to be installed, maximizing the use of available roof space to deliver a higher overall amount of behind the meter energy. This creates an enormous opportunity for both customers and developers.

Market leaders already see energy storage solutions as a key growth area for C&I business. Myles Carrucan notes "it's not just batteries, it's also any kind of long duration storage solutions that could potentially allow you to shift excess energy across seasons," he says, "The amount of people that I'm talking to about hydrogen opportunities is fantastic".

The market overseas is even more focused on behind-the-meter energy storage. In places like Canada with long summer days and short dark winter days, seasonal energy shifting becomes particularly interesting. Market players see decreasing cost and increasing efficiency of energy storage systems will open significant opportunities.

"Lithium-ion batteries help in the short term, lengthening the day by three or four hours," says Asif Hussain, "but we really need longer term storage solutions to facilitate seasonal shifting".

Energy storage solutions open opportunities to expand existing roof top systems allowing not only increased generation but also revenue from wholesale grid ancillary services markets. As these markets expand, so do the opportunities for distributed energy storage.

Existing customers will be please to know that GPE isn't sacrificing technological advancement for quality though. GPE prides itself on maintaining the quality of its products and services as it grows, installing high quality technological solutions on day one.

"Ultimately the value in our business is the relationships with our customers," says Myles Carrucan, "if we're underwhelming them with our performance, that will be a constraint on our ability to grow, so we need to prioritise serving customers at a high level all the time."

And the future is near. BESS costs are falling almost monthly, and technological advancement continues to improve efficiencies and cycle rates.

Where to from here for C&I solar?

The C&I roof-top solar is set for exponential growth. Rising energy prices, energy security fears, equipment cost reductions, ESG requirements, electricity transmission constraints - macro-economic trends all point to huge opportunities for C&I customers, developers, and investors alike.

Scale is key. Scale drives efficiencies in plant construction, maintenance, operation, and monitoring, thereby making roof-top systems more profitable for both customers and developers (and their investors).

Technology enables scale. Remoting monitoring, scalable systems, customer facing software, artificial intelligence, predictive maintenance – are all must haves for any C&I developer seeking to capitalise on growing C&I customer demand.

Experience and expertise are the secret sauce – C&I solar development has unique challenges. It shares similarities with a retail business, however, regulatory change and technological advancement mean the big opportunities are in aggregation.

Consolidation is coming. For a nascent sector, this would appear an odd prediction, however, scale is going to be king. There will be opportunities on both sides of the consolidation. Mergers and acquisitions will create instant scale, however, execution of implementation and integration will ultimately determine success – and who wins the C&I race.

The Hamilton Locke team advises across the energy market – from project development, grid connection, financing, construction, to the buying and selling of development and operating projects, platforms, and businesses.

Is C&I Solar the next big generator?

Authors: Matt Baumgurtel, Hannah Jones, Beatrice Drumore
First published: 08 December 2021

Hot off CBRE IM's investment into Green Peak Energy, in the next instalment of our New Energy Expert Insight series we look to the rooftops, and arguably the most influential segment of electricity generation – rooftop solar.

Supercharged by subsidies, Australia's thirst for energy independence has resulted in Australia having some of the highest penetration rates of residential solar. However, the commercial and industrial sector has lagged, until now.

Power prices, regulatory change, ESG goals, energy security, equipment and installation costs (including large batteries), all combine to point to one conclusion – the C&I market is primed for exponential growth. With the potential not only to catch-up to residential solar but surpass and not look back, the C&I market has the potential to become the next dominant influence in the National Electricity Market.

So how will the vast untapped opportunity of C&I solar play out?

Matt Baumgurtel - New Energy lead at law firm Hamilton Locke, sat down with CBRE IM, Green Peak Energy and Pottinger to discuss the rapidly expanding and quickly evolving C&I market, and what opportunities lie ahead for C&I developers and investors. We identify the opportunities available, the challenges to be navigated, and the risks to be mitigated.

One thing is clear and is common to all rapidly evolving sectors - the critical importance of partnering with experienced players, and the value of advisors with deep market knowledge and current, directly applicable sector experience.

In this first of a two-part discussion, we explore the macro themes driving the C&I solar market and the current and future opportunities created by the exponential growth of the market. In part 2 we dive deeper into how the sector is evolving (both in Australia and internationally) and how investors and developers can stay ahead of the curve and win the impending C&I battle.

You can access previous New Energy Expert Insights here.

Hamilton Locke is very pleased to have assisted GPE in relation to CBRE IM's investment.

The players and the deal

Matt was joined by the key individuals who lead the CBRE | Green Peak Energy transaction; CBRE Investment Management ("CBRE") Managing Director, Direct Private Infrastructure Investments Asif Hussain and Director David Xu, Green Peak Energy ("GPE") CEO Myles Carrucan and General Counsel Anthony Headlam, and Pottinger CEO John Sheehy and Senior Vice President Rodrigo Arias.

GPE is a leading developer, owner and operator of behind-the-meter and rooftop solar solutions for commercial and industrial customers. Founded in early 2017 by leading players in the Australian renewable energy, infrastructure and capital markets sectors, GPE has capitalised on the growing demand for C&I solar in Australia.

CBRE's investment into GPE is one of the largest investments in the Australian C&I solar market, highlighting the rapidly progressing nature of the C&I sector both in Australia and internationally.

This investment marks CBRE's first foray into the Australian rooftop solar market, with Asif Hussain commenting upon the announcement, "The investment in Green Peak Energy provides an attractive opportunity to invest in the burgeoning behind-the-meter solar space for commercial and industrial clients in Australia as well as possible expansion into the broader APAC region,"

Perhaps more interestingly Asif Hussain comments "We see strong tailwinds in this sector with C&I customers increasing their focus on lowering their carbon footprint and adopting behind-the-meter renewable energy solutions."

The CBRE IM/GPE transaction is arguably a watershed moment for C&I solar, both in Australia and globally.

It is a clear indication that the challenges of the past are quickly being resolved, creating opportunities for C&I solar to bypass some of the issues faced by residential and utility solar.

What is C&I Solar? Why has it lagged behind residential and utility scale solar? How are we closing the gap?

Commercial and industrial scale solar, or C&I solar as it is often called, refers to the installation of solar panels (and increasingly batteries) on the rooftops of commercial and industrial buildings, filling the gap between the well-known residential and utility scale solar industry sectors to create a niche, but high-performing solar market. C&I solar encompasses a wide variety of customer types, solar designs, and project sizes.

Until recently, the C&I solar market in Australia has lagged the residential and utility scale sectors.

Australia is a world leader in residential uptake of solar, with over 20% of free-standing households installed with a PV system generating an aggregate of 13 GW of rooftop solar.

Further, in 2020, Australian utility scale solar had a total capacity of 3.9 GW, producing over 3% of the total electricity Australia generated in 2020.

However, a shifting perception of clean energy, uncertainty in wholesale electricity prices and a lack of resources available to build large PV projects is driving investors (and customers) towards C&I solar.

Customers

John Sheehy suggests that the difference in uptake of residential and C&I solar has to do with the customer, "Think about what you're selling, and who you're selling to. These customers are corporates for whom their core business and the people in their procurement teams will not necessarily be considering the benefits of utilising solar."

Whereas the individual customer receives a personal benefit from choosing rooftop solar, for corporate clients it is often primarily an economic decision. Businesses are often slow to adopt complex, innovative solutions to broader company problems, particularly where they relate to both financing and technology; however, substantial increases in retail electricity prices plus reductions in rooftop PV costs have closed the gap, with many commercial customers appreciating the energy independence gained from installing rooftop solar systems. By utilising available real estate, whether it's rooftops or land, businesses can reduce their dependency on, and concerns with regards to, market and grid specific factors.

Increasing ESG considerations for businesses have also become a persuasive tool in the push for commercial solar facilities.

Many companies have now seen C&I solar deployed successfully overseas, particularly in the US and Europe, and are looking to roll out the same model for their Australian assets. Consequently, many Australian companies with international counterparts are under pressure to adopt a green approach to energy.

Over the last 12 months, a sustainability overlay has been almost as much of a motivating factor as cost savings in terms of catalysing these kinds of transactions, to the point that some customers are willing to jump in purely on a break-even basis.

However, Myles Carrucan proposes that the economic benefits are still the driving factor for most customers.

"We haven't encountered many customers that are willing to incur additional cost to go green, but a lot of them are really just happy to break even for now", he says.

Scale and infrastructure

Scale and infrastructure have also impacted the relatively slow development of C&I solar in this market, being a smaller scale and a more fragmented way to get to scale when compared to utility scale solar.

However, John Sheehy believes that this is also an advantage of C&I solar, “There’s a logical adjacency in terms of the property component plus diversification of customer and site which removes some of the ‘boom or bust’ factor that is inherent in utility scale projects. Ultimately, when you see the source of transactions, like the CBRE IM / GPE transaction, this is pure play infrastructure investing and the pursuit of long-term annuity income.”

This shift has become more apparent in recent times, with issues and delays in development and construction in the utility scale segment, primarily due to the strength and capacity of the electricity grid, uncertainty in wholesale electricity prices, and a lack of resources available to build large PV projects.

Investors that have previously expressed an interest in utility scale solar are now turning to the C&I market to fill the gap, driving significant investments in rooftop renewable energy.

“I think the appetite is there,” says John Sheehy, “the attractions of the C&I market are a way of circumventing some of the challenges of utility scale projects that have arisen in the last two years or so.”

Ongoing maintenance of these infrastructure assets has also improved, with developments in remote monitoring reducing the ongoing maintenance costs and improving the operating efficiency and generation levels of commercial systems.

Regulatory changes

Despite the fact that Australia doesn’t currently have in place any persuasive mandates for companies to adopt rooftop solar at a federal level, at an international level there’s a big push for companies to green up their energy use and to promote the security of electricity supply.

Asif Hussain, Managing Director, Direct Private Infrastructure Investments at CBRE Caledon Capital Management, says, “C&I solar is being adopted more frequently in Australia by companies wanting to lower their carbon footprint”.

This shift in customer perceptions is benefited by the possibility of impending regulatory changes across the solar sector, creating the potential for the aggregation of C&I rooftop generation systems. Regulatory changes in the C&I sector will make it viable to build rooftop systems with the ability to generate well above the anticipated demand of the occupier of the building, allowing for part of the generation from the rooftop system to be exported to the grid.

What are the opportunities for investors in the C&I market?

Australia

As the Australian C&I market hasn’t advanced at the same rate as utility scale and residential solar, this creates a very attractive prospect from an institutional investor perspective. The market is still young, and it hasn’t been overpriced yet, so investors have the potential to “ride those waves” as the market matures.

This is particularly relevant now, as the market transitions from emerging to mature - it’s still an early mover advantage market, as evidenced by the recent acquisition of Solgen Energy Group and Epho by AGL Energy earlier this year. With CBRE IM’s investment into GPE upping the stakes, this investor interest is only expected to increase over the next few years.

As these market leaders take up an increasingly significant share of the C&I market, at some point smaller market players will look to seek strategic options.

Based on Asif Hussain’s experience, this is a direction that many market players will look to. “Not everyone is going to get funding,” Asif says, “To the extent that they don’t have funding, they’re going to look for an exit which creates an interesting M&A opportunity for larger players or players with greater access to funding”.

John Sheehy agrees, “Whether they have three systems and 500 kilowatts or 20 megawatts, solar developers will eventually bump into that challenge when the big players arrive. That naturally lends itself to a consolidation over the next 18 to 24 months which should be pretty interesting.”

International

Opportunities also abound internationally. The same macro forces of higher power prices, regulatory change, ESG goals, energy security, equipment and installation costs (including large batteries) will influence markets across North America, through Europe and into Asia. The international C&I market is primed for exponential growth.

Like in Australia, countries and regions that have high solar resources often focus on utility and residential scale solar developments before considering C&I solar. International solar markets such as the US, especially the southern US, some regions in Asia, and Europe will provide C&I opportunities at a scale many multiples the size of the Australian market.

CBRE in particular has a keen interest in the international C&I market, undertaking recent transactions in the United States including their recent partnership with Altus Power to advance clean energy generation across commercial and industrial properties.

Asif Hussain hopes to achieve the same goals through their investment into GPE, “The Green Peak Energy team has built a strong business delivering Power Purchase Agreement solutions to help lower energy costs for their customers. We are excited to partner with Green Peak Energy and believe that this partnership can help accelerate their growth delivering on-site clean energy solutions for businesses and property owners.”

So who wins the C&I battle, and why

Over the next two years, C&I solar is expected to expand grow exponentially, with enormous opportunities for investors, developers, and customers alike.

With a shifting perspective of green energy and economic gains in the commercial sector, C&I solar has the potential to overtake residential solar as the largest generator in the national electricity market, with significant and wide-ranging impacts for the wholesale market.

Based on their recent market success, and long-term market share of the C&I solar market, GPE are leading the race.

Pottinger has high hopes for the future success of GPE. Rodrigo Arias, Senior Vice President of Pottinger, anticipates that “GPE is well poised to come out on top of the capital shootout that the C&I market is likely to face when all of the “low hanging fruit” in the market is taken up by different players. GPE’s ability to understand credit risk and play along the credit risk curve and price in a more bespoke way will eventually set them apart from other market players”.

Current market investors are also expected to achieve significant wins through their investments into the C&I market, their early entry into the market bypassing some of the issues faced by residential and utility solar investors.

In the coming years, investors such as CBRE IM will be looking to add to their portfolios through the acquisition of smaller market players, committing significant amounts of funding into the advancement of clean energy generation across commercial and industrial properties.

In part 2 of this New Energy Expert Insights, we will lift the lid on the opportunities currently available in the C&I solar market, explore how the sector is evolving (both in Australia and internationally) and discuss how investors and developers can stay ahead of the curve to win the impending C&I battle.

Fifty shades of Green

Authors: Matt Baumgurtel, Adriaan van der Merwe, David O'Carroll, Ally Frizelle
First published: 17 March 2022

Hydrogen comes in almost every colour, be it blue, yellow, pink, turquoise, grey, black, brown or green. Green hydrogen (GH2) is however the most attractive type, as no greenhouse gases are emitted during its production. Determining the "shade" of GH2 is complex. For example, can GH2 still be considered green if its methods of transportation, storage or disposal are not carbon-neutral? Is GH2 still green if carbon offsets are used to counter emissions? In the absence of a clear regulatory framework to classify the shade of "greenness," all GH2 is definitely not equal.

Internationally there is no agreed definition for GH2, which complicates its certification. Australia's Clean Energy Regulator (CER) is in the process of establishing a hydrogen certification scheme - the Guarantee of Origin (GO). The GO scheme will involve additional compliance costs to quantify emission intensity across various stages of the hydrogen lifecycle. While the GO scheme will lead to an increase in compliance costs, the resulting emission transparency will boost the credibility and business case of renewable hydrogen producers. This should contribute to an increase in GH2 demand, as certification will enable consumers willing to pay a premium for a cleaner product, to identify that product with certainty.

How will the scheme work in practice?

The GO scheme will quantify and display essential attributes like where and how a unit of hydrogen is produced. This data will be captured in a digital certificate, allowing consumers to select the hydrogen supply most suited to their sustainability requirements. The practical application of this process is set out below:

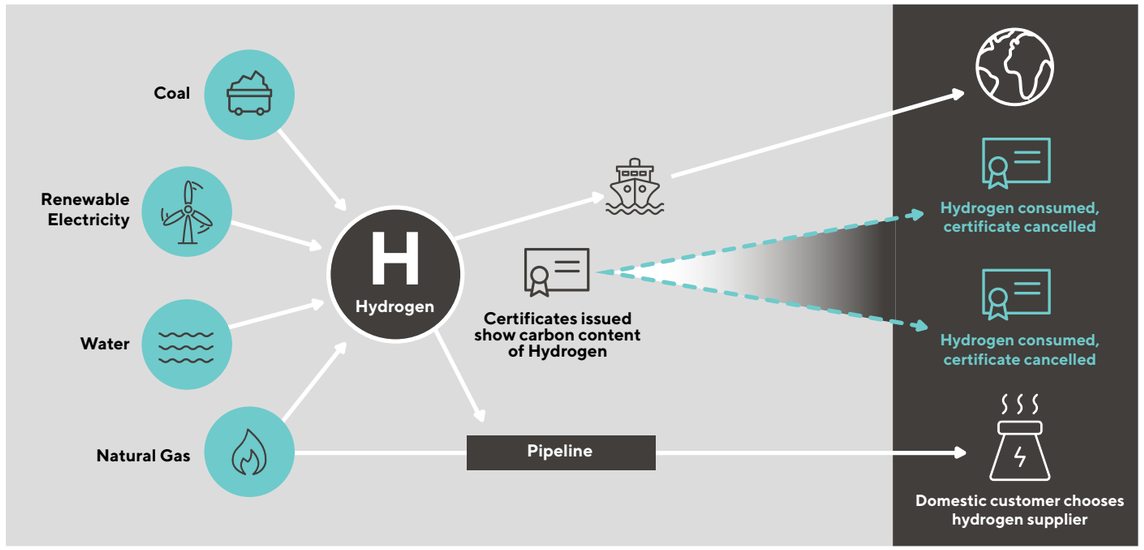


Figure 1: Practical application of the GO scheme (source: Clean Energy Regulator)

System Boundary

A key consideration for developing a GO scheme is determining an appropriate "boundary" from which emissions are to be measured (see Figure 2). This boundary should be clearly defined and consistently applied to enable an accurate comparison of hydrogen supplies. The broadest boundary would cover the lifecycle emissions of one unit of hydrogen, a 'cradle-to-grave' approach. This approach will consider the carbon emissions involved during supply, production, processing, transport, storage, use, recycling and disposal. Conversely, the narrowest boundary would only cover the emissions occurring at the production facility, a 'gate-to-gate' approach. While a 'cradle-to-grave' approach will increase accountability, the complexity of data capturing may lead to diminished accuracy.

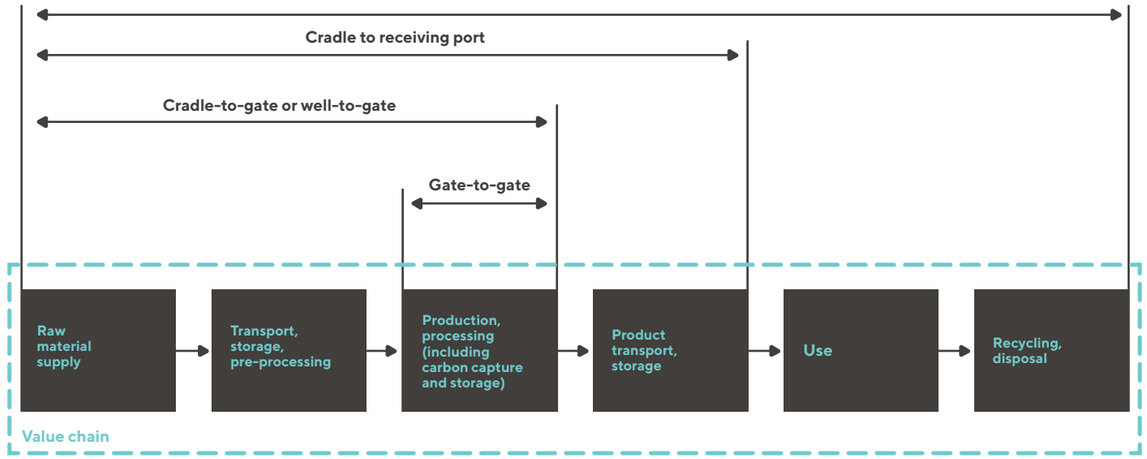


Figure 2: System Boundary Options (source: CER discussion paper)

On 21 June 2021, the government released a discussion paper outlining an approach to developing Australia's hydrogen GO scheme. Subsequent consultation with Australian stakeholders revealed that a well-to-gate approach (which includes emissions associated with extraction, fossil fuel processing and transportation and hydrogen production) is the preferred approach. Selecting a boundary that is consistent with international standards is therefore crucial to ensure that international trading of hydrogen is fair and transparent.

Carbon Offsets

Carbon offsets also impact the shade of GH2. One of the challenges in developing a GO scheme is determining whether such offsets should be allowed to achieve a zero or low-emissions hydrogen certification. CER's consultation with stakeholders identified that those in favour of offset inclusion recognised that offsets could help the development of the industry in the early stages and provide a greater selection of products to consumers. Equally, those against offsets proffered concerns that the inclusion of offsets may not be accepted internationally, particularly as there is scepticism about the permanence of non-geological carbon storage.

What are our international counterparts doing?

There are a handful of hydrogen certification schemes abroad, the most notable being Europe's industry led CertifHy Scheme. Founded in 2014 by a consortium of industry stakeholders, CertifHy was created with the aim of establishing minimum thresholds of hydrogen emissions intensity. The CertifHy Scheme utilises a well-to-gate boundary but does not permit carbon offsets. While the Scheme was one of the first of its kind and a good foundation to build upon, there are some shortcomings that the Australian GO scheme should improve on. These include that the CertifHy Scheme is only applicable to hydrogen used in transportation and that it does not facilitate price differentiation between various colour categories of hydrogen.

Where are we now?

On 10 December 2021, the Department of Science, Energy and Resources and the CER announced the commencement of GO scheme trials with companies who have been operating or have well-advanced hydrogen pilot projects. Over the next 15 months, these trials will test the practical application of methodologies for hydrogen carbon emission and ultimately help settle the specifics for the GO scheme. Phase 1 kicks off in March 2022, with phase 2 following from August 2022 to June 2023. The GO trials will not only inform an Australian hydrogen certification scheme, but also play a significant role in shaping international certification standards.

Conclusion

Determining an appropriate system boundary and considering carbon offsets are just two of many important considerations in developing a GO scheme. It is hoped that the scheme will evolve over time to include additional hydrogen production pathways and value chain components. Until the GO scheme is rolled out, we will however continue to see fifty (or so) shades of green.

Offshore wind to H2

Authors: Matt Baumgurtel, Andrew Smith
First published: 01 December 2021

Update (1 December 2021):

The development of an offshore wind industry in Australia has achieved a major milestone with the Bill passing both Houses of Parliament on 25 November 2021. There are currently 10 to 15 proposals for offshore wind developments, with the most advanced proposal being the Star of the South offshore wind development off the coast of Victoria's Gippsland coast. A further feather in the cap for offshore wind's offering in the GH2 space, is the execution of an agreement that will see the Singaporean company, Enterprise Energy, develop a USD$10 billion wind farm off the coast of Ireland to power an onshore GH2 facility.

Update (7 April 2022):

*On 4 March 2022, the Victorian Government announced a minimum target for offshore wind generation for the State. Victoria is aiming to reach 2GW of offshore wind energy production by 2032, stretching this to 4GW by 2035 and 9GW by 2040. The Victorian Energy Minister, Lily D'Ambrosio stated that Victoria's ambitious target is a fantastic opportunity for GH2 production.

*In Western Australia, Danish energy firm Copenhagen Energy lodged plans with the Federal Government for the Leeuwin Offshore Wind project, a 3GW offshore wind farm, comprising up to 200 wind turbines.

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

An offshore green-hydrogen plant, as envisaged by Engie's Tracetebel unit.Photo: Tractebel

On 2 September 2021, the Offshore Electricity I nfrastructure Bill (the Bill) was introduced to the Australian Parliament. The Bill establishes a regulatory framework for the offshore wind industry. The unlocking of Australia's offshore wind capacity not only paves the way for existing proposed offshore wind farm projects, but also provides a new pathway for the development of a large-scale Australian green hydrogen industry.

For years, Australia's vast abundance of high-quality offshore wind energy has gone to waste as there has not been the regulatory framework needed to develop the industry. While not a silver bullet, the proposed law is the first step to unlocking the enormous potential of Australia's abundant offshore wide resource.

The Bill at a glance

- The Bill was introduced following AEMO's decision to include candidate Offshore Wind Zones in its report dated 30 July 2021 and provides for the regulation of "offshore renewable energy infrastructure" which includes "fixed or tethered infrastructure".
- The Bill defines "fixed or tethered infrastructure" as any infrastructure, structure or installation that:
    - rests on the seabed; or
    - is fixed or connected to the seabed (whether or not the infrastructure, structure or installation is floating);
    - is attached or tethered to any other fixed or tethered infrastructure, but does not include a vessel that is temporarily moored or anchored to the seabed.
- The Bill provides for the following categories of licences: feasibility (on a competitive auction basis), commercial activities, research and demonstration; and transmission and infrastructure.
- The Bill is based off the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) and has the same regulatory bodies, NOPSEMA and NOPTA.

We are currently discussing the mechanics of the Bill with our clients including international offshore wind farm developers. In summary the Bill is a "framework" in the purest sense – it is a skeleton around which the specifics and detail is to be fleshed out. These specifics and details will be critical to the success of an Australian offshore wind industry. We have the benefit of precedent regulatory regimes in the US, UK, Europe and north Asia – learning of these jurisdictions will be critical to developing the detail and specifics required in an Australian context.

Offshore wind opportunities

Offshore wind turbines can be constructed taller and with much larger blades compared to their onshore relatives, which boosts efficiency and capitalises on the stronger, more consistent ocean winds. Currently, offshore wind turbine designs can produce up to 15MWs each. Research conducted by the Blue Economy Cooperative Research Centre found that in some parts of southern Australia, the capacity factors of offshore wind turbines could exceed 80 % which matches the output of many of Australia's baseload generators. For the rest of Australia, the study found that capacity factors up to 50% could be achieved.

However, as the overseas experience indicates, offshore wind provides its own significant development and operational challenges. First, offshore wind does not necessarily solve the intermittency issues that its onshore siblings face. While the quality of offshore wind is more consistent than onshore wind, there are still times where the wind does not blow. Second, the capex and opex requirements of offshore wind farms are significant. In particular, the cost of constructing the infrastructure to connect to the electrical grid, and the cost to maintain that connection can be prohibitive. This deep-water electrical infrastructure is costly to maintain and difficult to fix when it breaks. One just has to look at the Basslink outage in 2015/16 which took 6 months and a team of 100 cable experts to fix with a cost to Hydro Tasmania estimated at AUD$140 to $180 million.

An opportunity for H2

The capex and opex costs of connecting offshore wind to the grid provide a niche for the hydrogen industry. Why connect offshore wind to the grid at all? With an abundant, chemically consistent water source co-located with the reliable and low-cost green electricity produced by offshore wind turbines, green hydrogen could be produced offshore either on power islands or at each wind turbine.

The oil and gas industry has already developed much of the technology required to produce and export offshore hydrogen such as semi-floating production facilities and floating production storage offloading. Australia should leverage its existing offshore oil and gas expertise to further utilise its competitive advantage in the renewable energy industry to supercharge its development as a major exporter of green hydrogen.

On the demand side, the appetite for green hydrogen is increasing. Apart from electrification, the global shipping industry is increasingly looking to green ammonia produced using green energy to fuel the shipping fleet. Currently, the shipping industry accounts for 2.9% of global CO2 emissions as an end user of fossil fuels, and with the International Maritime Organization's (a United Nations agency) energy efficiency measures due to come into force in 2023, the shipping industry's demand for cleaner fuels will increase dramatically.

Global examples

Internationally, offshore wind has traditionally been connected to grid-connected utility markets. However, developers are now looking at how offshore wind can be used to power decarbonisation in off-grid scenarios. Many high-profile companies are exploring the use of offshore wind to produce green hydrogen in the North Sea.

For example, Norway has identified two zones in the North Sea for development of up to 4.5 GW of offshore wind capacity to assist the Norwegian oil and gas industry transition to a low-carbon business model. Other countries such as Denmark, Germany and the Netherlands have large-scale industrial projects underway, all of which are focusing on how green hydrogen can decarbonise their respective economies. Presently, however, offshore green hydrogen production is cost-prohibitive relative to grey hydrogen production, but GW scale offshore wind farms may provide the economies of scale required to reduce the cost of green hydrogen

Japan is another jurisdiction where there are plans to utilise offshore wind to produce green hydrogen. The construction of a 110 MW offshore wind farm and hydrogen facility is planned in the coastal city of Ishikari. The plan is for commercial operation to begin in March 2024 with production of up to approximately 550 tonnes of a hydrogen a year. The project participants are Hokkaido Electric Power, Green Power Investment, Nippon Steel Engineering and Air Water.

These international examples show that rather than being connected to the grid, the larger opportunity for offshore wind energy is to service the mass electrification required by the future green hydrogen industry. Offshore wind energy has the potential to be a strategic resource for offshore hydrogen production or a source of electricity for hydrogen production at port-based export facilities and local heavy industry.

So why not in Australia

With the recent announcement of the Federal Government's Clean Hydrogen Industrial Hub grant program which will award grants up to AUD$ 3 million for feasibility and design work, and a further AUD$ 70 million for the rollout of projects, Australia is in a perfect position to capitalise on the growing global consensus that green hydrogen is the fuel of the future. Offshore wind provides a unique opportunity for Australia to produce offshore hydrogen which can be exported both domestically and internationally to electrify households or used to fuel the global shipping fleet moving goods around the globe.

Digital Power – Green Crypto Miners and Data Centres

Authors: Adam Jeffrey, Matt Baumgurtel
First published: 08 March 2022

This is the first part of our Digital Power Series focusing on the deep connection between power and the digital economy. Throughout the series, we explore the opportunities that data centres and crypto miners bring to the National Electricity Market, important digital security considerations for energy asset holders, the 'tokenisation' of energy related projects, and relevant ESG considerations when acquiring a digital assets business.

The data centre and cryptocurrency mining industries are becoming a more prominent part of the Australian and global economy. In 2021, Australia's data storage demand attracted $3.8 billion in investment and globally amounted to roughly $13 billion. However, most of the energy consumed by these industries is still generated by non-renewable energy sources and account for an increasing amount of global energy consumption and CO2 emissions.

It is then unsurprising that operators of such businesses are actively looking for ways to reduce their carbon footprint. This is in no small part due to environmental, social and governance (ESG) targets being under increased scrutiny at board and governance levels, with companies setting robust targets for improvement. Investors are also increasingly focussed on ensuring their investments are sustainable and so it is in companies' interests to ensure that their business is as sustainable as it can be to attract capital.

The benefit of strong ESG commitments was demonstrated by the successful Nasdaq listing of two Sydney based crypto mining companies, Mawson Infrastructure and Iris Energy. The two companies have raised over $USD250 million in their NAS with much due to their strong ESG commitments.

Green, or sustainable, financing is an option available to those operating in this space and is one that seeks to assist companies achieve their targets in the conduct of their business (and introduces an element of accountability), and sends a strong signal to the market of a company's sustainability credentials. Customers can also benefit as their supply chains become greener.

What is 'Green' Financing?

Green financing can take several forms and can be structured for the debt capital or loan markets. As for the terminology:

Green bonds or loans are debt securities or loans where the proceeds are to be used for green projects (such as renewable energy, energy efficiency, biodiversity conservation, water management etc).

Social bonds or loans are debt securities or loans where the proceeds are to be used for social projects (such as affordable infrastructure, access to essential services, socioeconomic advancement etc.).

Sustainability linked bonds or loans are debt securities or loans which are structured to incentivise borrowers to meet agreed sustainability performance targets through pricing adjustments.

Guidelines have been developed by various loan and debt market associations in the Asia Pacific, Europe and the United States to encourage consistency in the application and classification of green and social financing arrangements.

According to BloombergNEF global sustainable debt issuances in 2021 increased to US$1.6 trillion (from US$760 billion in 2020). Interestingly the majority of these debt issuances comprised green bonds and sustainability linked loans, with the share of other instruments, such as social bonds and sustainability linked bonds ever increasing.

Refinitiv reports that a total of $9.85 billion was raised in the Australian sustainable debt market in 2020, and by the end of September 2021 $11.3 billion of sustainable debt was issued in Australia.

The obvious appetite for green and sustainable debt provides an opportunity for operators in the data centre and crypto mining industries to access debt with potentially cheaper pricing, while also furthering their green credentials.

How can these industries take advantage of Green Financing?

There have been several examples of operators in the data storage industry implementing green financing options, which can serve as a guide for how others in these industries can access these financing options.

Companies such as AirTrunk, DCI Data Centers, Equinix, Aligned, Nabiax and Digital Reality have all raised green funds in the past couple of years – both in their respective domestic and international debt capital and loan markets. For example:

- AirTrunk converted its existing corporate loan facility into a A$2.1 billion sustainability linked loan in 2021;
- Brookfield Asset Management put in place a A$160m green and sustainability-linked term loan to refinance its Australian and New Zealand DCI Data Centres; and
- Digital Reality (a leading issuer of green bonds in the data centre industry) has raised over US$5 billion using green financing arrangements since 2015.

Both green bonds and green loans have been put in place by these entities, the proceeds of which are to be used, for example, to improve energy efficiency of their operations, invest in renewable energy, construct energy efficient facilities and better manage water use and waste.

Conclusion

In conclusion, Australia has a tremendous amount of green capital available for a growing crypto mining and data centre market. Collocating crypto miners or data centres with energy generation assets may not only provide economic benefits, but also open the doors to green financing. In our next article "Data Centres and Crypto Mining – How to be green?" we provide an overview of the most important considerations to obtain green financing.

At Hamilton Locke, we advise across the data centre and crypto mining project life cycle as well as the energy project life cycle. Our team assists in project development, grid connection, green financing, renewable energy purchases and the construction of projects, including the selling and operating of projects.

Digital Power – Powering Greener Pastures, Can Crypto Help? Energy Crypto Part I

Authors: Matt Baumgurtel, Cedric von Duering
First published: 24 March 2022

Part 1 – Crypto going green

This is part of our Digital Power Series focusing on the deep connection between power and the digital economy. Throughout the series, we explore: the opportunities that crypto miners and data centres bring to the National Electricity Market; digital security considerations in energy; the 'tokenisation' of energy related projects; and relevant ESG considerations when acquiring a digital assets business.

In this Part I, we explore the intersection between cryptocurrency and New Energy. In Part II, we will examine the key factors and measures that you should consider before launching a crypto project in the New Energy sector.

Cryptocurrency and green energy

Mounting international pressure on businesses of all sizes to focus on their ESG efforts and plan for a net zero/ carbon neutral future is leading to an increased focus and demand for:

- Access to green energy;
- Supply of carbon offsets;
- Funding and implementation of green energy projects;
- Consumer access to green investments;
- Widely available energy markets; and
- Global standards for green energy certification.

We are also seeing the rapid expansion and uptake of cryptocurrency and the development and implementation of Web 3.0. These two industries are rapidly growing and will be significant industry sectors in the future. For instance, EY released a report with Mawson in December 2021 titled "Cryptocurrency and the distributed digital economy", which predicted that cryptocurrency and digital asset deployment and adoption would see a 30x growth by 2030, adding $68.4 billion to the economy and creating 206,000 new jobs.

To date, the crypto industry has copped a lot of criticism about the environmental impacts of cryptocurrency mining, particularly given the energy drain and green power supply issues. However, we are seeing a growing interest in the role cryptocurrency can play in the New Energy sector by combining miners with renewables and storage projects. This could result in significant returns for project investors and developers by allowing behind the meter use of otherwise curtained solar and wind power, thus moving more solar and wind projects into profitable territory. From a grid perspective, this would also allow the seemingly unlimited appetite of crypto miners to eat whatever remains of the solar duck curve's belly.

We are already being asked, "how can we tokenise our project"? But first the basics… what is cryptocurrency?

Crypto 101

Cryptocurrency is a digital store of value that exists on a blockchain. A blockchain is a decentralised, immutable and infinite ledger that records data in blocks, links those blocks on a chain and shares the blocks across a network of computers. All the data on a blockchain is encrypted with cryptography. No central authority or counterparty can control or change a transaction, blockchain or the network – meaning they are final and cannot be modified once created. All transactions on a blockchain are effected by smart contracts. A smart contract is computer code that automatically executes a transaction in accordance with pre-defined parameters. Importantly, smart contracts are not legal contracts.

There are thousands of tokens available in the market now. Tokens can generally be grouped into the following four categories:

- Token Type
  Description
- Commodity token
  This is a token backed by a physical asset that has value (e.g. currency, gold, index or oil). Tokens backed by a currency are commonly referred to as "stable coins".
- Utility token
  This token is native to a decentralised protocol that has a designated use in the protocol such as providing access to a service or product.
- Security token
  Security tokens provide tokenholders with ownership rights in a company similar to a share. These tokens are also referred to as "Initial Coin Offerings".
- Non-fungible token (NFT)
  An NFT is a cryptographic asset on a blockchain with a unique identification code and metadata that distinguishes it from other tokens. These tokens are non-fungible meaning they cannot be traded or exchanged for each other. NFTs can only be purchased for value. There are different types of NFTs. An NFT can be an original work, provide ownership rights to some other work or simply record existing ownership rights to something i.e. a digital certificate.

Now we know what crypto is… next we need to look at how it is currently regulated in Australia.

How is Cryptocurrency regulated in Australia?

In Australia, cryptocurrency is treated as a commodity (much like gold). Therefore, the exchange of cryptocurrency to fiat currency, fiat currency to cryptocurrency or cryptocurrency to cryptocurrency is not regulated as a foreign exchange contract (like the exchange of AUD to USD).

Cryptocurrency is not considered to be "money" in Australia. Bitcoin is the most widely used cryptocurrency at present and the Reserve Bank of Australia is of the view that Bitcoin is not money. While Bitcoin may be used to make payments, its current use is limited and it does not display all the key characteristics of money.1 This may change as cryptocurrency shifts from being a commodity accruing value to a widely accepted method of payment and as more countries (e.g. El Salvador) designate Bitcoin (or other tokens) as a legal tender.

Given the broad structure and use cases for cryptocurrency, a token may instead fall into another type of regulated financial product depending on how it is structured or used. In Australia, cryptocurrency is most likely to be regulated as a security, managed investment scheme or a derivative (but depending on the design it may be another type). The Australian Securities and Investments Commission (ASIC), Australia's financial service regulator, has recently updated is guidance in INFO 225: Crypto assets, which provides some high level guidance on the regulation of cryptocurrency.

Is your token a financial product?

If your token is a financial product, then you will need to work out whether:

- you require an Australian financial services licence;
- any disclosure obligations apply;
- the client money rules apply; and
- any other conduct or compliance obligations apply.

If your token is not a financial product, then you will need to ensure that you comply with, at a minimum:

- the legal requirements under the Anti-Money Laundering and Counter-Terrorism Act 2006 (Cth). Any person that facilitates the exchange of fiat currency for cryptocurrency or vice versa must be enrolled and registered as a Digital Currency Exchange with the Australian Transaction Reports and Analysis Centre (AUSTRAC) and comply with a range of compliance obligations;
- the privacy requirements under the Privacy Act 1988 (Cth), including the Australian Privacy Principles. This usually requires you to have a privacy policy and collection statement that meets all the regulatory requirements; and
- the Australia Consumer Laws relating to unfair contract terms, customer guarantees and misleading and deceptive conduct.

It is likely that your business will already have measures in place to comply with privacy and Australian Consumer Laws. If this is the case, it is critical that your current arrangements are updated to cater for any token or blockchain use.

Change is in the wind...

The Select Senate Committee on Financial Technology and Regulatory Technology Final Report was released in October 2021 following an inquiry into the regulation of cryptocurrency (as well as a number of other matters). The Committee made twelve recommendations for the future of cryptocurrency, including:

- Recommendation 1: Establish a markets licence for Digital Currency Exchanges (DCE), which will result in DCEs holding a markets licence similar to securities and derivatives exchanges (e.g. ASX);
- Recommendation 2: Establish custody or depository regime to be managed under the Treasury portfolio;
- Recommendation 3: Treasury and regulators to conduct a token mapping exercise;
- Recommendation 4: Establish a new Decentralised Autonomous Organisation (DAO) company structure; and
- Recommendation 7: Implementation of a company tax discount of 10% if Digital Currency miners source their own renewable energy.

The Government released its response in December 2021, agreeing with or noting all 12 recommendations, except for Recommendation 7 which it does not consider a current policy priority. Work is underway and Treasury is spearheading the charge. Much turns on the upcoming election, but the regulatory regime for cryptocurrency is likely to change in the near future if Australia wants to be a country of choice for cryptocurrency. The change process is already underway with Treasury having recently released a Consultation Paper on Crypto asset secondary service providers: Licensing and custody requirements (March 2022). This is important to bear in mind when thinking about tokenising your green project or otherwise harnessing the power of cryptocurrency or blockchain.

In Part II we will be taking a deeper dive to what you will need to consider before launching a crypto product in the New Energy sector.

At Hamilton Locke, we advise across the data centre and crypto mining project life cycle as well as the energy project life cycle. The Fold Legal is the national leader in all matters crypto and law. Together we assist energy companies to become a leader in the New Energy Crypto age.

Digital Power – How to Tokenise Your New Energy Project – Energy Crypto Part II

Authors: Matt Baumgurtel, Cedric von Duering
First published: 24 March 2022

This is part of our Digital Power Series focusing on the deep connection between power and the digital economy. Throughout the series, we explore: the opportunities that cryptocurrency (or "crypto") miners and data centres bring to the National Electricity Market; digital security considerations in energy; the 'tokenisation' of energy related projects; and relevant ESG considerations when acquiring a digital assets business.

In Part I, we explored the intersection between cryptocurrency and New Energy. In this Part II, we examine the key factors that you should consider before launching a crypto project in the New Energy sector.

What factors should you consider?

Before you launch your New Energy project on the blockchain, you need to first work out your objective - why do you want to tokenise your project or use the blockchain.

This may seem like a simple question. But, in our experience, businesses often do not spend enough time on this upfront. It can be difficult to pinpoint why you want to use a token or the blockchain for your project. However, the following questions can help you narrow this:

- Will you need a token as an essential component of the project?
- What token standard will you use (e.g. ERC-20, ERC 721 or ERC 777)?
- What blockchain will you use (e.g. Ethereum)?
- Will the token provide any rights?
- If so, what are these rights? Will the token provide any ownership, licensing, voting, distribution or other rights?
- Do you want the token to be tradeable on any cryptocurrency exchange?
- Will the token be used to reward customers?
- Will the token be used to make donations?
- Will the token be used to fund business activities?
- Will the token be used to invest in green projects?
- Will the token be used as a form of payment for your services or other services?
- Can the token be used as collateral for lending protocols?
- Can the token be staked on decentralised protocols?

In answering these questions, you should identify what are your "must haves" and "nice to haves" as this will drive the design of any token solution and what is possible from a legal and regulatory point of view. Also, it is possible that there may be other features or functionality that you will need to consider for your project. The above list is not exhaustive but is a great starting point.

Once you have answered these questions, you will have a better understanding of your commercial objectives and key drivers. It will also help you determine whether the token and blockchain will meaningfully achieve your objectives or simply add unnecessary complexity.

Parthering with advisers

One you have settled on your objectives, the next step is to make sure you get sound legal advice. Given the complexity and uncertainty surrounding cryptocurrency, it is important that you have a clear understanding of whether your token will be regulated and, if so, how. This will help inform the design of your token and your legal arrangements. In addition, there may be alternate structures available to you to combat regulatory challenges. Make sure you work with lawyers that have a sound understanding of cryptocurrency and its regulation. It may require expertise across technology, intellectual property, financial services and tax.

The final step is then implementing your solution from a legal perspective. This may require a tokenholder agreement, whitepaper, regulatory and licensing arrangements and other marketing collateral. It is important to remember that a token is not typically a quick-to-market solution and requires significant time investment to get right.

The ESG cost of cryptocurrency

Given the computer power and significant energy consumption required to operate a blockchain, there has been much talk about the ESG impacts of blockchain.

If you are proposing to use tokens or the blockchain for your green project, you should consider the energy and environmental impacts of using this technology. This is because you do not want to undermine your green project simply because you have utilised the blockchain. There a number of solutions that you can deploy to reduce or offset any environmental impact and the technology powering the different blockchain solutions can lead to better sustainability outcomes. Make sure you consider this as part of your due diligence process. If you are unsure, make sure you tap into the relevant experts.

Just remember…

The cryptocurrency industry is rapidly growing and expanding into new markets like New Energy. With that, there is a lot of hype and opportunity. However, it is important that you follow a robust legal due diligence process before you launch any token or blockchain technology.

At Hamilton Locke, we advise across the data centre and crypto mining project life cycle as well as the energy project life cycle. The Fold Legal is the national leader in all matters crypto and law. Together we assist energy companies to become a leader in the New Energy Crypto age.

Digital Power – How to Green Finance Data Centres and Crypto Miners

Authors: Adam Jeffrey, Matt Baumgurtel.

First published: 11 April 2022

This article is part of our Digital Power Series focusing on the deep connection between power and the digital economy. Throughout the series, we explore the opportunities that data centres and crypto miners bring to the National Electricity Market (NEM), green financing available for crypto miners, important digital security considerations for energy asset holders, the 'tokenisation' of energy related projects and relevant ESG considerations when acquiring a digital assets business.

We previously explored the opportunities for Data Centres and Crypto Miners to access green financing options. Now we turn our attention to examples of green projects which may assist crypto mining and data centre industry participants take advantage of green financing arrangements.

'Green' Financing Refresher

Green financing can be structured for the debt capital or loan markets. Most commonly it structured as:

- green bonds or loans – where the proceeds must be used for green projects; or
- sustainability linked bonds or loans – where borrowers are incentivised to meet agreed sustainability performance targets through pricing adjustments.

To illustrate how operators in the data storage industry can implement financing arrangements to their benefit, we provide examples we have seen in the market.

Green Projects

Examples of data centre operators having used green financing to fund their projects include:

- improvements to energy efficiency of their operations,
- investments in renewable energy,
- construction of energy efficient facilities, and
- better management of water use and waste.

Renewable Energy

Equinix's recent €1.1 billion green bond issue is an example of this approach. Equinix will use the proceeds of these bonds to fund green energy projects to support their data centre footprint. The interest cost of these bonds was 2.215% lower than Equinix's existing Euro-denominated notes, and Equinix were able to realise €11.1 million in savings by refinancing its existing credit line.

Construction of Energy Efficient Facilities

Data centre and crypto mining operators can consider using green finance to construct new 'sustainable' buildings which meet one or more verified third-party standards. Green financing could also be available for retrofitting existing facilities to meet such standards. There are many standards in the market to consider, including LEED, BREEAM and NABERS. Certification under the relevant standards assists substantially to meet the requirements of green financing arrangements.

Energy Efficient Operations

If the refurbishment or construction of an entire facility is too much, then operators can look to invest in systems that improve the energy and resource efficiency of buildings, subsystems and land. For example, green financing could be available for the installation of onsite renewable energy systems (such as solar panels or hydrogen power), energy storage systems or more energy efficient cooling systems.

Thinking outside the box

Making these energy intensive industries more sustainable will require data centre and crypto mining operators to take new approaches. Examples of innovative thinking in the market include:

- Microsoft's Project Natick is exploring the benefits (and difficulties) of housing data centres underwater to increase energy efficiency;
- BNP Paribas relocated its data centres to Iceland where low stable temperature makes cooling more efficient (as no need for external air conditioning systems). In addition, Iceland's energy is sourced from almost 100% renewable sources;
- Mawson is hosting other crypto miners within their facilities to increase the energy efficiency and decrease the cost of electricity; and
- Aligned uses a cooling system that captures and removes heat (rather than pushing in cold air) which has the benefit of reducing water flow requirements (and associated costs).

In addition to the more usual 'green' power sources, there have been recent examples of crypto miners thinking differently when it comes to sourcing their energy, including Mawson's bio waste Power Purchase Agreement in Byron, NSW. These projects would lend themselves to green financing options in a similar vein to those made by the data centre industry.

Green KPIs

Another avenue of 'green' financing is sustainability linked loans – where pricing benefits are linked to a company meeting certain specific KPIs.

Examples of KPIs in the data centre industry include:

- increasing consumption of energy from green sources;
- maintaining of NABERS 5-star building ratings;
- reducing carbon emissions (scope 1 and scope 2);
- aligning a company's ESG reporting efforts with global standards; and
- reducing water usage.

There have also been examples of KPIs linked to the energy efficiency of data centres referred to as 'power usage effectiveness' (PUE). PUE is the ratio of energy used by the data centre divided by the energy used for computing.

It is important to note that green finance KPIs can also fall outside the traditional 'green' space. For example, KPI's such as diversity and inclusion and other social goals have also been used by data centre operators to access green financing operations.

The lack of standardisation of sustainability metrics makes it difficult to compare progress between operators. There is a push to standardise these metrics across multiple industries to assist with their adoption and progress sustainability. For example, Schneider Electric have recently proposed 23 key environmental sustainability metrics in 5 categories with respect to data centres.

Conclusion

There is a significant opportunity for crypto mining and data centre operators to:

- take advantage of green and sustainable debt;
- gain access to debt with potentially cheaper pricing; and
- further their green credentials.

With socially responsible investors and financiers growing in number and traditional investors increasingly looking to the sustainability of their investments, crypto mining and data centre should be exploring ways to be green.

At Hamilton Locke, we advise across the data centre and crypto mining project life cycle as well as the energy project life cycle. Our team assists in project development, grid connection, green financing, renewable energy purchases and the construction of projects, including the selling and operating of projects.

Digital Power – Experts Insights with Guy Dickinson from BetaCarbon

Authors: Matt Baumgurtel, Cedric von Duering
First published: 11 April 2022

This article is part of our Digital Power Series focusing on the deep connection between power and the digital economy. Throughout the series, we explore the opportunities that data centres and crypto miners bring to the National Electricity Market (NEM), green financing available for crypto miners, important digital security considerations for energy asset holders, the 'tokenisation' of energy related projects and relevant ESG considerations when acquiring a digital assets business.

The Fold Legal sat down with Guy Dickinson, co-founder of BetaCarbon to learn more about how BetaCarbon is changing the carbon market in Australia.

What is BetaCarbon?

BetaCarbon was established in 2021 to provide everyone in Australia with the opportunity to respond to their call to action on greenhouse gas outputs. It does this by providing businesses and consumers a new choice in how they manage their carbon liability.

Why did you start BetaCarbon?

The Australian carbon market is extremely inaccessible. To access the market, you need to open a registry account with the Clean Energy Regulator. This is a long, arduous and expensive process. Currently, there are less than 60 traders in the Australian carbon market. Greater access means more demand, more demand means more green projects.

BetaCarbon's mission is to democratise the carbon market and open it to businesses of all sizes and everyday consumers.

By involving everyday Australians and businesses in the carbon market, more environmental projects are created, generating more carbon credits. It's a virtuous circle which connects farmers with carbon credits and carbon markets with consumers via BetaCarbon. Adopting this model, everyone's a winner. Everyone earns value. Starting with the planet. We call this the BetaCarbon Butterfly Effect – a series of small changes collectively produce wholesale changes. We are jump starting Australia's efforts to produce more green energy and capture carbon, which is key to working towards net zero.

How does BetaCarbon provide consumers with access to carbon credits?

To provide anyone and everyone with access to the carbon market, BetaCarbon has designed a cryptocurrency token called the BetaCarbon token (BCAU). BetaCarbon issues 1,000 BCAU for every Australian carbon credit unit it holds in an account with the Clean Energy Regulator. The beauty of the BCAU is it enables customers to get investment exposure to carbon credits without needing to hold an account with the Clean Energy Regulator. The price of the BCAU will vary based on supply and demand for the token. The BCAU does not entitle the tokenholder to any carbon credit (or fraction of a carbon credit), but because BetaCarbon must hold caron credits to issue BCAUs, it influences the market. Customers can purchase a BCAU, which in turns drives demand for carbon credits and consequently green projects. It can also be held for investment purposes like many other cryptocurrencies.

What role does crypto play in BetaCarbon?

BetaCarbon uses the BCAU to provide consumers non-traditional investment opportunities relating to carbon credits, which would ordinarily require an account with the Clean Energy Regulator, via cryptocurrency rails .While cryptocurrency is core to BetaCarbon's offering, we view the BCAU as more of a digital asset.

The BCAU is built on the Ethereum blockchain using smart contracts and can presently be traded on UniSwap (which is a decentralised cryptocurrency exchange) and can be purchased directly from us for OTC transactions over $10,000.

What are the benefits of the token?

Given that we are purchasing carbon credits, we are taking carbon out of circulation, meaning we are forcing the creation of new carbon offsetting projects for new carbon credits to be generated. Everyday consumers are driving this simply by purchasing our token.

When someone owns a carbon credit, for example, let's say it's a big polluter who owns a carbon credit, they use that carbon credit to offset themselves. Now, if the tokenholder owns the BetaCarbon token, we've taken that right to pollute out of the general market of the polluters, which means we've actually stopped that ton of pollution being re-released into the environment. We think this is pretty important when you consider that a lot of the offset schemes will plant a tree today that actually won't start taking any carbon out of the environment for up to five years. So we think it's a much better output for the environment to take that potential ton of carbon pollution out of the market today and force the creation of new carbon credits to meet demand.

What can a customer do with a BCAU?

The BetaCarbon token is a way to participate in the new energy movement. When a customer purchases a BCAU, they enter into a tokenholder agreement with us. That agreement requires us to hold sufficient Australian carbon credit units for all BCAUs minted.

We hold the Australian carbon credit unit in our account on the National Register of Emissions Units. Each Australian carbon credit represents 1 tonne of carbon dioxide equivalent (tCO2-e) stored or avoided by a project certified by the Clean Energy Regulator.

We are exploring different ways for tokenholders to access the benefit of the tCO2-e represented by the Australian carbon credit unit. Watch this space – we are looking to launch some new products and features later this year! One of them is the retirement token.

Customers can also hold on to the BCAU like any other crypto asset. Customers may retain BCAU because they anticipate the price for the token will increase over time as demand for the token and access to carbon credits increases. Customers may purchase BCAU today and hold it to access in the future. We have seen a stark jump in the price of carbon credits – the price has increased 150% in the last 5 months. We have created a mechanism where customers can buy carbon at today's price and access it in the future when prices may be higher.

Crypto is complex and new. how did you navigate this?

Putting crypto to the side, what we are doing at BetaCarbon is an Australian first, so trying to create and launch a product that has never existed before has its own level of complexity – our product straddled both energy, financial services and tax regulation. Adding cryptocurrency into the mix meant a whole lot of new learning for me and my co-founders. We took a back-to-basics approach, learning the ins and outs of digital currency and surrounding ourselves with the people that had the technical knowledge to execute. We found it much easier to hire motivated experts to join our team, as Betacarbon is a purpose driven company and these experts genuinely believe in BetaCarbon's mission.

What experts did you access and when?

The Betacarbon team has deep background in commodity trading and markets and understand the operation of carbon markets in Australia and abroad. However, in designing our BCAU, we drew heavily on regulatory and energy consultants, technology and cryptocurrency experts as well as lawyers who understood the intersection between cryptocurrency, financial services, tax and energy. There are very few experts that can do everything – you need to surround yourself with the best in each field and make sure everyone is on the same page. We engaged the experts at concept phase and throughout to ensure that the token was fit for purpose and complied with all the regulatory requirements.

There is a lot of criticism generally about energy consumption in the crypto industry. How did you balance this with your corporate purpose? What measures did you put in place to manage your carbon footprint?

Our very purpose is to allow mass participation in carbon capture, carbon reduction and avoidance. We have taken steps to ensure that our internal policies don't differ from our purpose. We acknowledge that today we are climate positive and have offset our carbon liability by using carbon credits. Like many small businesses, we are willing and trying to make a difference for the planet and have taken the Climate Pledge to be carbon negative.

We have a three-step process for achieving carbon neutrality:

1. Measure Emissions - Use calculation tools to measure
2. Reduce - Identify the areas for reductions in carbon output
3. Offset - Use the BetaCarbon product to purchase and offset emissions

How do you see the growth of the new energy sector in Australia and what would you like to see in the next 12 months?

New energy is the only future in Australia, and with each passing year we see major new developments in the industry. It is fantastic to see great innovation and initiative in the space, particularly the rapid technological development over the past 12 months. Over the next 12 months, we would really like to see some rapid developments in both clean energy storage and transportation as this will really pave the way forward in the industry.

What future plans do you have for BetaCarbon?

We are still in our early stages, so we have plenty of future plans. One of our most immediate plans is to launch our own exchange in the near future which will allow customers to set-up an account, use our cryptocurrency wallets and purchase our token. We are also planning the launch and release of our retirement options, which will allow wholesale investors to convert 1000 BCAU for 1 retirement token, allowing us to retire the carbon credit on their behalf and pass on a certificate of retirement that they can use for tax purposes.

At Hamilton Locke, we advise across the data centre and crypto mining project life cycle as well as the energy project life cycle. The Fold Legal is the national leader in all matters crypto and law. Together we assist energy companies to become a leader in the New Energy Crypto age.

A Crypto Grid?

Authors: Matt Baumgurtel, Adriaan van der Merwe, Cedric Von Duering Megan Chau, Rahul Tijoriwala
First published: 06 April 2022

This article is part of our Digital Power Series focusing on the deep connection between power and the digital economy. Throughout the series, we explore the opportunities that data centres and crypto miners bring to the National Electricity Market (NEM), green financing available for crypto miners, important digital security considerations for energy asset holders, the 'tokenisation' of energy related projects and relevant ESG considerations when acquiring a digital assets business.

The Crypto Market

The market value of the global digital asset ecosystem is approximately AUD$2.8 trillion with over 221 million users having engaged with cryptocurrencies or used a blockchain based application. A report by EY and Mawson predicts that digital asset adoption and deployment will increase 30 fold by 2030, adding approximately AU$68.4 billion to the Australian economy and creating new jobs.

Despite the growing market, crypto is often scrutinised for its excessive energy consumption. As a result, crypto mining companies focus on using renewable electricity. Recently, Sydney based crypto mining companies Mawson Infrastructure and Iris Energy both successfully listed on the Nasdaq, having raised over US$250 million much due to their strong ESG commitments. However, both companies operate predominantly in the United States with only Mawson active in Australia.

Government Awareness

The Australian government has recognised the opportunity to become a global leader in the digital assets space. In October 2021, the Select Senate Committee on Financial Technology and Regulatory Technology Final Report recommended a 10% tax discount for companies undertaking renewable powered digital asset 'mining' and related activities in Australia.

Although the recommendation was not pursued, it opened the door for the government to create a structured plan and incentives for new energy powered crypto mining. In the meantime, Data Centres, and hence Crypto Miners, enjoy preferential treatment in the NEM under national Energy Laws.

Whilst the move to crypto is increasingly clear, the question remains: can crypto miners actually add value to the energy transition in the NEM?

A Crypto Grid

Opportunities in the NEM

We have recently written about the electricity Duck Curve and have seen an increase in daytime negative pricing intervals across the NEM. The NEM is also plagued by grid connection difficulties for electricity generation assets resulting in:

- stranded renewable generation assets that are incapably exporting electricity to the grid; and
- declining investment certainty in the NEM.1

Crypto mining possesses the ability to utilise stranded capacity and provide a demand response mechanism for the notoriously volatile peak demand in the NEM.

Can crypto miners be a demand response mechanism?

In 2019 the Australian Energy Market Commission changed the rules around demand response, incentivising large electricity customers to participate in demand response mechanisms. Few industry participants can however change their electricity demand as quickly as crypto miners.

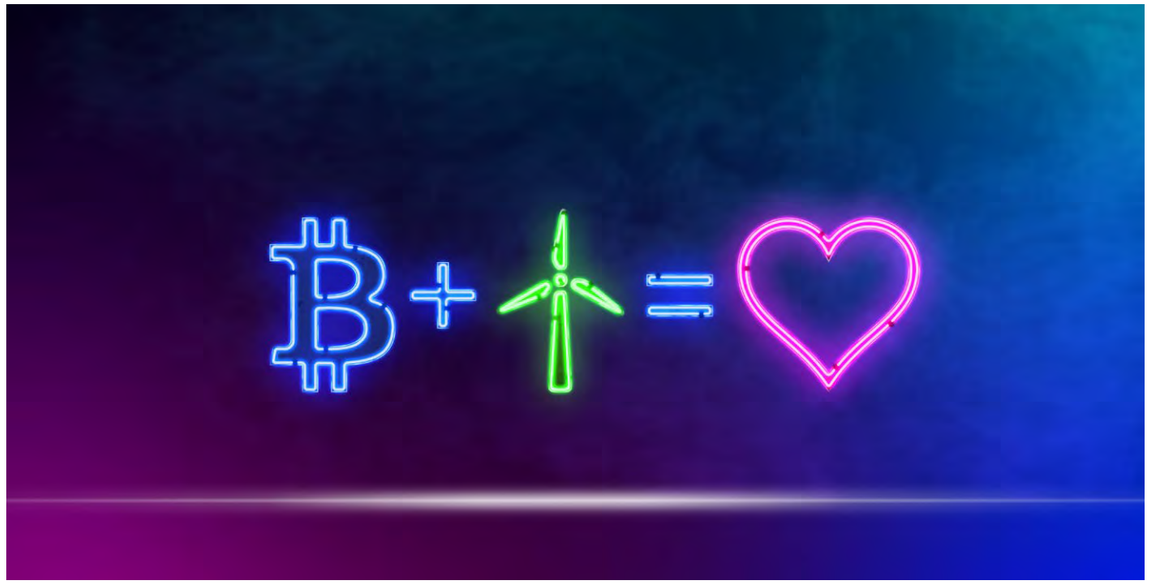
Data Centres often conduct computing processes that cannot be interrupted. Google has however started aligning flexible and non-time-sensitive computations with new energy generation but is limited by the speed at which sudden changes can be adapted to.

In contrast, crypto miners can shut off and turn on with comparatively little response time and negligible losses for stopping the mining process. This makes crypto mining a quicker, more flexible and more responsive alternative than data centres.

Demand Response Flexibility

Emphasising the following strengths of crypto mining compared to traditional demand response will ensure crypto mining can be sustained and viewed as a viable option in the NEM:

- Ability to manage fluctuations - crypto miners can operate 24/7 and have the capacity to increase or decrease activity depending on whether excess power is available. This allows power system operators to fluctuate loads as required and leaves them less reliant on, say, industrial loads which only run during work hours. This leads to the next strength -



- Consistent scalable loads - if grid operators can be convinced that crypto mining can create reliable, and highly predictable scalable loads, they will be able to use these assets to efficiently manage peak demand and, conversely, avoid oversupply which may cause the grid to collapse.
- Flexibility - crypto mining typically utilises non-time-sensitive computations, partially due to the feasibility of mining for new coins. Without this time-dependence, crypto miners are able to operate more flexibly.

Utilising Energy Generation

Instead of storing electricity, crypto mining consumes it in large quantities to power their operating functions, deterring the possibility of excess energy causing grid frequency problems and simultaneously providing an alternative revenue stream for renewable energy generators.

The NEM has multiple partially or fully developed generation assets that haven't been able to connect to the grid - unutilised generation capacity. The U.S has capitalised on bitcoin mining to utilise cheap, stranded energy and turning a profit on the way. Three projects ranging from Texas to Montana currently provide electricity to bitcoin mines for under $0.03/kWh, substantially less than the current median price for bitcoin mines in the US. Additional mines in the Pacific Northwest and Texas are being powered by cheap New Energy respectively. [2]

Capitalising on the unutilised generation capacity in the NEM will provide New Energy developers additional revenue to support and facilitate further developments, which may increase much needed investor confidence.

Conclusion

While crypto mining's primary function is not to expedite or enable the energy transition, its responsiveness and ability to use stranded capacity present an opportunity to support the NEM's energy transition.

We will explore the abilities of crypto miners to provide value to Virtual Power Plants in our next article.

Expert insights: How to stack your BESS

Authors: Matt Baumgurtel, Cedric Von Duering
First published: 08 April 2022

Part I

In this two-part New Energy Expert Insights series, we sat down with Marija Petkovic, founder and Managing Director of Energy Synapse to discuss the challenges and opportunities of incorporating Battery Energy Storage Systems (BESS) in renewable energy projects.

Marija is one of the nation's leading energy analysts and her advice is often sought by government and major public and private actors in the energy sector. Energy Synapse is an Australian analytics and advisory firm specialising in wholesale electricity markets, renewable energy, energy storage and demand response.

In our previous New Energy Quarterly on "The Rise of Dispatchable Renewables", we examined how the incorporation of BESS in renewables projects is changing the Australian energy market. While advising clients we see revenue calculation and regulatory barriers complicating BESS developments.

In this Part I, we gain Marija's insights into the 'stacking' of BESS revenues and in Part II, we discuss barriers to BESS deployment.

How does Energy Synapse assist projects that also incorporate battery storage technologies?

Energy Synapse provides revenue modelling and strategic advisory for battery projects ranging from utility-scale projects in the hundreds of megawatts down to innovative distributed and community-scale batteries. We have had the pleasure of working with a range of private clean energy developers as well as state and federal government departments and local councils. Energy Synapse also offers a software platform that makes it easy to evaluate the financial performance of BESS.

A buzzword currently being used in the market is 'revenue-stacking' for BESS. How do you approach the revenue stacking of BESS? What are the revenue streams and how do you categorise them?

One of the things that makes batteries so exciting is the range of services they can provide. For front-of-meter BESS projects, this typically includes:

- Wholesale market services: Energy arbitrage and the eight FCAS markets;
- Non-market ancillary services;

Non-monetised NEM services such as fast frequency response (new markets being created in 2023), virtual inertia, system strength;

Network services which can defer the need to upgrade Transmission and distribution infrastructure; and

Financial contracts such as those related to firming renewables and virtual cap style contracts.

Wholesale energy arbitrage and FCAS are the easiest to access because the NEM has markets for these services. As a result, these are a core area of focus when modelling revenue streams for batteries.

However, there are a number of valuable grid services such as fast frequency response and virtual inertia for which the NEM does not have a compensation mechanism at present (although that will change for the former with the creation of FFR markets).

Batteries can also potentially act as "virtual transmission" and alleviate the need for network upgrades. Unfortunately, most network companies have been relatively slow in considering non-network solutions.

What is energy arbitrage and what drives the arbitrage revenue model?

Arbitrage revenue is the difference between the price at which the battery buys energy (i.e. charges) and the price at which it sells energy (i.e. discharges). Arbitrage opportunities are highest when there is a large spread in wholesale energy prices. In contrast, arbitrage opportunities are lowest when the price profile is relatively flat.

Market volatility has traditionally been driven by high demand events that arise due to extreme temperatures. While these extreme weather events are still important, going forward, we will increasingly see market volatility being driven by the availability of wind and solar.

Wind and solar have zero marginal costs, which makes them very good at pushing down the wholesale price at the times that they are generating electricity. In contrast, prices spike when there is low variable renewable energy (VRE) output and the market is controlled by gas and hydro generators. For example, we are already seeing very large intraday price spreads due to solar pushing down the price in the middle of the day and dispatchable generators bidding up the price in the evening.

Furthermore, the coal fleet is becoming less reliable and when these generators trip, we tend to see extreme volatility in the market – especially when these events occur at times of low VRE output. Due to their fast and accurate response, batteries are very well placed to take advantage of any unexpected price spikes under five-minute settlements.

In a previous article, you highlighted how BESS in South Australia were generating income by charging during negative pricing intervals. Do you think this 'income stream' is temporary due to the market not being ready for renewables or do you see this continuing?

When there are negative prices, that is the market working exactly as it should. It is sending a signal that there is excess generation in the market and that is a great opportunity for batteries, pumped hydro, and demand response to soak up the excess supply.

There were a record number of negative price intervals in South Australia during September and October 2021. As a result, batteries were paid to charge throughout those two months. This was certainly a very interesting development in the market! However, despite being paid to charge, the total arbitrage revenue stream (sum of charging and discharging revenue) was relatively modest during these months.

Arbitrage opportunities tend to be driven more by high price events rather than low price events. This is because market pricing in the NEM can go as high as $15k/MWh whereas the floor is only $1k/MWh.

In Part II, we will gain Marija's insights on barriers to BESS. deployment.

The Hamilton Locke cooperates with Energy Synapse to provide the best for clients across the energy project life cycle – from project development, grid connection, financing and construction, including the buying and selling of development and operating projects.

What are the Barriers to Batteries? New Energy Expert Insights with Marija Petkovic of Energy Synapse

Authors: Matt Baumgurtel, Cedric Von Duering, David O'Carroll
First published: 08 April 2022

Part II

In this two-part New Energy Expert Insights series, we sat down with Marija Petkovic, founder and Managing Director of Energy Synapse to discuss the challenges and opportunities of incorporating Battery Energy Storage Systems (BESS) in renewable energy projects.

Marija is one of the nation's leading energy analysts and her advice is often sought by government and major public and private actors in the energy sector. Energy Synapse is an Australian analytics and advisory firm specialising in wholesale electricity markets, renewable energy, energy storage and demand response.

In our previous New Energy Quarterly on "The Rise of Dispatchable Renewables" (read here), we examined how the incorporation of BESS in renewables projects is changing the Australian energy market. While advising clients we often see two issues complicating BESS developments, namely revenue calculation and regulatory and other market barriers.

In Part I, we gained Marija's insights into the 'stacking' of BESS revenues and in this Part II, we discuss the barriers to BESS deployment.

What do you see as the biggest economic and legislative barriers for the successful deployment of BESS in the NEM?

The barriers for the successful deployment of BESS in the NEM are due to a range of factors.

First, all power projects in the NEM have been plagued with grid connection issues. There is a critical need to streamline this process to make sure we can deploy the vast quantities of renewables and storage that will be required to not only replace coal but also serve the growing demand for renewables that will come from electrification and large-scale green hydrogen production.

Batteries are an incredibly exciting and unique asset in the grid. However, one of the key challenges for their business case currently is that while batteries can provide many services, many of these are not currently priced by the market (for example, grid services). We will need ongoing market reform to make sure BESS projects are appropriately compensated for the value they bring to the grid.

Related to this is the need to recognise that batteries operate under a very different business model to thermal and renewable generators. They are very much in a class of their own. There is a strong need to educate the investment community and provide them with data and insights so they can understand the unique opportunities and risk profile of BESS projects.

Lastly, there is a need to remove costly and unnecessary barriers such as poorly structured network charges that are being imposed by some network providers.

What in your experience are the main issues BESS projects face in obtaining finance?

The value stack for BESS is currently driven by FCAS opportunities and will likely continue to be driven by a range of broader ancillary services in the future. This makes BESS an incredibly unique asset class in the market. Ancillary services have played a very small role in the business case for traditional generators and have no real role in the business case of wind and solar generators. As a result, when it comes to BESS, financiers are having to get their heads around revenue streams that work very differently and which can often be incredibly complex. Furthermore, there are limited opportunities to hedge ancillary services. The lack of understanding around the opportunities for ancillary services combined with the lack of hedging mechanisms has meant that many financiers have been hesitant to finance BESS.

We believe there is an important role for data to help financiers better assess the risks and opportunities for BESS, so they can more confidently allocate capital to these projects. Our team has developed a software tool called the Energy Synapse Platform, which is helping with this.

If you are interested in finding out more about revenues for BESS, please read here.

There is a lot of discussion around network charges for BESS, which has a direct impact on battery development projects. What have you seen from your work on these types of projects?

When we model the business case for BESS projects, we also model the impact of proposed charges from the network provider. Unfortunately, we have seen several projects where the network tariff structure has essentially killed the viability of the BESS. We have found max demand charges to be particularly problematic.

We firmly believe there should be no network charges imposed on batteries in situations where the battery has been dispatched to provide a grid service or where it is acting as a solar sponge.

Under typical operating conditions, we see very little rationale for batteries to be incurring any network charges.

Hamilton Locke strongly supports Marija's view that BESS projects should not be liable for any network charges. It is our view that the opportunity that BESS brings to the market should be rewarded rather than punished by network costs.

The Hamilton Locke cooperates with Energy Synapse to provide the best for clients across the energy project life cycle – from project development, grid connection, financing and construction, including the buying and selling of development and operating projects.

Driving it Home: How Australia Can Make the Switch to Electric Vehicles

Authors: Matt Baumgurtel, Adriaan van der Merwe, David O'Carroll, Megan Chau
First published: 23 March 2022

At the 2021 United Nations Climate Change Conference, Australia signed a global agreement committing to make electric vehicles (EVs) the new normal by 2030. Whilst a welcome initiative, and one supported by most Australians, the question of how to do this remains up in the air.

Australia currently faces several challenges in taking EVs mainstream, which includes a lack of physical and legislative infrastructure to support EVs, little private sector support and fewer models of EVs readily available on the domestic market.

What is happening domestically?

Action is being taken at both Federal and State government levels to address the issues mentioned above. For example, the Future Fuels Fund and, more recently, the Future Fuels and Vehicle Strategy aim to provide substantial funding and promote initiatives to support the smooth transition to EVs. This includes leveraging private sector investment to roll out refuelling infrastructure in both metropolitan and regional areas and capitalising on Australia's large resources of critical minerals to manufacture EVs and other battery technologies.

At the State level, New South Wales, Victoria, the Northern Territory and Australian Capital Territory have implemented financial incentives, such as excluding EVs from stamp duty and introducing rebates, to encourage greater uptake of EVs. On the other hand, South Australia, Western Australia, Queensland and Tasmania are focused on developing public infrastructure to support the use of EVs.

While these interventions are important, there are still a lot more to be done to make EVs the new normal by 2030.

What is happening internationally?

Several countries have successfully promoted the EV industry in their respective domestic markets through a combination of incentives packages, effective policy instruments with government backing and substantial investment in infrastructure which supports the move to EVs.

Since the 1990s, Norway has maintained a consistent demand and supply for Evs. Among other initiatives, Norway has promoted an incentives package which imposes a high tax for high-emission vehicles and relatively lower tax for low-emission vehicles. Alongside implementing policy instruments and initiatives, Norway has also invested heavily in the construction of appropriate infrastructure to support EVs. An example of this was equipping all main roads in Norway with fast-charging stations.

The UK introduced its own discount programme to encourage more consumers to switch to less polluting cars, with a view to phase out internal combustion engines by 2030. Currently, consumers may be eligible for discounts of up to £2,500 for new low-carbon emission vehicles, with the plan to expand the scope of the programme so a greater number of consumers can access this benefit.

Other countries, such as the US (California) and China, have implemented mandatory targets for EV sales. These targets put pressure on manufacturers to increase production of low-emission vehicles, thereby making more models of EVs available for purchase in the domestic market.

With these initiatives in mind, there are a few key steps Australia can take to expedite and sustain the switch to EVs.

A path to the future?

Infrastructure and policy

An important first step is to continue building the required infrastructure to support EVs – including the roll-out of more charging stations and the development of appropriate policy instruments and regulations. This could include a national subsidy plan for making the switch to EVs, regulations to maximise efficient use of charging stations (particularly during the day/'peak' hours versus off-peak/night hours), development of fuel-efficient standards and cost-effective home charging options.

Grow Supply and Demand

Also crucial is the focus both at Government and industry level on growing and maintaining demand and supply. This essentially boils down to consumers consistently choosing to buy EVs over similar fossil fuel alternatives and manufacturers choosing (i.e. not being commercially deterred from) exporting their EVs to Australia - at least until domestic manufacturing becomes sustainable.

One way of doing this is by developing incentive packages for consumers and manufacturers. This may take the form of discount programmes, exemption from GST, stamp duty or fringe benefits tax, or access to funding to make the switch to EVs a reality. Another method is to diversify the EV models available on the market to cater to a wider range of Australian citizens and their needs, and to cast a wider net for manufacturers potentially interested in selling their EVs in Australia.

To encourage continued commitment to phasing out high-emission vehicles for low-emission EVs, Australia could follow the example of the US and China and introduce a national sales mandate. Given Australia will, in time, likely follow suit as a domestic EV manufacturer, a national sales mandate may stimulate and drive greater domestic production of EVs.

Turn your EV into a household battery

A potentially game changing emerging technology is bi-directional charging, which essentially enables homeowners to use their EV as a household battery to power their home and make money by selling power from the vehicle's battery back to the grid at times of peak demand.

If the energy used to charge the car comes from a free or cheap source, such as rooftop solar, a free charger at the local shopping centre, or even the workplace, the potential is there to substantially reduce consumers' home power bills. Alternatively, there is an arbitrage use by charging the EV off-peak and exporting back to the grid during peak evening hours to optimise profits.

While bi-directional charging is not yet available in Australia, a trial backed by the Australian Renewable Energy Agency (ARENA) is underway in Canberra to test the technology. The Realising Electric Vehicles-to-grid Services (REVS) trial involves 51 Leaf EVs that are part of the ACT Government fleet and when plugged in will inject power back into the grid when the vehicles are not in use. Once the charging units have been certified by the relevant authorities it is hoped the technology will be ready to roll-out in Australia.

To consumers, these developments will help normalise the use of EVs and ensure it is seen as a legitimate, viable alternative to high-emission vehicles.

The world is undeniably in a period of exciting change, where traditional sources of fuel and energy are being traded for renewable resources in a bid to ensure a greener and more sustainable future. For Australia who recently affirmed its commitment to achieving this future, EVs may be just the way to drive that point home.

There's a New Duck in Town – Part I

Authors: Matt Baumgurtel and David O'Carroll
First published: 01 February 2022

Part I – The Rise of Rooftop Solar

The structure of the National Electricity Market (NEM) has seen rapid change in recent years. Sustained low technology costs, governmental support and a shift in investor and consumer attitudes towards fossil fuels has led to an unprecedented uptake of renewable generation in the NEM. Australia is at the forefront of this renewables revolution with the highest uptake of residential rooftop solar installations globally.

However, while the energy transition is moving in the direction needed to preserve our planet for future generations, the influx of intermittent renewable generation over the last decade in a NEM originally designed for fossil fuel generators has created a large disparity in electricity supply and demand depending on the time of day.

In this, the first part in a two-part series, we examine the factors that have led to this disparity worsening over time. In the second part, we consider some of the innovative solutions that are already in train to resolve this issue once and for all.

The Fat Duck

This electricity supply and demand disparity can be summarised as follows: as people leave their homes in the morning and small-scale renewable generation (ie solar) ramps up, electricity demand from the network decreases as more and more renewable energy is generated into the NEM. Then, as the sun begins to set and people return home in the evening, this intermittent generation drops off and network demand begins to peak. If shown on a graph – and with a touch of artistic licence - this MW demand curve resembles a duck, also referred to as the "duck curve issue".

Chart, line chart Description automatically generated
Source: The Hub, AGL

Over the last decade, the graph has shown the belly of the duck hanging lower and lower due to the drop in demand in the middle of the day coupled with the increasing penetration of intermittent renewable generation in the NEM.

The Rise of Rooftop Solar

A leading contributor to this has been the adoption of household rooftop solar (without energy storage) in very large numbers and the lack of a targeted legislative regime to regulate this new form of generation. This has seen the NEM used as a dumping ground for this "dumb solar" in the middle of the day when MW demand is at its lowest.

Compounding this has been governmental support for rooftop solar by way of fixed feed in tariffs which apply irrespective of the wholesale market price, resulting in new market demand lows being set almost every week.

For retailers and rooftop solar owners, the knock-on effects of record levels of solar penetration have led to large price swings (including negative pricing) and system inefficiencies across the NEM. This has led to the Australian Energy Market Operator (AEMO) curtailing the amount of rooftop solar that can be fed into the grid, hurting the revenue streams of rooftop solar owners.

Variability in solar generation has also undermined the stability of the grid. Until the relatively recent deployment of energy storage technologies, solar systems did not inherently provide the "system strength" and "inertia" services required to keep the lights on. Such services are currently largely provided by coal and other thermal plants, whose very existence is currently under threat by (amongst other factors) the additional solar generation in the NEM.

5-Minute Settlements

Further driving down the MW demand curve in the short term has been the switch from 30-minute settlements to 5-minute settlements (5MS) in the NEM, which commenced in October of last year (see our articles on 5MS here and here).

The early evidence shows that it is having the impact expected, ie that the market is now favouring fast-moving energy storage technologies, and catching out legacy fossil fuel plants that are too slow to respond to market movements. This has had the short-term effect of inflexible supply (ie fossil fuel generators) either being forced to stay on or taking the financial decision to do so because they are not able to ramp up or down in the time required to react to price spikes in each 5-minute interval.

This will likely exacerbate the duck curve issue in the short-term as these slow fossil fuel generators will continue to pump energy into the grid, accepting the negative prices. However, in the long term, as these inflexible generators either retire voluntarily or due to no longer remaining economically viable, their generation will fall off decreasing the amount of generation being pumped into the grid at the lowest demand period of the day. AEMO has said as much in its latest Integrated System Plan, predicting that coal plants will close three times faster than the industry had expected.

The Duck's Stiff Neck

With regard to the duck curve's peak, the surge in demand in the evening, especially in the sunnier summer months, requires the intermittency of renewable generation to be supported by flexible firming energy sources that can react to peaks in demand when generation supply is low. Currently, the intermittency and for the most part, the non-dispatchability of rooftop solar has compounded the issue.

Duck Curve 2.0

The key question is ultimately how to tame rooftop solar so that it can be strategically utilized when energy demand is at its greatest. As with most complex issues, the answer requires the combination of multiple solutions. These can be broadly categorized in the context of the duck curve as technological advancement of energy storage and its continued reduction in cost, the widespread adoption of energy storage technologies at a micro and macro grid level, and most crucially, targeted and effective regulatory reform to facilitate and promote the uptake and application of novel energy storage technologies to respond to peaks in MW demand.

For instance, the increased uptake of household batteries and AEMO's proposed rule changes facilitating the uptake of aggregated solar and virtual power plants (see our articles on the Integrated Resource Provider here, here and here) should go a long way to coordinating this form of renewable generation so that it is dispatched when required and not simply dumped into the grid. Looking again at 5MS, while the effects in the short term are likely to only increase the arbitrage gap between low and high prices, this will give an extra incentive to renewable generators to adopt or retrofit energy storage to buy low and sell high, thus providing the market with the dispatchability resource it requires to balance demand with supply in the long term.

We will be delving into these various developments and how they are set to flatten the duck curve once and for all in an upcoming follow-up to this article.

There's a New Duck in Town – Part 2

Authors: Matt Baumgurtel and David O'Carroll
First published: 24 February 2022

Part II – The Flat Duck

In Part I (read here) of this series, we saw how the widespread adoption of intermittent renewable generation in the energy system (mainly in the form of rooftop solar) has in recent years created a large disparity in electricity demand vs supply, thus creating the "duck curve" issue.

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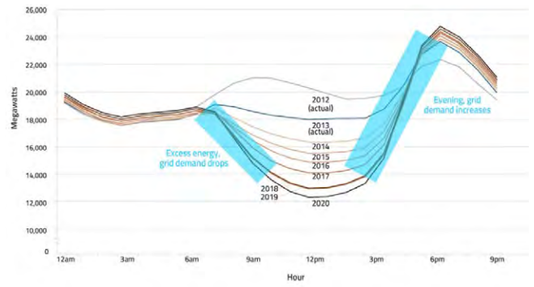

Grid demand falls in the day, and then rises again in the evening

Source: The Hub, AGL

In this article, we examine how recent developments in energy storage technology and proposed regulatory changes should see the duck curve move closer towards a flat line by enabling energy demand to be met by dispatchable renewable generation regardless of the time of day.

The Rise of Dispatchable Renewables

Energy storage, particularly in the form of battery storage, is due to play a key role in the context of the duck curve by enabling the market to more readily align consumer energy demand with supply. As we have seen in our New Energy Insights Quarterly (The Rise of Dispatchable Renewables), as a fast energy response technology, batteries have the ability to rapidly respond to changes in electricity demand throughout the day.

Strategies currently being trialled to address grid instabilities caused by intermittent rooftop PV mainly focus on increasing grid stability by limiting and controlling rooftop and utility solar power generation. This includes restricting the output from solar farms, reducing or even eliminating feed-in tariffs, limiting the size of household inverters and employing big batteries[1]. However, these strategies do not really address the key issue, ie that there is an oversupply of solar generation in the grid. For instance, as recently as last week, Origin Energy announced that it will be bringing forward the closure of its 2,880MW Eraring coal fired power station, seven years ahead of its original schedule. Origin cited the diminishing profitability of the Eraring coal plant as the main reason for the closure, with high levels of solar output during the day pushing prices to such lows that the long-term operation of the coal plant is now unsustainable.

The most direct solution to balance out the duck curve is to add battery storage to household solar systems behind the meter. Nearly all big batteries are used for providing frequency control or buffering against short-term voltage fluctuations. However, these issues are caused by the decrease in operational demand during the day and can be resolved with household battery storage, minimizing household export to the grid as well as household load demand.

While perhaps still a couple of years off, also relevant in this context is the now inevitable electric vehicle (EV) revolution. An EV battery is multiple times the size of a standard battery used on the side of a house and the technology is already there to put rooftop solar PV to good use in the middle of the day. The business case for this will be given a further boost once bidirectional chargers are more affordable and commercially available. As the majority of EV users travel a relatively short distance each day, EV batteries (typically with a range of more than 500km) still have plenty of charge left over which can be exported to the grid in the evening to assist with grid stabilizing.

From a regulatory point of view, the Government has the ability to weigh in further in balancing out the demand curve through the introduction of tariffs which incentivize EV owners to charge from the grid during the middle of the day when demand (and price) is lower.

Looking at in front of the meter energy storage, while frequency control ancillary services (FCAS) remain the dominant revenue stream, batteries also have a key value in energy arbitrage. Simply put, this is the purchasing and storing of energy at low price times only to generate and sell into the market at high priced times. The potential investment opportunity in this service (backed up by regulatory reform, see below on 5-minute settlements) is now becoming more and more apparent.

Taming Rooftop Solar through Regulatory Reform

The Integrated Resource Provider

The regulatory framework has for some time been in need of reform to facilitate the shift to combining renewable generation technologies with energy storage. The Australian Energy Market Commission (AEMC) has recently

made a final determination and rule as a step to achieving this goal. Key to this is the creation of a new market participant category – the integrated resource provider (IRP).

IRPs are intended to capture market participants with bi-directional energy flows that can choose when to export (discharge) and import (charge) energy and thus have the capacity to offer grid stability services (FCAS). This includes energy storage, hybrids (renewable generation combined with battery storage) and virtual power plants (VPPs) that are aggregators of small generation and storage units (usually rooftop solar).

Controlling rooftop solar to balance the electricity system has and continues to be a significant challenge for the Australian Energy Market Operator (AEMO). The IRP rule change will be particularly relevant for existing and future small scale aggregation businesses (less than 5MW) because registration as an IRP will provide access to the energy and ancillary services markets (and resulting revenues). The development of a strong aggregation market will assist AEMO to control this disparate, widely distributed, increasingly dispatchable generation in the context of a market designed for centralised one-way generation.

5-minute settlements

On 1 October 2021, the NEM shifted from 30-minute settlements with the dispatch price averaged over six separate 5-minute intervals to 5 minute-settlements (5MS) with the dispatch price calculated on each 5-minute interval. As we have seen in our New Energy Expert Insights series (read Part I and Part II), this switch has promised to spur investment in large scale battery storage by removing market conditions that previously allowed the large incumbents to game the system and fix the price of electricity.

The switch to 5MS should in time result in a much truer price signalling, reflective of actual supply and demand conditions which will favour energy storage technologies due to their ability to take energy from the grid when the price is low (or get paid to do so during negative pricing) and dispatch it rapidly when the price is high.

Early indicators are showing that this prediction is already ringing true and that batteries are benefitting from the effects of 5MS. AEMO has reported in its Quarterly Energy Dynamics Report for Q4 20212 that "South Australian batteries also benefitted from their ability to respond quickly to price spikes under 5MS this quarter, with net revenue around $0.4 million higher than what would have been received under 30-minute settlement, assuming the same five-minute price and dispatch outcomes".

Indeed, further analysis has shown that the batteries that were operational in the last quarter of 2020 and 2021 enjoyed a 26% increase in total market revenue, with 80% of this coming from the arbitrage market3. This shows that the opportunity is already there for batteries to extend their services - and indeed their business case - beyond system services to the arbitrage market. In the long term, this arbitrage should ultimately lead to a duck curve that more resembles a flat line as electricity becomes dispatchable throughout the day to meet peak demand.

The real question then will be: where will the price ultimately rest, ie how high will the duck fly?

Levelized Cost of Storage

The real winners in this race will be the energy storage technologies with the fastest response times, coupled with the lowest Levelized Cost of Storage (LCOS). This is essentially the lowest average revenue per unit of electricity generated that would be required to recover the costs of building and operating the energy storage facility during an assumed financial life cycle.

Other key factors are the rate of energy lost in the storage process, its overall energy storage capacity, and how quickly the storage asset can be recharged. We will be discussing the various types of energy storage technology and how they can be best optimized in an upcoming article.

Ultimately, if we are going to have a carbon neutral energy system, the high penetration of intermittent renewables in the grid will require an effective and fit for purpose regulatory framework to facilitate the ever-increasing uptake of energy storage. In doing so, this will facilitate balancing and frequency control services to ensure system security and affordability for consumers.

The fat duck is about to become a thing of the past, the next version of the NEM will bring about duck curve 2.0.

The 'Business' of Australia's Green Recovery – Key Drivers and Risks for 2022 – Part 1

Authors: Brett Heading, Matt Baumgurtel, James Delesclefs, Adriaan van der Merwe
First published: 05 April 2022

Australia's climate commitments have come under intense scrutiny once again following the recent floods in Queensland and New South Wales. This came on the back of COP26 (the UN Climate Change Conference in Glasgow) in October and November 2021, at which the Australian Government, despite setting a target of net zero emissions by 2050, received criticism from many nations for declining to revise its existing interim target of reducing emissions by 26-28% by 2030 to a level necessary to meet the Paris Agreement goal of limiting global warming to 1.5°C by the end of this century.

While important, the reality is that the commitment to net zero emissions and the transition to a lower carbon economy is no longer primarily driven by governments.

This has been a distinct shift which has occurred largely in the last 24 months – a hidden transition as COVID-19 has dominated global attention. At the same time, however, the pandemic has itself accelerated this shift, as governments and businesses collectively focus on 'building back better' in a new world.

We attribute the role of business in the green economic recovery to:

- environmental, social and governance concerns (ESG);
- decreased cost of generation; and
- energy security.

This series is divided into three parts. Part 1 deals with the ESG concerns and Part 2 deals with the decreased cost of generation and the necessity for energy security. Part 3 demystifies the Australian carbon market and focus on the distinction between net zero and carbon neutral, greenwashing and Australia's potential as a carbon sink.

PART 1 – ESG concerns driving the green economic recovery

After the early beginnings in the form of 'corporate social responsibility', or 'CSR', decades ago, attention has now turned to the more tangible environmental, social and governance concerns, or 'ESG'.

Indeed, ESG is now a primary driver for businesses to align their operations with priorities that contribute towards a more sustainable, equitable and responsible future.

These priorities range from diversity in gender, sexuality and ethnicity in the workforce and on boards, to action on modern slavery, implementing effective anti-money laundering and cybersecurity systems to protect against privacy and data breaches, and action on climate change.

It is climate change that has become one of the biggest focus points for financiers, insurers, investors, customers and employees.

The key point for businesses is that if they do not transition towards a net zero emissions operating model, they could soon find themselves without finance, insurance and investors. In the last 12 months, ANZ, IAG and Suncorp have been clear on this message and have prioritised a movement away from heavy emitting customers. There is also a strong presence from major Australian banks and insurers as signatories in global sustainability initiatives including the Equator Principles, the UN Principles for Sustainable Finance and Insurance and the UN Net Zero Banking Alliance.

Further, in October 2021, the Business Council of Australia laid out its own roadmap supporting net zero emissions by 2050 and calling for stronger short-term emissions reductions goals to provide investment certainty and prevent Australian businesses from needing to play 'costly and damaging catch up' on inevitable global change.

Investor groups have also agitated for climate advisory resolutions to be placed on AGM agendas and have turned up the pressure on boards to take action on climate change by the 'back door' method of voting down remuneration reports to force a spill of the board. In some cases, most notably BHP, ANZ and NAB, this shareholder pressure has led to enhanced commitments to transition to lower carbon projects, investments and customers and to undertake more diligent and comprehensive climate risk assessments and disclosure.

Just this month, US fund manager Fidelity, which manages $20 billion of Australian assets, similarly announced that it would use its shareholdings to pressure Australian companies to reduce their exposure to coal and coal-fired power production, through shareholder resolutions and eventually by selling out of high emitting companies if meaningful action is not taken.

Novel investor claims on climate change are also successfully progressing in courts around the world, including the Royal Dutch Shell ruling in The Hague in May 2021 which required a private company to comply with Paris Agreement emissions reductions targets originally intended for governments alone. Also, in May 2021, the Federal Court of Australia recognised a novel duty owed by the Australian Environment Minister to take reasonable care to avoid causing injury to Australian children through inaction on climate change. While this finding was overturned by the Full Court on appeal in March 2022, if the matter is further appealed to the High Court of Australia, the original determination could potentially be reinstated given the High Court is typically willing to take a more expansive view of the law of negligence and to impose novel duties of care in new and emerging areas of concern to the Australian community.

Regardless, there is considerable scope for climate-related litigation to further expand in Australia in coming years, and litigation funders, environmental groups, not for profit entities and private philanthropists are all potential funding sources for new test cases before the courts.

Aside from potential corporate liability, directors too face the prospect of personal liability for breaching their duties to act in good faith in the best interests of the company if they do not assess and seek to mitigate climate risks facing the company – whether physical risks from a changing climate or broader 'transitional risks' such as reduced revenue linked to declining demand from consumers for products supplied by heavy emitting businesses.

All of this will see an increase in sustainability-driven capital transactions and restructures and this will be a major M&A growth area in 2022 and beyond. Corporate restructures will become the norm as companies are compelled to change their business models to become more environmentally friendly and sustainable. Companies will require access to new capital and there will be a strong pathway for companies to issue green bonds to investors in domestic and global debt markets linked to the implementation of identified sustainability and emissions reduction measures and the completion of renewable energy projects.

There is also a growing market for green finance, with ANZ and CBA last month reporting a strong demand for green loans from customers. On the bank side, there is also a desire to provide that funding as both a business opportunity, as well as an expectation from the banks' own investors that banks transition their lending and investment practices towards 'green friendly' projects and customers.

'Green-driven' takeover bids can also be expected to increase, building on the failed $8 billion consortium bid for AGL Energy led by Atlassian and Brookfield on the platform of ceasing coal-fired power production and moving solely to renewable energy by 2030.

In this sense, it is businesses that will now lead the transition towards net zero emissions in Australia and globally.

Origin Energy's announcement last month that it will bring forward the closure of Australia's largest coal-fired power station at Eraring in NSW to 2025, seven years ahead of schedule, is just the latest business-driven commitment to dedicated and tangible action on climate change in Australia, notwithstanding criticism levelled at Origin from many government sources.

At the same time, directors need to tread careful ground. Even if directors do properly take into account the climate risks their company is facing, there are still clear liability risks. First, the required standard of disclosure of critical climate risks is currently underdeveloped, with ASIC and APRA still in the process of providing further guidance and a clear disclosure framework for directors incorporating stress testing, scenario analysis and uniform concepts based on the UN Task Force on Climate-Related Financial Disclosure standards. Without a clear disclosure framework, the manner in which climate risks are disclosed to the market may lead to a breach of continuous disclosure obligations and possible liability for misleading and deceptive conduct.

Further, directors who cause companies to make bold and broad-based commitments to net zero emissions – embellishing the company's environmental credentials in the art of 'greenwashing' – without putting in place the structures and businesses processes and practices to actually achieve those commitments may also face liability for misleading and deceptive conduct in making statements without reasonable grounds.

In this sense, while it is businesses that will provide the impetus for Australia's transition to net zero emissions, it will be necessary for cooperation and close consultation between businesses, regulators and governments to ensure the required level of certainty, consistency and balance to maintain market stability, business efficiency and growth in Australia's post-pandemic recovery.

The 'Business' of Australia's Green Recovery – Key Drivers and Risks for 2022 – Part 2

Authors: Brett Heading, Matt Baumgurtel, James Delesclefs, Adriaan van der Merwe
First published: 06 April 2022

Australia's climate commitments have come under intense scrutiny once again following the recent floods in Queensland and New South Wales. This came on the back of COP26 (the UN Climate Change Conference in Glasgow) in October and November 2021, at which the Australian Government, despite setting a target of net zero emissions by 2050, received criticism from many nations for declining to revise its existing interim target of reducing emissions by 26-28% by 2030 to a level necessary to meet the Paris Agreement goal of limiting global warming to 1.5°C by the end of this century.

While important, the reality is that the commitment to net zero emissions and the transition to a lower carbon economy is no longer primarily driven by governments.

This has been a distinct shift which has occurred largely in the last 24 months – a hidden transition as COVID-19 has dominated global attention. At the same time, however, the pandemic has itself accelerated this shift, as governments and businesses collectively focus on 'building back better' in a new world.

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PART 2 – Decreased cost of generation and energy security driving the green economic recovery

Traditionally economic growth and energy demand went hand in hand. This means that the wealthier a country, the more electricity it generated and the more CO2 it emitted.1 This culminates in the world's two energy problems. Firstly, that the bulk of our energy generation produces carbon dioxide emissions, with Asia Pacific accounting for 52% of global emissions in 2030. And secondly that about 770 million people still lack access to electricity, which means that we will see an 80% increase in generation capacity by 2040.

Addressing these seemingly opposing energy dilemmas of increasing electricity supply and decreasing CO2 emissions creates a tremendous opportunity for business, especially as the cost of renewable generation technology have decreased significantly in recent years. For example, the cost of solar generation has fallen by a staggering 80% since 2010.2 This has accelerated the uptake of renewable energy by generators in large scale generation, and also by households installing rooftop generation.

The realisation of business opportunities in renewable energy is evident. The NSW New England Renewable Energy Zone for instance attracted 4 times more applications than it can accommodate, and the NSW hydrogen hub scheme eight times the state's target.

The effect of this high uptake of renewable technologies have however caused a substantial shift in the NEM's energy demand profile. As explored in our article on the electricity duck curve, there is now a time of day when electricity is, for all practical purposes, free.

While this predicament erodes profits for some generators, it does lead to lower electricity prices benefitting parts of the economy. It also holds a tremendous opportunity for generators willing to innovate. To a large extent we are still operating in an energy market where generators were designed to follow load, but we are transitioning to a market where load can follow generation. In such a market the ability to shift one's demand profile is key, and possible due to technological advances and storage solutions.

The message to generators is clear – there will be a point in time for somewhere the business of generating electricity alone will not be enough. Generators will have to explore the synergies that their generation facility has with other industries, determine what opportunities exist beyond their core business and find their Power PLUS. This sees an abundance of energy move an economy from selling electrons to selling tomatoes, from selling iron ore to selling steel and from selling wool to selling cloth. Keep a lookout for our New Energy Quarterly on Power PLUS where this theme I explored in greater detail.

A discussion on the drivers of the green economic recovery would however not be complete without mentioning the European energy security crises, created by Russia's invasion of Ukraine. While the EU has responded by implementing various sanctions on Russian oil and gas exports, the world has witnessed the limitations of international diplomacy when energy security is involved. In a world where countries are dependent on the importation of energy to sustain their economies, the exporter of energy often has the upper hand.

One can only speculate what the international response, and the outcome of the invasion, would have been if the EU was reliant on itself for its energy security, or it had a greater choice of where to purchase energy from.

In a market where cheap, decentralised solar and wind generation can be coupled with storage solutions and hydrogen transport, international alliances may look different in the years to come. This is especially true as the COVID-19 recovery measures that heavily invested in renewable generation and hydrogen development can now benefit from the creation of a European offtake market

Up to now, the EU relied on Russia to supply 25% of its oil and 40% of its gas requirements. In a bid to make Europe independent from Russian fossil fuels, the European Commission announced the RePowerEU plan on 8 March 2022 which will, amongst others, quadruple green hydrogen supplies by 2030.

Business is alive to this shift, as the industry is increasingly looking at methods to secure their own sources of electricity generation. This is evident through the various projects announced in recent weeks where European businesses are planning to purchase electricity from independent renewable power producers or develop their own generation facilities.

As evident from the above, the COVID-19 recovery has created the perfect market conditions for businesses to accelerate the shift to a carbon neutral world – and it is heartening to see that we are building back greener.

New Energy Team

Key Contacts

Matt Baumgurtel View Profile

Partner – Head of New Energy

Matt has over 17 years' experience, particularly focused in the energy sector. Matt's has considerable expertise in project development, construction, financing, joint ventures, and mergers and acquisitions transactions. He specialises in legal advice throughout the energy and infrastructure lifecycle, and acts for investors, developers, and constructors of solar, thermal, wind, hydrogen, electricity transmission, waste to energy and energy storage projects in Australia and the APAC region.

Matt's expertise also includes drafting and negotiating project and finance agreements, EPC and O&M agreements, connection and access agreements, and power purchase agreements. Matt also has extensive experience managing non-recourse project financing, including parallel bank negotiations, due diligence and transaction documentation.

Contact Details
E: matt.baumgurtel@hamiltonlocke.com.au
T: +61 459 900 08

Andrew Smith View Profile

Lawyer – Energy, Infrastructure and Resources

Andrew leverages his attention to detail and collaborative nature to cultivate strong relationships with his colleagues and clients, working together to deliver optimal outcomes. Andrew has practised as a projects lawyer in both Sydney and Dubai, and has been expanding his skillset in the energy space since his return to Sydney in 2021.

Andrew has a passion for navigating complex issues, particularly in the renewable energy space. He specialises in renewable energy projects including wind, solar, energy storage, waste-to-energy and hydrogen. Andrew has experience working on a variety of contracts, including EPCs, O&Ms and PPAs.

Contact Details
E:andrew.smith@hamiltonlocke.com.au
T: +61 419 966 779

David O'Carroll View Profile

Associate - Energy, Infrastructure and Resources

As an energy, infrastructure and resources specialist, David has a passion for law and looking at problems with a logical and strategic lens, using his extensive knowledge and skills of the market to find positive outcomes for clients.

David has expertise in energy, infrastructure and resources, as well as project development and construction. In particular, David's expertise includes drafting and negotiating project agreements, EPC and O&M agreements, connection agreements and other construction contracts (including D&C and construct only contracts).

David is admitted in Ireland and not admitted in Australia.

Contact Details
E: david.ocarroll@hamiltonlocke.com.au
T: +61 421 497 311

Adriaan van der Merwe View Profile

Senior Associate – Energy, Infrastructure and Resources

Adriaan is a problem-solver with a passion for finding creative, people-oriented solutions for his clients. Adriaan began practising as an energy and projects lawyer in Africa, before expanding hiss on the technologies of wind, solar PV, CSP, landfill, biomass, gas, coal, nuclear and hydro. Adriaan's other work includes transmission, distribution and procurement related assignments.

Contact Details
E:adriaan.vandermerwe@hamiltonlocke.com.au
T: +61 403 120 410

Cedric von Duering View Profile

Lawyer – Energy, Infrastructure and Resources

Cedric has over 7 years' experience in the energy sector. Cedric has considerable expertise in project development, construction, financing, energy related transactions and general commercial transactions. He specialises in advising clients involved in the energy lifecycle and has acted for solar, wind and energy storage investors and developers, as well as energy off takers, such as crypto minors and data centre providers. Cedric also has vast expertise in advising electricity retailers. He was previously the Young Energy Professionals' co-chair of the Australian Institute of Energy.

Cedric's expertise includes negotiating and drafting on-market and off-market power purchase agreements, finance agreements, and grant and bank financing arrangements.

Contact Details
E:cedric.vonduering@hamiltonlocke.com.au
T: +61 411 320 631