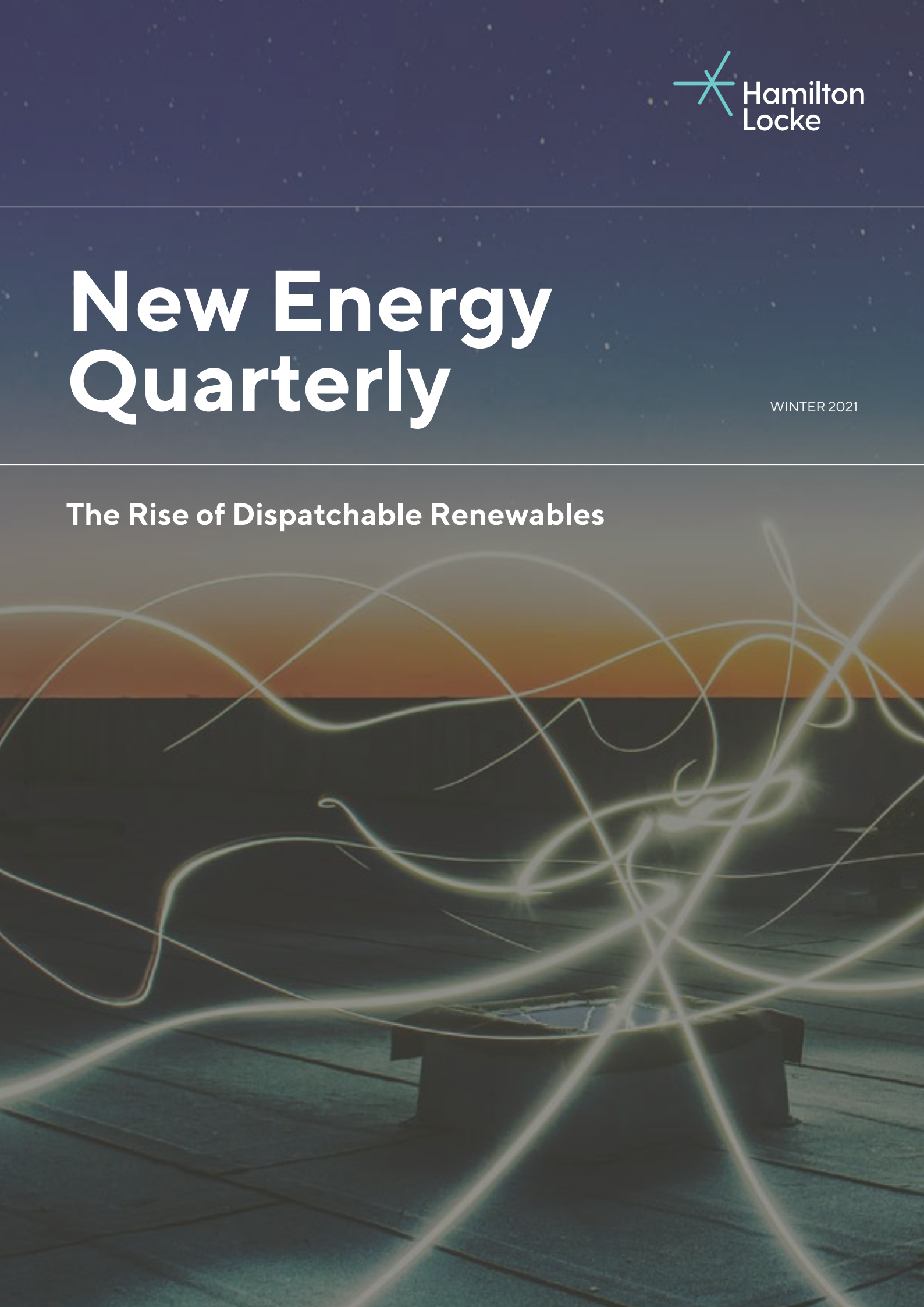
Hamilton Locke

New Energy Quarterly

WINTER 2021

The Rise of Dispatchable Renewables



Welcome to New Energy

Welcome to the first edition of New Energy Quarterly – a reflection on developments and trends in new energy markets over the last 3 months (including updates on our observations). We will also pull out the crystal ball and make some predictions for the future.

What is "New Energy"?

But first, what do we mean by "new energy". New Energy is the label we give the production and/or storage of power in "nontraditional" ways. Power (light, heat or motion) has traditionally been produced at scale by the combustion of finite (non-renewable) resources or stores of energy.

Through technological advancement humanity has and will continue to invent more efficient ways to capture and use renewable sources of energy at larger and larger scale. This search for efficiency and scale defines new energy.

It is important to note that using renewable sources of energy is not new – the burning of wood is as old as civilization itself, the harnessing of wind to traverse the oceans can be traced back millennia while wind has also been used to create motion / mechanical energy to pump water and crush grain for hundreds of years, gravity (arguably the source of all energy) has been used to create power (in the form of motion) since the middle ages. Now we give these sources of energy different names – biomass, waste-to-energy, wind farms, hydro, etc. Humanity was a little slow to converting solar energy to power, but plants have been doing it (via photosynthesis) since the dawn of time.

Everything that is new was old

What differentiates old renewable sources of energy from "new energy" is the capture and conversion of renewable energy into power at ever increasing scale and efficiency.

Ultimately New Energy is how humanity will create the energy to power our society into the future. It recognises that human advancement is based upon a constant technological evolution – solving problems to improve our lives through the invention and application of ideas is at the core of what makes us human.

There is no better example of constant technological evolution than the ever expanding use of electrical energy. From supercomputing and the internet, to transportation, robotics and nanotechnology, we are in the electrical age and will be for some time.

Increased utility, flexibly and efficiency in the use of electricity has facilitated the application of electricity to more and more areas of our lives - the "electrification of everything" is the result. Once something is powered by electricity, it is a relatively incremental step to connect / communicate / control via electricity – and the "internet of things" is the result.

The rise of dispatchable renewables

Ever increasing electrification requires more and more electricity to be produced at the time when it is required. The inflexibility of when large scale renewable energy is created and when power is required has placed a natural limit on the amount of electricity we can "rely" upon being generated from renewable energy – the sun is not always shining nor the wind blowing when electricity is required, not every town has a geothermal spring to capture heat, and not every city has a river to turn a water wheel.

Humanity bypassed this "intermittency and scale" problem by generating electricity from non-renewable resources in traditional ways – burning carbon-based material to convert its calorific value into electrical energy.

However, burning finite resources has natural, physical and economic limitations - physical in that there is only so much of a finite resource, and economic in that the cost of extracting and burning the resource must be less than the value of the electricity generated, particularly if the local and global externalities of burning carbon-based materials are considered.

Both, but in particular economic considerations, have presented just another problem that humanity is solving through technological advancement, this time in the form of the efficient storage of electrical energy at scale to be available (dispatchable) when required.

The efficient large scale storage of electricity created from renewable resources solves the "intermittency and scale" problem, making renewable energy "reliable" or "dispatchable" and therefore removing the ceiling on the proportion of renewable energy which can power our electricity networks – hence the rise of dispatchable renewables.

Over the last few months, we have focused on this seismic shift in the energy sector, and it is the theme of this edition of New Energy Quarterly.

So welcome to the New Energy Quarterly and our focus theme for this quarter – the rise of dispatchable renewables. ■

Matt Baumgurtel
Partner – Head of New Energy

Contents

Editorial

Authors:
Matt Baumgurtel and David O'Carroll

The current landscape

The fundamental structure of the National Electricity Market (**NEM**), and electricity networks around the world is changing. Increased penetration of intermittent renewable generation is placing increasing demands on aging thermal (particularly coal fired) generators, most of which are well past their initial design life and are nearing the end of their useful (i.e. reliable) life.

For electricity networks to function in a stable and secure manner, intermittent or viable generation needs to be balanced by dispatchable (on demand) generation. Traditionally this was done by baseload coal fired generation supplemented by open cycle gas turbines and traditional hydroelectricity. This need for "balancing" or "firming" generation places a technical limit on the amount of intermittent or viable generation in the network.

At the same time, in the NEM we are seeing significant reductions in the reliability of coal fired generators, primarily due to their age and failure to be properly maintained over many years.

So, in a landscape where the amount of intermittent renewable generation in the network is reaching its technical limit and once reliable balancing generation is faulting, human ingenuity is solving the problem – energy storage – by removing the need to balance generation by making renewable energy available on demand (i.e. dispatchable).

The integration of energy storage in renewable generation projects is creating enormous opportunities. Renewable energy projects that were previously non-economic due to curtailment, Marginal Loss Factor (**MLF**), grid capacity, or market price risk are now feasible when coupled with energy storage allowing for time of energy dispatch to be flexible and not determined by the time of generation.

The steady advances in energy storage technology and reductions in cost are now enabling renewable energy generators to produce a product that their customers want – electricity at the time of day they need it.

Large scale energy storage technology is also playing a key role in supporting grid stability – providing the network balancing previously delivered by coal fired and open cycle gas generation. Grid-stabilizing batteries are providing a whole raft of support functions such as frequency control ancillary services (FCAS) and network support and control ancillary services (NSCAS).

We have also seen that the regulatory landscape is undergoing significant change. The latest National Electricity Rules changes to introduce new spot-market arrangements for fast frequency response supports dispatchable generation.

The proposed introduction of a new registration category, the Integrated Resource Provider and Integrated Resource Unit classification will simplify the registration and operation of energy storage systems.

Allowing for the aggregation and participation of small-scale batteries in the wholesale market will unlock revenue streams for behind the meter generation and storage assets, and open a new market in the aggregation of the capability of these assets.

These rule changes are consistent with AEMO's objectives of ensuring system security and market efficiency. However, these changes are ultimately at the margin.

The future

The continued retirement of coal generators will continue to create opportunities for new dispatchable renewable generation and standalone energy storage (i.e. projects that store electricity generated by others).

The opportunity for standalone energy storage is directly proportionate to the requirement for generation to balance existing and new intermittent generation, and hence is heavily dependent on the retirement of coal generation. Hence there is a natural limit to the amount of standalone energy storage required.

Dispatchable renewable generation will fill the gap left by existing coal generation – the almost weekly announcement of another "mega" project in development which integrates renewable generation, energy storage (and potentially hydrogen production) is testament to this.

These mega projects are possible because of continued equipment and construction cost reductions and are fueled by the huge amounts of low cost capital seeking to invest in clean energy, often driven by ESG mandates and attracted to the macro fundamentals of energy markets and long-term stable cash flows. In addition, governments around the world are stimulating their covid affected economies by investing staggering amounts in their electricity and energy markets, essentially resetting them for the next millennia. Hydrogen produced from renewable energy will be a huge part of this future - from covid lemons to green hydrogen lemonade!

Regulation has struggled to keep up with the pace of technological advancement and falling equipment and construction costs. National Electricity Rules amendments and revisions continue to incrementally respond to the evolving market, however, these revisions are ad hoc, bespoke changes often implemented to address a specific gap or respond to a particular set of circumstances (and often sponsored by stakeholders with a vested interest in the change).

It is widely acknowledged that a structural rewrite is required to implement a regulatory system (both a set of rules and the regulators that enforce them) which is fit for purpose for this decade, the next generation of technology, and beyond. Redesigning the NEM is a monumental challenge – building a regulatory system on shifting technology sands with powerful vested interests at every turn will require huge amounts of fortitude and a heavy dose of political buy in across State, Federal and political party lines. We may look back and mark the statements this month from the new head of AEMO, Daniel Westerman, that the grid needs to be able to run 100% renewables by 2025, as the beginning of the seismic structural change required.

Engaging all stakeholders in this process will be crucial to achieving a NEM which is fit for purpose for the long term. What the "new NEM" needs to look like is quite clear and building broad consensus around how to achieve it will be important. However, it will be more important to resist the influence of vested interests to delay and resist structural change.

The ESB's option paper released in April and the public statements from the ESB upon the delivery of its final advice to the Energy National Cabinet Reform Committee are consistent with a redesign of the NEM.

However, media reports in relation to the final advice and statements from the Federal Energy Minister suggest the progression of the broad reforms required have been put aside in favour of the short-term propping up of old failing technology via a capacity payment mechanism. Such a mechanism ignores the inherent and ever-increasing unreliability of old coal-fire generators. It steals from the future by living in the past.

Electricity capacity markets are inherently inefficient and are being abandoned around the world. A capacity market would be a significant step backwards for the NEM, not the giant leap forward required to develop a NEM fit for the future.

Similarly, the proposed congestion management model (or COGATI 2.0) is an abstract economic modelling thinktank thought-bubble experiment looking for a problem. The practical frailties and counterproductive signalling to the investment of congestion taxing resulted in the first iteration being dismissed. Reviving the COGATI ghost under the guise of the promotion of Renewable Energy Zones denies the reality that the future is a decentralized generation system.

The future NEM requires better and more transmission infrastructure – unsurprising given the lack of investment in transmission over the last 30 years. Someone should work out where more electricity transmission infrastructure is needed and develop a plan to build it in an integrated way addressing the greatest need first. An integrated system plan is what we need – hang on, didn't we do that? Why don't we just get on with building the ISP 2020?

A new NEM is crucial to unlocking the massive private investment eager to invest in energy storage and dispatchable renewables. Legislative support, regulatory certainty, and a transmission system fit for a distributed energy future is critical to the smooth transition to the inevitable future of baseload renewables… ■

Matt Baumgurtel
Partner – Head of New Energy

David O'Carroll
Associate - Energy, Infrastructure and Resources

Watt's happened?

Veno Panicker spoke at the 2021 Integrated Project Engineering Congress on *"Avoiding a repeat of post GFC mistakes in major infrastructure projects"*

Matt Baumgurtel featured in which-50 Minicast on *"The emerging world of energy as a service"*

Matt Baumgurtel featured on Boardroom Media's Around the Markets Segment discussing *"Energy as a service"*

Matt Baumgurtel featured in Inframation discussing the reality of the Australian renewables M&A market

Watt's new?

Hamilton Locke

New starters

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Corporate M&A and Private Equity
Sydney

AFR recognises Hamilton Locke as Australia's fastest growing legal partnership

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Matt Baumgurtel appointed to Market Advisory Panel of Business Renewables Centre Australia

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Hamilton Locke Launches Brisbane Office
Hamilton Locke is pleased to announce the launch of our Brisbane office, as featured in Lawyers Weekly, with corporate partner, Peter Williams and insolvency and litigation partner, Mark Schneider joining as foundation partners of our Brisbane presence.

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Halo Group

Halo Group Acquires Leading Regulatory and Compliance Firm, The Fold Legal

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AFR features HALO Group's intention to list on the ASX

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Watt's new?

World

NSW government to invest additional $380 million in funding for renewable energy zones in NSW as part of 2021-22 budget

House Standing Committee on Environment and Energy holds first hearing on 23 June 2021 for its inquiry into dispatchable generation and storage capability in Australia

SA Government inviting national and international expressions of interest to develop land at Port Bonython in the Upper Spencer Gulf, one of SA's most prospective hydrogen export hubs

Interesting times await regarding the upcoming AGL demerger – owners of renewable energy assets will be encouraged to test the market after the valuation and acquisition of Tilt Renewables. It is reasonable to consider that NewAGL (AGL Australia) may be an attractive take-over target for the right buyer

The newly appointed CEO of AEMO has announced that he wants Australia's main grids to be able to handle periods of 100% renewable energy penetration by 2025. This ambitious target will require a multi-faceted approach including stabilising the increasing penetration of solar and wind with dispatchable technologies (eg big batteries) to plug gaps in peak-usage periods

AEMC draft determination in relation to the integration of energy storage into the NEM - the single largest reform to the NEM since the NEM was created over 20 years ago. We unpack the implication in our 3 part series here

The Energy Security Board released its Post 2025 Market Design advice to Government on 28 July 2021. The leaked advice outlines a number of reforms which are likely to stymie deployment of renewable energy projects and energy storage projects.

Watt's next?

Connecting Green Hydrogen APAC Conference on 11-13 October, 2021:
Matt Baumgurtel will be moderating the panel '*Green Hydrogen: Accelerate Production and Use of Renewable Hydrogen*' and will be speaking on the panel '*Exploring Opportunities for Hydrogen Export & Industry Supply*'

5th Solar Energy Future Australia Conference 2021 on 11-13 October, 2021 in Melbourne: Matt Baumgurtel will be speaking on the panel *'Key Considerations when going into a Corporate PPA in Australia'*

The upcoming Summer months are likely to see even more negative pricing events. Following AEMC's recent determination on negative pricing, generators await how AEMO will use its new power in the coming months. See our analysis and predictions here

Renewable hydrogen (in particular green hydrogen) as the focus of our next quarterly

Ammonia Energy Conference 2021 on 25 - 27 August 2021:
Matt Baumgurtel will be speaking on innovation and R&D in the ammonia value chain

The Dawn of Dispatchable Renewables

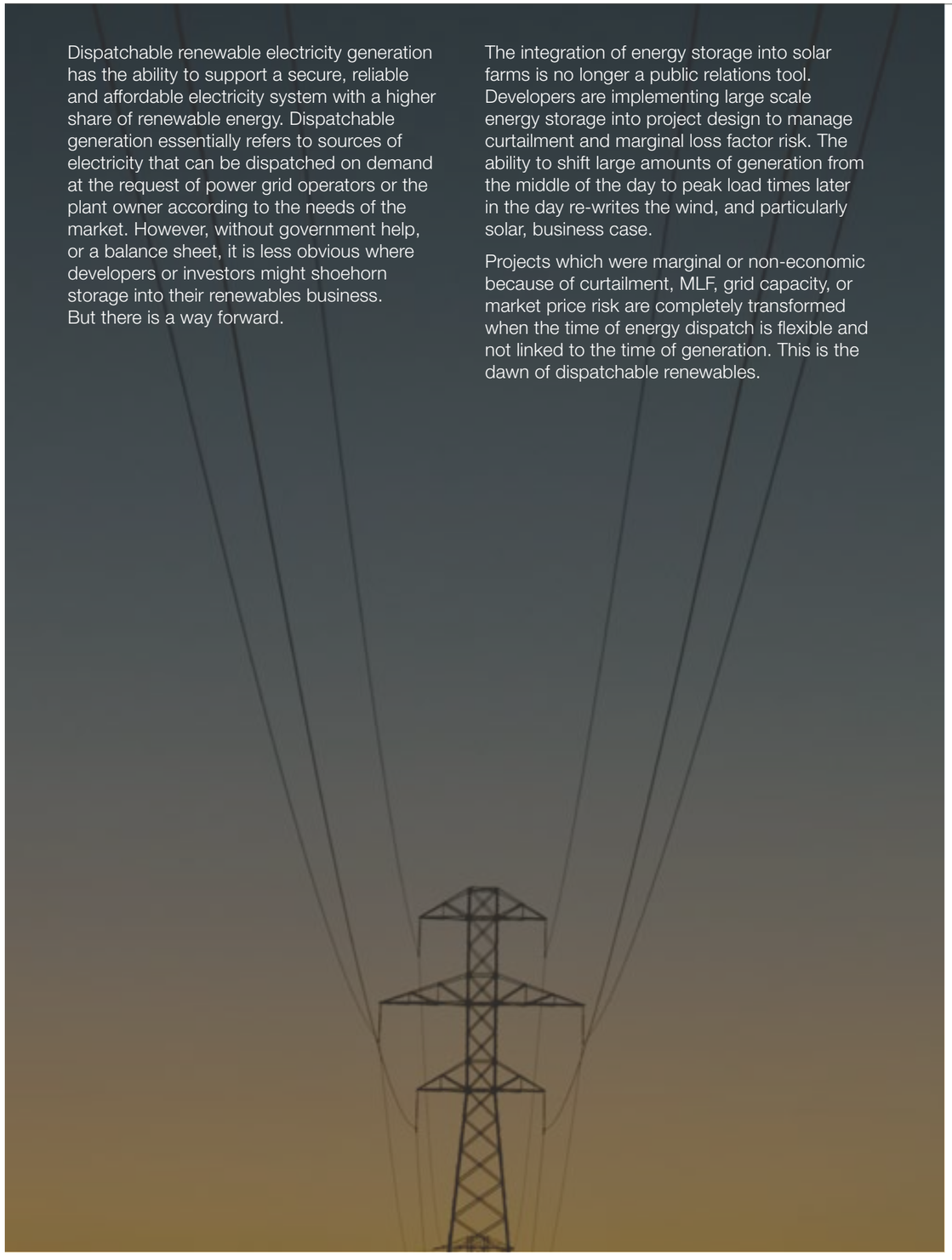
Authors:
Matt Baumgurtel and David O'Carroll

First published:
25 March 2021

Dispatchable renewable electricity generation has the ability to support a secure, reliable and affordable electricity system with a higher share of renewable energy. Dispatchable generation essentially refers to sources of electricity that can be dispatched on demand at the request of power grid operators or the plant owner according to the needs of the market. However, without government help, or a balance sheet, it is less obvious where developers or investors might shoehorn storage into their renewables business. But there is a way forward.

The integration of energy storage into solar farms is no longer a public relations tool. Developers are implementing large scale energy storage into project design to manage curtailment and marginal loss factor risk. The ability to shift large amounts of generation from the middle of the day to peak load times later in the day re-writes the wind, and particularly solar, business case.

Projects which were marginal or non-economic because of curtailment, MLF, grid capacity, or market price risk are completely transformed when the time of energy dispatch is flexible and not linked to the time of generation. This is the dawn of dispatchable renewables.



Pull factors

But this is only the "push factor", the "pull factor" is even more critical. Offtakers are looking for firmed green power. The types of offtakers in question are the big US technology firms, who are heavily committed to reducing their emissions and increasingly active in writing Australian power purchase agreements. When presented with a choice of renewables offtake firmed from the grid or energy storage charged from known renewable generation (ie behind the meter BESS), they are choosing the green firmed option despite the significant price difference.

There appears to be a strong impetus to be the first truly 100% green energy user, not merely buying wind or solar MWhs equal to consumption on an annual basis which ignores when that energy is consumed. While nothing has been announced on this yet, we have seen term sheets which reflect this.

New offtaker market

The rise of dispatchable renewables is also expected to open up a whole new offtaker market.

Corporates, governments and even community groups with smaller inflexible load profiles will be able to buy renewable energy directly from generators with the confidence that the time (and hence price) when the electricity is dispatched into the grid matches the time they are consuming electricity from the grid. This "load following generation" removes the inherent risk of entering into a financial contract (PPA) referenced to electricity prices at the time of generation in the hope that profits from that contract will offset the cost of electricity they consume at a different time of day.

At its simplest, advances in energy storage technology and reductions in cost are allowing renewable energy generators to produce a product that their customers want – electricity at the time of day they need it. Ultimately this will give these electricity consumers a lot more confidence to contract for a much larger percentage of their total load, conceivably up to 100%. This leads to the obvious question from both electricity consumers and generators – why can't the generator be the supplier (retailer) of electricity? – and hence we are seeing the birth of the "miniGentailer".

Energy storage is also supercharging the "sub 5MWac" market (those projects which have a connection capacity below 5MWac). The oversizing of the MWdc capacity and incorporation of BESS to store the "excess" energy allows projects to be sized to match the more modest annual MHh consumption of some corporates. These projects can be constructed and generating within a matter of weeks (12 weeks is common) with the single offtaker often being given naming rights adding to the appeal. These projects are often progressed on a portfolio basis (5 – 10 separate sites) to create economies of scale in equipment procurement, construction, and financing.

As coal fired generators retire and are replaced with cheaper renewable energy and Australia moves to a low carbon future the resolution of the 'energy trilemma' – energy which is affordable, sustainable and reliable – will be critical to a smooth, just and efficient low carbon transition.

While all roads lead to dispatchable renewables, partnering with advisors with depth and breadth of renewables market experience who provide innovative commercial legal solutions will be critical to navigating a constantly evolving environment. ■

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Committee inquiry into the need and potential for dispatchable generation and storage capability in Australia

Authors:
Matt Baumgurtel and David O'Carroll
First published:
08 April 2021

Update: On 23 June 2021, the Committee held the first public hearing for its inquiry into dispatchable energy generation and storage capability in Australia. It heard from AEMO and from the Department of Infrastructure, Science, Energy and Resources about the policy framework and settings for Australia's dispatchable energy future.

At the time of writing, a report of the hearing has not yet been published. We look forward to its publication and will issue an update as soon as this becomes available.

Following on from our recent article on the need for and rise of dispatchable renewable electricity generation in Australia (see: The Dawn of Dispatchable Renewables), we are pleased to see that on 24 March 2021, the House Standing Committee on the Environment and Energy has resolved to inquire into the current circumstances, and the future need and potential for dispatchable energy generation and storage capability in Australia.

The Committee is accepting written submissions, addressing one or more of the terms of reference to be received by Friday 7 May 2021. The terms of reference listed are:

a. current and future needs;

b. issues related to system integration, connection, and grid transmission requirements;

c. existing, new and emerging technologies;

d. comparative efficiency, cost, timeliness of development and delivery, and other features of various technologies;

e. applications to various scales and forms of end-use such as households, industry, and transport;

f. Australia's research and innovation development framework and policies;

g. opportunities for Australia to grow and export dispatchable zero-emission power; and

h. other relevant matters, including reference to international examples.

We at Hamilton Locke are engaged with our clients in relation to this inquiry and we will be assisting in preparing submissions to the Committee in the coming weeks. We are also very interested to hear from other stakeholders in the sector on any of the items raised above. Please get in touch with our Energy, Infrastructure and Resources lead, Matt Baumgurtel, should you wish to discuss. ■

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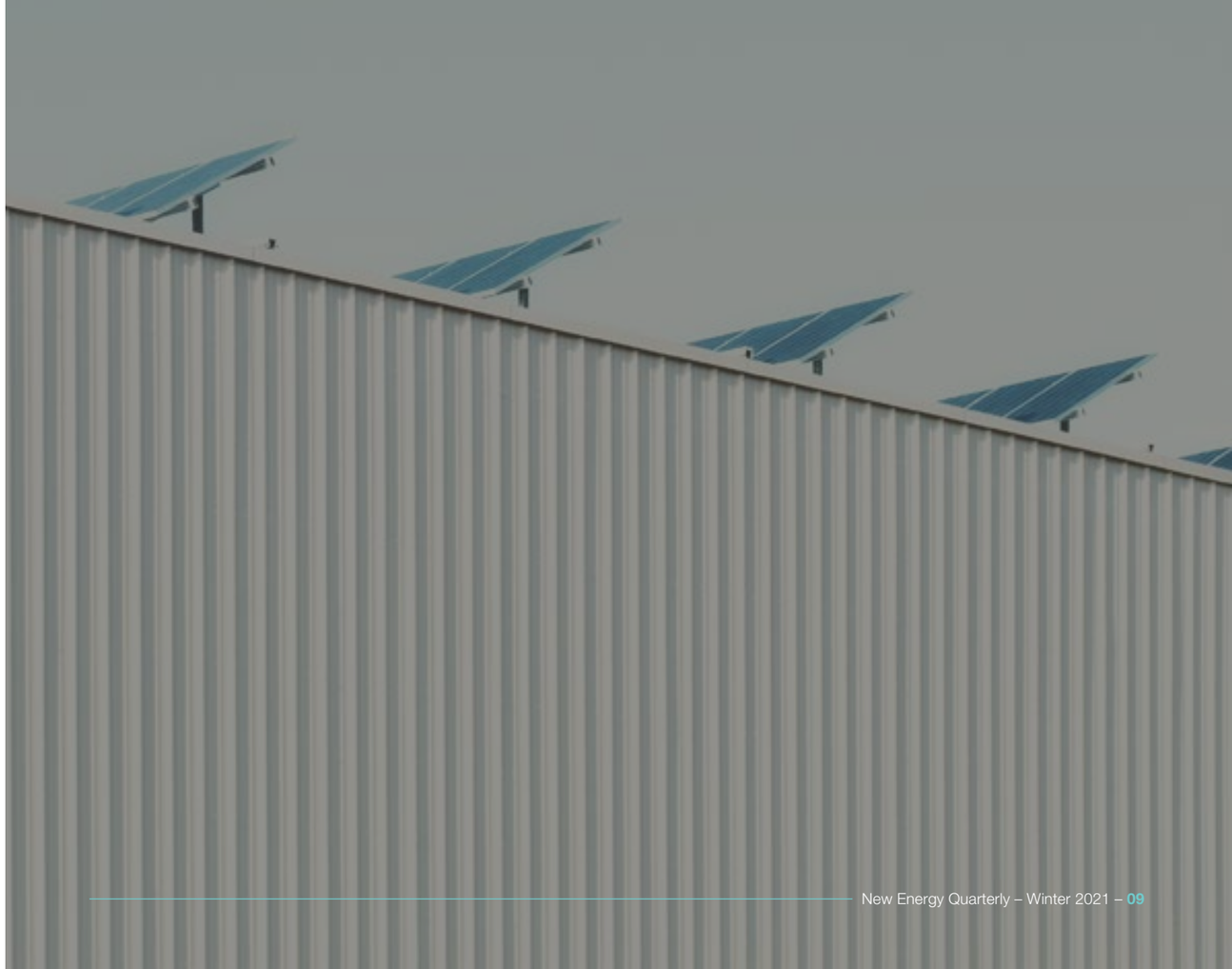

Dispatchable renewables – how bright is the future?

Authors:
Matt Baumgurtel and David O'Carroll

First published:
08 April 2021

Update: We note the news that AGL Energy will be partnering with Australian solar technology firm RayGen to deploy concentrating solar and energy storage technologies at Liddell. The project will be a further example of renewable energy supplies being paired with long-term energy storage facilities, by building a 3MW/50Mwh 'solar hydro' facility alongside a 4MW concentrating solar PV project, providing up to 17-hours of dispatchable storage.

Furthermore, we welcome the recent report by the Clean Energy Council (Battery Storage: The New, Clean Peaker) which finds that large-scale battery storage is now a better choice than gas for electricity peaking services, based on cost, flexibility, services to the network and emissions. The CEC states that, whilst the future applications of batteries have almost unlimited potential, gas projects come with several inherent risks, such as the price of gas, which has a significant impact on the economic feasibility of gas-fired peaking services. In contrast, batteries have higher availability due to the requirement for less maintenance and can offer guaranteed fixed power and energy for over 20 years. The CEC's analysis shows that "battery storage is the true bridge to a clean energy future and can become the new flexible peaker to accelerate Australia's transition to sustainable energy".

Finally, we note the recent announcement by Daniel Westerman, the new CEO of AEMO, settling an ambitious target for Australia to lead the rest of the world with a grid ready to handle 100 per cent of renewables by 2025. To do this, it is clear that not only will stronger transmission infrastructure be required, but so to will dispatchable technologies (ie big batteries) so that the intermittency of solar and wind generation can be stabilized to provide electricity to the grid when required.

In the first article in this series (see link), we discussed the need for and rise of dispatchable renewable electricity generation in Australia, highlighting that in recent years there has been a marked shift from baseload coal balanced by open cycle gas turbines and hydro, to increasing levels of variable renewable energy generation (**VRE**) balanced by dispatchable renewable generation.

But this transition is and will not be without its challenges and the oft cited "energy trilemma" of having an energy system that is secure, affordable and reliable still rings true. Here, we consider these challenges and some of the proposed solutions and opportunities.

Security

If the fundamental opportunity for renewables is their abundance and relatively widespread occurrence, the challenge is applying these to meet demand given their variable nature over the long-term. This for the most part means the availability of large-scale electricity storage. Battery storage systems are emerging as one of the key solutions to effectively integrate high shares of solar and wind renewables in power systems worldwide. In Australia, battery storage for renewable energy is increasingly being used in a variety of designs, sizing and locations for the main purposes of load shifting and supporting the stability of the grid. Batteries are also now being included more and more in project planning as mitigation against future storage costs, penalties or to account for future legislative or market requirements.

Cost

A fundamental question when considering whether the long-term goal of net zero emissions will be achievable is whether the technology needed for dispatchable generation will be cheap enough. If so, in theory enough of it can be added to the grid to absorb just about any fluctuations.

In general, costs are likely to continue to fall for all renewable energy technologies in correlation with their growth in global deployment. This should improve the competitive position of dispatchable renewables compared to other forms of energy such as gas. Readily achievable growth rates (around 25% per year) in dispatchable renewables could keep pace with coal retirements and enable an orderly transition to a large share of renewable energy.

In the solar space, the falling costs of essential equipment such as panels, tracking systems and smart inverters are resulting in generators adding more panels to produce more power in times of lower sunlight and curtailing their output during peak times. Coupled with this, the cost of batteries is also decreasing rapidly as the global and Australian supply scales up.

A variety of technological options should provide solutions for different demand profiles and can contribute to minimizing the overall system cost. Ultimately, policy decisions on electricity market design will decide which degree of dispatchability is required and rewarded. As the system value for short and long term storage is not the same, revenues from these segments might also be different and yet, technologies to serve both segments will be needed and as such, should be supported.

Reliability

The main market objective is and will continue to be overall reliability, ie providing electrical power when it is most needed. This is the issue that will require the greatest long-term planning and investment. Some dispatchable generators are more flexible (ie faster in response) than others. Consistent renewable energy sources such as bioenergy and geothermal are inherently dispatchable, while VRE inputs such as solar or wind energy can be converted to dispatchable generation when combined with a form of energy storage (such as batteries, pumped hydro or hydrogen).

To be reliable and secure, a high penetration renewable power system will need to make use of a blend of dispatchable and VRE technologies with a mix of different technologies, durations and locations.

As referenced above, it is therefore important that energy policy is technology neutral and the services that are required to support system reliability and security are appropriately defined and valued.

Other factors

Government policy and incentives will largely dictate the growth and uptake in alternative means of electricity generation and storage. As recently as last week, we noted the House Standing Committee on the Environment and Energy's inquiry into the current circumstances and future need and potential for dispatchable energy generation and storage capability in Australia (see link to bulletin).

Support in the form of grant funding will be critical in the formative stages of this market, as it was in the early years of large scale solar. Absent ARENA and CEFC funding of early Moree, Nygan and Broken Hill solar farms as path finder projects the multi-billion dollar Australian solar market would arguably not exist (see "*Insights from the First Wave of Large-Scale Solar Projects in Australia*" (ARENA report, January 2020)).

To be reliable and secure, a high penetration renewable power system will need to make use of a blend of dispatchable and VRE technologies with a mix of different technologies, durations and locations.

In the current landscape, CEFC's Dispatchable Power Program which is designed to complement grant funding offers for emerging technologies is available to support contracted, partially-contracted and uncontracted projects and it is expected that large-scale battery projects will meet CEFC's investment criteria eligible for finance, with such projects being assessed on a case-by-case basis. In NSW, the $75 million NSW Emerging Energy program has allocated funding into capital projects and pre-investment studies streams to support activities that accelerate the development of on-demand, electricity projects and as of the date of this article, grants have been awarded to five capital projects with a combined capacity of 220MW and nine investigative projects with the potential to deliver 2,700MW. We at Hamilton Locke are actively assisting our clients in relation to these programs.

Equally critical – and which will assist in unlocking the tidal wave of private investment eager to invest in energy storage - is legislative support and regulatory certainty both in terms of the orderly retirement of existing coal generation and the market in which dispatchable renewables will operate over the long term.

Looking ahead, the retirement of coal generators will inevitably require alternative energy supply technologies to fill the gap left behind. Effective dispatchable renewable electricity generation is currently mooted as one of the key solutions to this as renewables become more controllable and affordable. While the ultimate solution will likely require a holistic approach using multiple energy sources and technologies, having a high volume of renewable energy in the system that is dispatchable on demand would appear to be an essential part of this approach. The future is likely dominated by dispatchable renewables. ■

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Let's tax the COVID vaccine...

Authors:
Veno Panicker and Andrew Elias

First published:
14 April 2021

Update: On 12 August, AEMC delivered its final decision on the rule change. Owners of rooftop solar homes may be able to export their excess power without facing additional charges under a "basic export service", but can expect to pay their electricity retailers for paid plans to avoid curtailment and to access the best feed-in-tariffs. The fall out from the introduction of the Solar Tax remains to be seen, however, it is clear that it will continue to cause controversy across the industry.

Who will pay to upgrade the grid?

The need to upgrade if not over-haul much of the electricity network across Australia is not a new problem – and is a problem measured in billions.

We reported on 12 April 2021 on the Australian Energy Market Commission's (**AEMC**) announcement to review plans to upgrade electricity networks – a decision which will be a barrier to operators financing their network projects.

A recent draft determination from AEMC floated the equivalent of a charge for home owners that export to the grid during busy periods – to assist in funding the grid upgrade.

In effect, this is a tax for consumers that have invested in roof top solar for their homes. We consider this the energy equivalent of a tax on the COVID vaccine.

We understand that the grid needs funding in the billions to meet future demand – this is not a cost which should be borne by those home owners that have already invested in solar panels to minimise their energy costs.

Of concern for the industry as a whole, such a tax is reflective of a government seeking to offset costs to anyone they can palm it too. The reality is government at Federal and State levels have dropped the ball for decades in the management and upkeep of the grid.

What is the Solar Tax?

On 25 March 2021, AEMC issued a draft determination outlining its strategy to deal with the integration of small-scale solar energy into the electricity grid.

To break this down further, AEMC floated the idea that electricity grids should offer what's called a 'two-way pricing system'. The two-way pricing system operates so that solar and battery owners1:

1. are rewarded for exporting power to the grid when it is needed; and
2. are charged for exporting power to the grid when it is busy.

We will refer to this two-way pricing system as a 'Solar Tax' throughout this article.

So how does AEMC propose the Solar Tax be calculated?

How will the Solar Tax be calculated?

AEMC has justified this draft determination on the basis that currently, the energy sector is suffering a 'traffic jam' problem with large volumes of excess electricity being exported to electricity grids.

AEMC's draft determination provided three different methods when modelling the impact of the Solar Tax2:

- a flat export charge - $0.00-0.02/kWh;
- a time-of-use (TOU) export charge - $0.00-0.02/kWh; and
- a max export capacity - $2.93-29.31/kW.

Submissions were made on the effectiveness of the three pricing methods by various industry players including MEU, ARENA and the Clean Energy Council. So what was the basis for AEMC's Solar Tax?

A long-term solution or a band-aid to patch a more systemic problem in the energy sector?

Underlying what appears to be a 'quick' and 'cheap' solution to this problem is a more systemic issue rooted by the failures of successive governments to ensure adequate infrastructure and electricity grids to store the increasing electricity supply by mum and dad solar panel owners.

In the early 2000s, the Australian Government introduced a renewable program which provided rebates to Australian households who acquired solar photovoltaic (PV) energy systems.

This program was very effective and successful with over 20% of Australian households having rooftop solar PV systems, which is a rate that is among the highest in the world3. Households which produced excess solar energy would then typically receive a credit for the excess solar energy which is then exported back to the electricity grid. The credit amount will vary between each electricity retailer.

With such a significant uptake by Australian households of rooftop solar PV systems, it would be logical to then consider implementing sound policies that look to ensure that projects commence to expand the existing electricity grid infrastructure to withstand the exponential increase in supply of electricity.

There's just a couple of problems:

1. the electricity networks are considered to be natural monopolies and unlike other industries, the electricity networks do not compete and drive to lower costs and invest in adequate infrastructure; and
2. there is a lack of political will in both sides of government to implement sound policies for the development and renewal of infrastructure and in most cases, projects that are government funded are late, over budget and poorly managed.

To drill the point home, this is analogous to government approving 1,000 units in a low-density suburb without approving any policies for the upgrading of roads in that suburb, inevitably leading to traffic congestion… then taxing each person living in that suburb a tax for using their cars during busy periods of the day.

If this is absurd, then why don't we consider the existing Solar Tax absurd?

Way forward

The energy market is constantly changing, improving and innovating at a rapid pace and as a result there is no real 'quick fix' to the problems faced. The Government at Federal and/or state levels must lead by example and implement sound policies to incentivise the upgrade and expansion of infrastructure in the energy market, particularly electricity grids.

At best this 'Solar Tax' is poor policy which will cost home owners and make very little impact to the upgrade of the grid – a problem orders of magnitude greater than such a tax will yield.

What's next – a tax on the COVID Vaccine? It makes about as much sense. ■

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Negative prices – what you gon' do when they come for you...

Authors:
Matt Baumgurtel and David O'Carroll

First published:
08 April 2021

A recent determination of the Australian Energy Market Commission (**AEMC**) amending the National Electricity Rules may have negative consequences for solar and wind generators who have Power Purchase Agreements (**PPAs**) that don't settle when prices are negative.

Semi-scheduled generators such as wind and solar farms, now face increased exposure to negative price risk as they will not be permitted to simply turn down generation when the spot price falls below zero.

The rule change effectively limits a semi-scheduled generator's ability to not export electricity during times of negative spot prices, i.e. adjust their output without an updated dispatch instruction from the Australian Energy Market Operator (**AEMO**) or without a valid rebid.

Many wind and solar PPAs provide that the financial "swap" of a fixed electricity price for the floating spot price only occur (or settle) when the spot price is positive, i.e. above $0. This agreement was often required by offtakers as a way to manage their financial exposure under the PPA. The positions essentially sets a maximum downside per MWh the offtaker must pay the generator.

Many generators accepted the "negative price risk" on the basis that they would not be paid under the PPA for generation when the spot price was negative, however they assumed they could reduce generation at these times so they would not be exposed to the negative price.

The rule change now requires semi-scheduled generators to comply with the MW dispatch level specified by AEMO during all dispatch intervals and observe a cap in generation during semi-dispatch intervals. Under previous arrangements, there was no explicit restrictions on semi-scheduled generators deviating below the nominated dispatch levels in order to reduce their exposure to negative prices.

The rule change is aimed at curbing the practices of some semi-scheduled generators deviating significantly from their dispatch targets instructed by AEMO by curtailing export in response to negative price fluctuations, i.e. managing the negative price risk.

As a result of the change, a semi-scheduled generator will be deemed to have complied with a dispatch level if it only varies from the dispatch level as a result of energy source availability, and in the case of a semi-dispatch interval, if it does not exceed the dispatch level, regardless of the energy source availability.

The rule change is aimed at curbing the practices of some semi-scheduled generators deviating significantly from their dispatch targets instructed by AEMO by curtailing export in response to negative price fluctuations, i.e. managing the negative price risk.

AEMC considered that negative price curtailment by semi-scheduled generators without rebidding or waiting for an updated dispatch target materially impacts AEMO's ability to maintain power system security. That may be true, however requiring semi-scheduled generators to essentially operate as scheduled generators imposes a large revenue risk on renewable generators – a risk that they (and their financiers) could not have reasonably anticipated.

The amendments action one of the Energy Security Board's (**ESB**) recommendations for interim security measures which are designed to improve system security and market efficiency. The intention is that these will also assist in improving AEMO's price and dispatch forecast accuracy. These are admirable goals, however, imposing additional revenue risk on renewable generators which could not have been anticipated at the time the project was committed, together with the constant uncertainty of MLF, curtailment etc create yet more regulatory uncertainty for investors.

What now?

Generators need to start preparing now for what they will do when negative prices next arise. For instance, generators should consider whether their existing dispatch procedures remain fit for purpose, particularly automatic dispatch systems that automatically reduce generation in response to a forecast negative price period.

We know generators are also carefully considering the change in law provisions of their PPAs. Provisions that were included to deal with COGATI, the NEG, or the myriad of other policy thought bubbles from regulators and government over the last 5 years are now being considered in the context of this latest rule change. The challenge in most change of law provisions will be that this rule change does not affect the project per se, rather it affects the business model of the project.

What's next?

Revisions to PPAs currently being negotiated are being vigorously debated by offtakers and generators. It is unlikely that offtakers will accept negative price exposure and hence it will likely be up to the generators to manage the risk the best they can, and price the residual risk into the PPA price. However, with negative prices likely to become more common before they become less common, renewable generators who can best mitigate and manage this risk will have a significant competitive advantage.

Parties currently negotiating PPAs are carefully watching and waiting to see how this rule change will be administered by AEMO – creating yet more uncertainty and hence delay in closing agreements and progressing project investment, financing, construction and ultimately new renewable energy generation.

With almost monthly announcements of coal generator retirements being brought forward, and the frailty of ageing coal generators on show every time they fail in hot weather, perhaps regulators should focus on encouraging cheap reliable, predictable, renewable electricity generation firmed by energy storage technology – this is what is going to keep the lights on in 5 years, and after all that is the whole point right? ■

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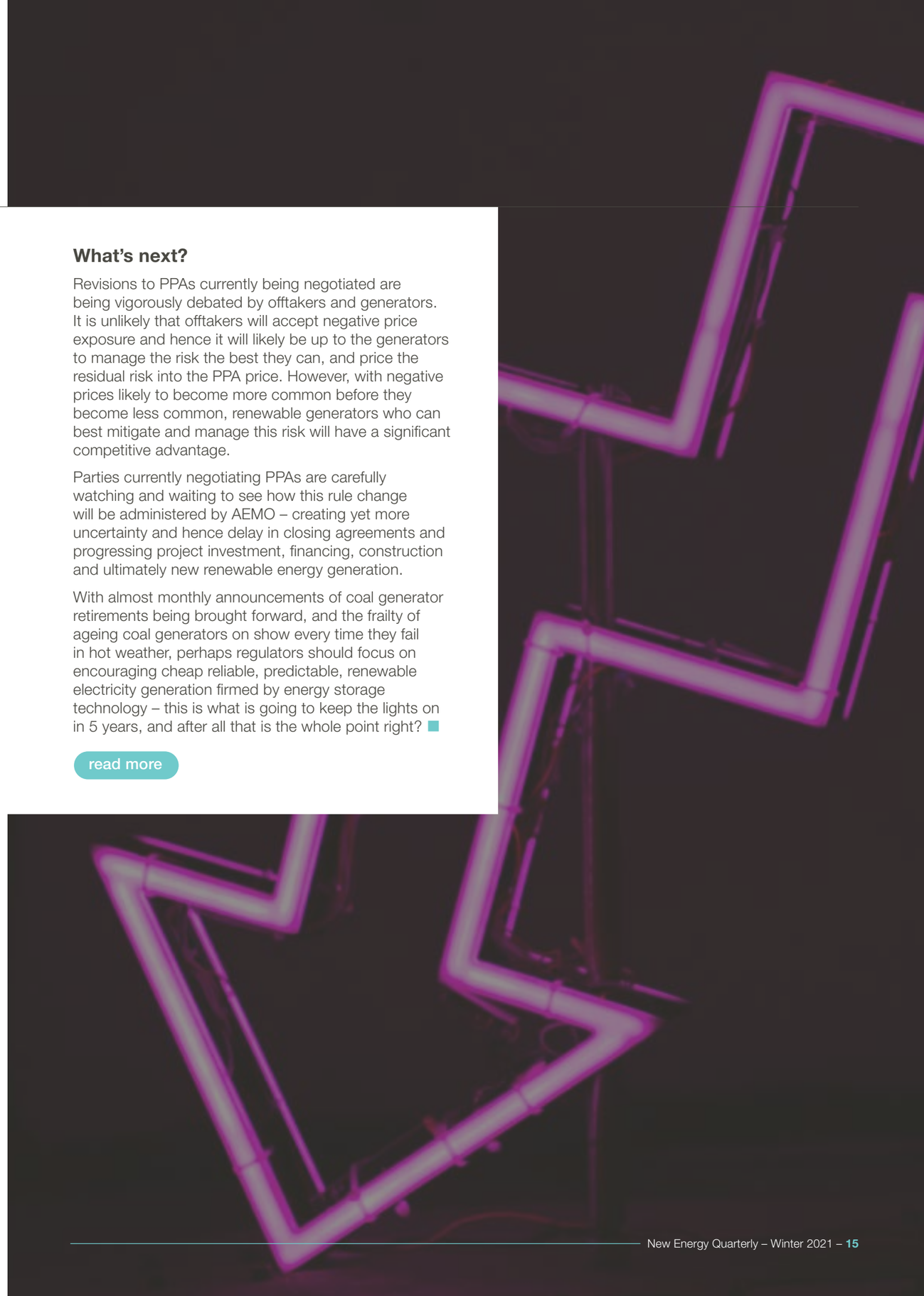


Battery industry given renewed charge

Authors:
Matt Baumgurtel and David O'Carroll
First published:
04 May 2021

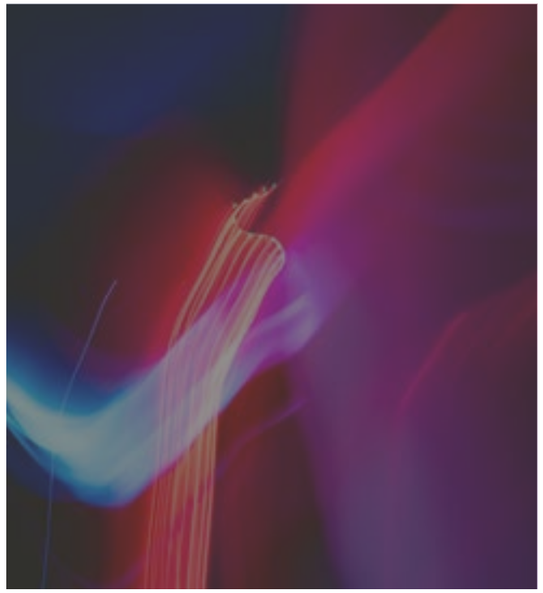
The battery storage industry in renewables has been given a major shot in the arm by the recent announcement of the Australian Energy Market Commission (**AEMC**) of rule changes that will incentivise renewable generators who use technology that dispatches electricity quickly to respond to changes in grid frequency.

The draft ruling published on 22 April 2021 proposes the introduction of new market ancillary services in the NEM to allow the Australian Energy Market Operator (**AEMO**) to procure fast frequency response to help control grid frequency following sudden and unplanned generation or power system outages. The aim of these services will be to lower the overall cost of frequency control ancillary services (**FCAS**) relative to expected future costs.

This has come about as a result of a rule change request proposed by Infigen Energy to introduce spot-market arrangements for fast frequency response to help efficiently manage system frequency. These new FCAS will be similar to existing services but would operate much more quickly to address the high rates of change of frequency in the system, which have come in part due to the increasing uptake of inverter-based generation in the NEM such as wind and solar PV and demand-side resources.

The introduction of these "very fast" FCAS would respond to changes in frequency in less than two seconds, rather than six seconds, which is the current fastest market. The intention is that this will make the system more economically efficient by reducing the overall costs of managing power system frequency compared to current arrangements or other arrangements to produce different types of frequency response. The draft ruling also envisages that these new spot markets will drive innovation in the provision of various combinations of essential system services from different technologies.

It is also proposed that arrangements for these new services would be the same as those for existing services, including arrangements for registration, scheduling, dispatch, pricing, settlement and cost allocation.



The announcement of the draft ruling is in keeping with AEMO's desire to ensure system security, ie the availability of dispatchable electricity generation to respond to fluctuations in the grid. As we have highlighted in previous articles on the topic (see here and here), the ability of battery storage technologies to respond at relatively lightning speeds to meet grid demand, the continued increase globally in their use and the steady decrease in costs are all factors which the AEMC has recognised in promoting this form of technology through the proposed rule changes.

The introduction of these new ancillary services is to be welcomed as it equates to regulatory support for dispatchable renewable electricity generation which is targeted to play a fundamental role in replacing retiring coal generators over the coming years. Fast frequency response will be essential in keeping the grid stable as we move towards a high volume of renewable electricity in the grid. ■

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Redesign of the NEM beginning to take shape

Authors:
Matt Baumgurtel and David O'Carroll
First published:
06 May 2021

Update: Energy Ministers met on 11 June 2021 as part of the Energy National Cabinet Reform Committee. They noted the Energy Security Board's (ESB) work to deliver the Post-2025 Market Design program, with final recommendations to be delivered in the following months.

We also note that there has been increasing criticism of the ESB's NEM reforms by key industry players (such as leading renewable energy developer, Neoen) as being 'rushed' and 'unquantified.' As flagged in our original article as an area of key concern, criticisms have largely focused on the proposed new mechanism – the physical retailer reliability obligation (PRRO) - for propping up the revenue of old coal generators.

On 30 April 2021, the Energy Security Board (**ESB**) released a shortlist of options for the redesign of the National Electricity Market (**NEM**).

Following consultation with industry and government, the options under consideration have been narrowed since the release of the ESB's "post 2025 market redesign directions paper" published in January 2021. The ESB has stated that the options provided are to address four critical areas:

1. preparing for old coal retirement by facilitating the timely entry of new generation, storage and firming capacity and an orderly retirement of ageing thermal generation;
2. backing up power system security by ensuring measures are in place to manage more variable renewable energy without AEMO intervention;
3. unlocking benefits for all energy consumers of recent changes including solar PV, batteries and smart appliances; and
4. opening the grid to cheaper large-scale renewables by putting generation and transmission together to minimize the costs of transformation.

One of the notable options put forward is to require electricity retailers – both big and small – to pay the owners of dispatchable generators to guarantee future capacity to support the grid in times of peak demand. This would include buying electricity from old coal generators, essentially providing them with a steady revenue stream into the future which would incentivise them to remain open. If this option is to be adopted and implemented, one would question how this is going to assist with Australia's climate change commitments. Indeed, it is hard to see how this option would be anything other than regressive.

A final round of consultation with stakeholders is taking place – with submissions closing on 9 June 2021 - prior to the ESB providing advice to the Energy National Cabinet Reform Committee by mid-2021. The full picture of the new NEM will likely then become a lot clearer. ■

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Big Boost for Batteries in the Redesigned NEM

Authors:
Matt Baumgurtel and David O'Carroll

AEMC's recent proposed rules changes are designed to facilitate and financially incentivise battery storage system owners in the National Electricity Market (**NEM**). But will these reforms have the desired effect?

As highlighted in our recent bulletin on the topic, the first of these reforms comes via a draft plan designed to better integrate energy storage technologies in the NEM and to make it easier for small batteries to earn extra income and to reduce the logistic hurdles large batteries have in participating in the NEM.

Included in this is the introduction of a new registration category, the Integrated Resource Provider (**IRP**), which will allow storage and hybrids to register and participate in a single registration category rather than under two separate categories. The intention is that market participants with batteries will no longer need to register twice to draw energy from the grid and send it out and that additional revenues will be unlocked for home and business battery owners by participating in new aggregation services provided by new aggregator businesses.

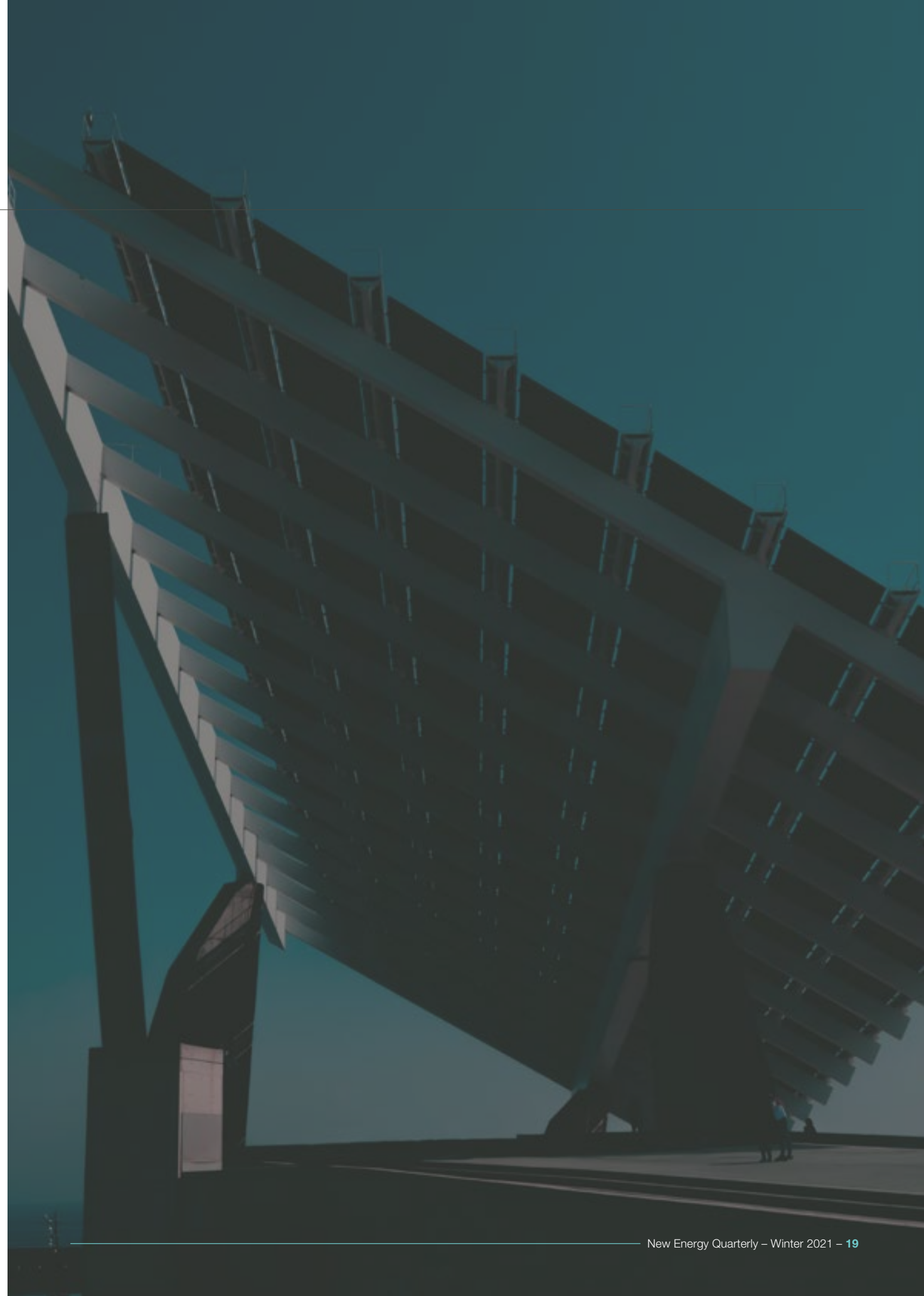
AEMC has also amended the framework to recover non-energy costs based on a participant's consumed and sent out energy, irrespective of the participant category in which it is registered. Consumed and sent out energy will be measured separately for all market participants and not netted at the connection point. Non-energy cost recovery would be based on a participant's gross energy flows, i.e. gross consumed energy (**ACE**) or exported energy (**ASOE**) during relevant intervals, rather than the category a participant is registered in. According to AEMC this change supports the principle that the costs of providing these services to support the power system should be funded by those who benefit from them.

Commencing in October 2023, the other major AEMC reform will create new markets for Fast Frequency Response (**FFR**) to financially reward ultra-fast energy providers who deliver energy to the grid in just one to two seconds to stabilise system frequency. This will operate similar to the existing arrangements for frequency control ancillary services, providing an additional frequency control option with the aim of reducing the overall cost of managing power system frequency.

These additional services are all the more necessary as the transition takes place from a system with centralised coal and gas-fired thermal generation to a system with a diverse portfolio of inverter based energy sources. With this transition, there will be much less inertia in the system which was previously provided by large spinning coal-fired generators. At lower levels of operating inertia, faster and/or more frequency control services will be required to stabilise the system frequency within the existing system operating standards.

The introduction of FFR services is to be welcomed for system security but should also incentivise an uptake in dispatchable technology ownership by providing an income stream for batteries, aggregators and hybrid businesses and other fast responders that are able to rapidly respond to fluctuations in grid frequency. Not only will the new ancillary services provide certainty to the market that sufficient resources are available, but they will also provide clear price and investment signals to new resources.

As always, the proof will be in the pudding but in principle these reforms are a big step in the right direction and should foster innovation by promoting technologies that will keep the future electricity system secure as the energy system transitions to one with a high concentration of variable renewable technologies. ■



Slowly Slowly for Very Fast Batteries – but Regulations still Playing Catch-up

Authors:
Matt Baumgurtel and David O'Carroll

First published:
27 July 2021

What are the changes?

Commencing in October 2023, two new "very fast" frequency control market ancillary services will be introduced under the existing ancillary services arrangements.

The new Fast Frequency Response (**FFR**) services are a clear recognition of the value to the power system of ultra-fast response (1 – 2 second) frequency control services and is implicit recognition of the value of battery energy storage systems (**BESS**) in the NEM.

The introduction of these new markets is a clear signal to industry (and particularly those developers and owners contemplating developing standalone BESS or incorporating of BESS in their renewable projects) that there will be a market for the capabilities of their BESS system.

The FFR services market will operate similar to the existing arrangements for frequency control ancillary services, providing an additional contingency frequency control option to AEMO when managing power system frequency, ie it will be up to AEMO to choose to procure the new Fast Frequency Response services over existing "slow" Frequency Control Ancillary Services (**FCAS**).

The introduction of this change is consistent with the Energy Security Board (**ESB**) post-2025 market design work, in particular the development of faster frequency response markets.

Importantly, the FFR reforms are intended to operate separately to continuous primary frequency control obligations (**PFR**). While AEMC continues to consider changes to PFR, the Commission has provided a window into their thinking by pointing to droop controls as a way generators can manage their PFR requirements. However, as any generator with older inverter connected assets knows, droop control is perhaps not as easy as AEMO and AEMC think.

What does this mean for existing and planned BESS projects?

BESS projects that are currently or anticipate providing system services will be able to access this market to sell this service. Project owners and those parties who have or are considering contracting their BESS capacity should consider who has the contractual right to participate in this new market. It is usual that all BESS capabilities and markets (including future markets and capabilities) at all times of year are included with the "rights" provided to BESS offtakers – usually referred to as "whole of capacity". However, parties should consider whether the FFR market is captured in contracts which are not "whole of capacity".

Why are the changes required?

FFR services will become increasingly necessary as the anticipated retirement of coal-fired generation will reduce the amount of synchronous inertia[1] in the power system over the coming years.

The transition to inverter connected generation including large scale solar PV, wind power, batteries and behind-the-meter distributed resources like rooftop solar will result in corresponding lower levels of operating inertia.

As inverter connected generators do not provide the synchronous inertia required to manage contingency events (such as the sudden and unexpected failure of a large generating unit or loss of a large transmission asset), additional frequency control will be required. FFR services will provide additional support by responding within 1 – 2 seconds to stabilise system frequency – the FFR market will respond to this requirement.

As well as providing additional system security, the introduction of FFR services will likely encourage new dispatchable technology by providing an income stream for batteries, aggregators and hybrid businesses and other fast responders that are able to rapidly respond to fluctuations in grid frequency. Not only will the new ancillary services provide certainty to the market that sufficient resources are available, but they will also provide clear price and investment signals to new resources.

Will the creation of a FFR market encourage BESS and integrated generation + BESS?

AEMC suggests the FFR services market is designed to facilitate and financially incentivise energy storage in the NEM, and hence encourage BESS and generation + BESS into the market.

Aggregated energy generators will benefit due to the distributed nature of their resource across the network and the relatively low marginal cost of providing the service (given the primary driver of installing behind the meter generation and BESS is to reduce on-grid consumption).

However, the largest benefit will likely be to large scale renewable generators who will be able to monetise BESS capability in addition to controlling the time of day they export (discharge) energy in the grid.

Lost opportunity or just the first step

New BESS have a response time in hundredths if not thousandths of a second. By setting the response time for FFR at 1 – 2 seconds the benefits of this "ultra fast" response capability are not captured. It is conceivable that a future "ultra fast frequency response" market could be developed in order to capture this capability. However in the short term we suggest further refinement of the FFR market to incorporate both price and response time be considered as part of AEMO's revision of the Market Ancillary Services Specification (MASS) which is due by 19 December 2022.

Delaying the implementation to October 2023 of what is essentially an incremental addition to the existing FCAS market appears to miss an opportunity to fast track BESS projects currently under development. If the FFR market was operational within 12 months, even if at low volumes given the current limited number of BESS systems that could provide services to the FFR market, this would give BESS developers a window into how the market will operate, in particular price and how AEMO will access the market. ■

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1. The instantaneous physical response of conventional generators, which act to overcome the imbalance of supply and demand by changing the rotational speed and the electrical frequency.

The Integrated Resource Provider is born...

Authors:
Matt Baumgurtel and David O'Carroll

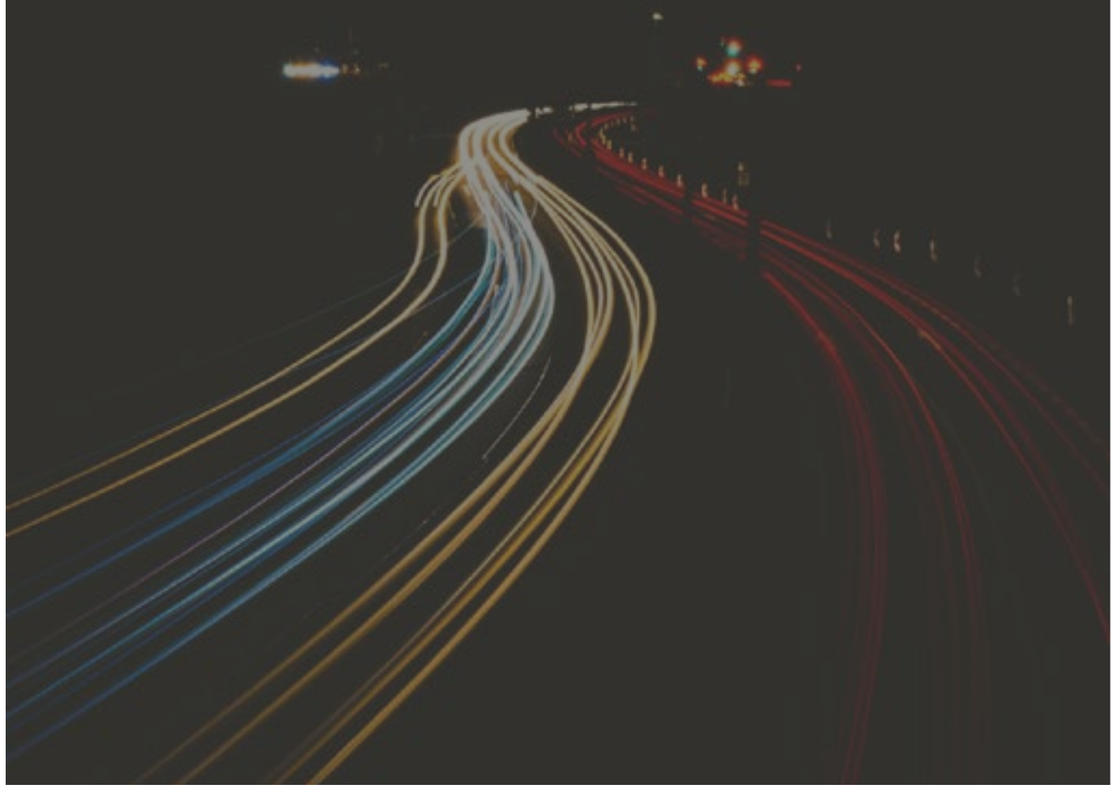
First published:
09 August 2021

Almost 2 years after being proposed by AEMO, AEMC has released its much-anticipated draft determination to address current and anticipated impediments to the integration of energy storage and hybrid (generation + energy storage) in the electricity network. These reforms are arguably the most significant change to the market since the NEM was created.

Key to this is the creation of a new market participant category – the integrated resource provider (**IRP**). An IRP is intended to capture market participants with bi-directional energy flows, ie that both export (discharge) and import (charge) energy, can choose when those flows occur (are dispatchable) and have the capacity to offer grid stability services (FCAS etc). This will include energy storage, hybrids (renewables + BESS) and virtual power plants (ie aggregators of small generation and storage units – usually rooftop solar on homes and businesses). These generation assets will have a new classification – the Integrated Resource Unit (IRU).

In this context the changes are a clear recognition of what is universally acknowledged – that the National Electricity Rules (**NER**) are no longer fit for purpose. The NER were written for a much simpler world, where a dozen or so centralised coal fired power stations ran day and night sending electricity into our homes and businesses. Those coal fired power stations and the entire electricity system (generation, transmission and retail) was government owned (not for long however) and the retail cost of electricity was essentially government subsidised from the coal mine to the light switch. The NEM is a very different place now and will evolve to be unrecognisable from today's market over the next decade.

In creating the IRP, AEMC is catching up to address the rapid deployment of BESS in the NEM. The changes also simplify how aggregators of small generation and storage units register and participate in the market and propose "net metering" when determining non-energy costs to be paid by grid scale energy storage



systems. Broadly speaking, these are logical, sensible (and obvious) changes to fix the current limitations, inefficiencies and inappropriate outcomes in relation to energy storage and hybrid systems which result from the current rules. As such, they address the change that is already here – the significant growth in energy storage, hybrids and virtual power plants in the NEM.

As new (renewables) replaces old (coal) electricity generation, new and different market dynamics and opportunities have and will continue to arise. Industry has and will continue to respond to these new dynamics and the proposed rule changes will remove barriers and encourage more energy storage, hybrids and virtual power plants to enter the market to meet the resulting opportunities.

What about the ESB's p2025?

The proposed rules changes are in line with the Energy Security Board's (**ESB**) Post 2025 market design work, specifically the design of the NER to accommodate new business models, bi-directional energy flows and the increasing importance of distributed energy resources. The IRP category and IRU classification are further progress in a move away from defining specific technologies and assets towards a technology-neutral approach that attaches obligations to services and activities.

A key objective of the ESB's work is to promote a two-sided market design in which both demand and generation participants respond to price based on their cost preferences and technical obligations are placed on services, not participant categories. A two-sided market promotes a "trader-service model" where all commercial participants are able to deliver services to customers irrespective of registration category.

AEMC suggests that the IRP category could become the universal category as outlined through the ESB's two-sided market work. However, given the wholesale changes to the NER likely required to implement the ESB's Post 2025 market design work it is almost certain the IRP category will need to be revisited in the not-too-distant future to implement the ESB's work.

The ESB has delivered its final advice which has been widely leaked across media and industry stakeholders.

Statements from the Federal Energy Minister suggest the broad market reforms required will be put aside in favour of the short-term propping up of old failing technology via a capacity payment mechanism. Such a mechanism ignores the inherent and ever-increasing unreliability of old coal-fire generators. It steals from the future by living in the past.

Electricity capacity markets are inherently inefficient and are being abandoned around the world. A capacity market would be a significant step backwards for the NEM, not the giant leap forward required to develop a NEM fit for the future.

Similarly, the proposed congestion management model (or **COGATI 2.0**) is an abstract economic modeling thinktank thought bubble experiment looking for a problem. The practical frailties and counterproductive signalling to investment of congestion taxing resulted in the first iteration being dismissed. Reviving the COGATI ghost under the guise of the promotion of Renewable Energy Zones denies reality that the future is a decentralized generation system.

We will be further considering the impact of the AEMC draft determination and the ESB's final advice in upcoming New Energy Insights and the winter edition of New Energy Quarterly. ■

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The Integrated Resource Provider, VPPs and the DC coupled future

Authors:
Matt Baumgurtel and David O'Carroll

First published:
11 August 2021

This article is the second in our three-part series considering AEMC's much-anticipated draft determination to address current and anticipated impediments to the integration of energy storage and hybrid (generation + energy storage) in the electricity network.

These reforms are arguably the most significant change to the market since the NEM was created.

The centre piece of this reform is the creation of a new registration category of integrated resource provider (**IRP**).

Who is (and do you want to be) an IRP?

If you are or will be providing storage or hybrid energy services with a capacity of more than 5MW you will be required to register as an IRP and energy storage units will be classified under a new classification category, the integrated resource unit (**IRU**).

This includes existing participants currently registered as both a market customer and market generator in relation to the same facility. The timing, process and cost of re-registering is unclear however we expect the transition period will be relatively short given the final rule determination is anticipated for October this year with implementation 18 months later in April 2023.

Participants who are not required to re-register as an IRP may choose to do so. This will be particularly relevant for existing and planned small scale aggregation businesses (less than 5MW) as registration as an IRP will provide access to the energy and ancillary services markets (and resulting revenues).

Aggregators win, and VPPs boom

Allowing aggregated small-scale generation and storage to participate in the ancillary services market will provide a significant boost to the household and commercial & industrial (**C&I**) rooftop sections of the market. For C&I focused businesses this will provide an additional potentially significant revenue line in addition to the behind the meter PPA with the owner or tenant of the premises. Also removing the retailers' entitlement to place blanket bans on customers who own their rooftop and solar battery to send their solar generation back to the grid, should enhance household participation in the electricity market and lead to a reduction in consumer power bills.

We should see a competitive market for household battery capacity develop. This will likely manifest in two ways:

1. "all in one solution" where the aggregator installs rooftop PV and BESS in return for the customer signing a PPA for a much larger proportion of their energy consumption and the aggregator owning any excess generation and storage capacity which they can sell in the wholesale market. This will likely provide yet another incentive for these aggregators to obtain retailer licences; and
2. for households who own their rooftop solar and battery, a market to contract that generation and capacity to an aggregator and reduce solar waste. Again, we can see retailers offering "free" network access (ie paying not passing on the network charges to the customer) in return for control of the customer's battery and the customer only paying for energy consumption above the daily roof generation. Alternatively, customers' will be able to opt into a paid plan, allowing them to earn more money at times and less at other times for their solar generation.

Behind the meter BESS also facilitates retail demand side management – which has struggled for traction due to our expectation that electricity will be available whenever we want it. All of this points to exponential growth in virtual power plants, and corresponding challenges for network operators.

Another significant reform, is the additional powers given to the Australian Energy Regulator (**AER**) to develop a governance framework in relation to how retailers should provide export services to customers and how the must report back to the AER. All network plans will need to be signed off by the AER to ensure the plans are in the long term best interests of the consumer.

Controlling rooftop solar generation to balance the electricity system has and continues to be a significant challenge for AEMO. It would appear to be more than a happy coincidence that the development of a strong aggregation market will assist AEMO control this extremely disparate, widely distributed, increasingly dispatchable (via the increased adoption of energy storage) bidirectional generation in the context of a market designed and a network built for centralised one-way generation.

Some big decisions yet to come on DC coupling

The future of renewables is dispatchable – if anyone needed convincing then the proposed IRP category should put it beyond doubt.

The deployment of BESS as part of new renewable generation projects and the retrofitting of BESS on operating renewable generators to manage grid risks has in large part driven (if not forced) the creation of the IRP category.

How quickly the future arrives for the NEM will in large part be set by how DC coupled systems are treated. Either they are encouraged to facilitate the future and promote deployment of existing and new BESS technologies, or obligations, restrictions and costs are imposed making the NEM less attractive to the global developers of these technologies.

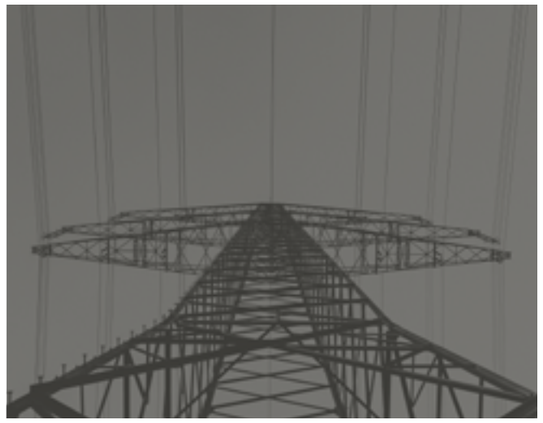
Buried in section G at page 145 of the draft determination is perhaps the most important part of the draft determination for the long-term future of the NEM – how DC coupled grid scale hybrid facilities will be registered, regulated and dispatched.

AEMO's view is well known to anyone who has registered DC coupled systems – they are scheduled generators (despite the NER not exactly saying that). The scars from forcing the square peg of a DC coupled system into the round hole of the NER are worn by those that have tried (irrespective of success) as a badge of honour. However it should not, and must not, be that hard.

DC coupled systems are the future of electricity generation – they will provide dispatchable renewable energy which will keep the lights on day and night for our children's children.

AEMC has not come to a definitive view as to how to classify and therefore regulate these generators and is seeking further feedback. The decision can be boiled down to the easy road and the hard road.

It will be easy to designate a DC coupled system as either scheduled or semi-scheduled based upon some arbitrary criteria in relation to the size, response, resource etc. However, this will likely discourage DC coupled systems that would be classified as scheduled generators, and hence stymy deployment of large DC coupled generators.



The hard road is a variable (dynamic) system where the obligations of DC coupled systems switch between scheduled and semi-scheduled based on the constraints and availability of the respective system. This would allow the maximum use of the capabilities of these systems to the benefit of both system owners, the grid, and the market.

AEMC's draft decision is to allow proponents of DC coupled systems the ability to choose from four different classifications once registered as an IRP, being:

1. a non-scheduled IRU (only for systems under 5 MW);
2. a scheduled IRU;
3. a semi-scheduled generating unit; and
4. separately as a scheduled IRU and a semi-scheduled generating unit, which would be treated as two separate units for dispatch purposes.

The outcome from AEMC's consultation will be critical to the deployment of DC coupled systems in the NEM and we are currently working with developers of DC coupled systems to provide feedback to AEMC on this proposal.

In our third and final article in this series, we consider how these reforms will be incorporated into the redesign of the NEM and what that future landscape might look like. ■

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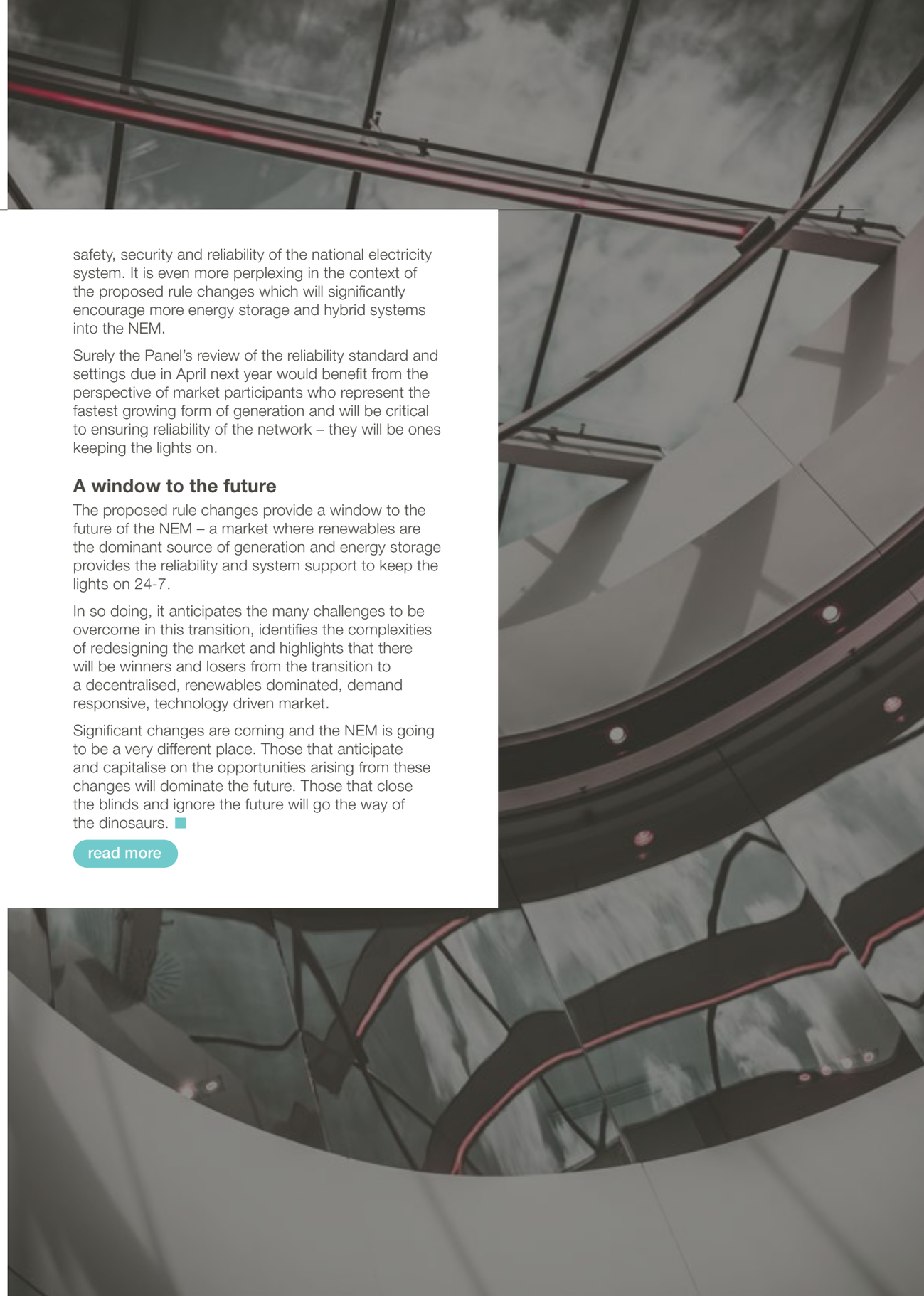
The Integrated Resource Provider – A Window to the Future

Authors:
Matt Baumgurtel and David O'Carroll

First published:
13 August 2021



In this, the third part of our three-part series considering the proposed introduction of the new integrated resource provider (**IRP**) category in the National Electricity Market (**NEM**), we take a holistic view of this seismic change to the market.

We consider how this change will shift the landscape of the NEM over the medium and long term, how participants will need to adapt and evolve to survive, and the opportunities available to those that react quicky and decisively.

Standalone energy storage gets (a little) easier

Registration for battery energy storage systems (**BESS**) and hybrid systems in the NEM will be much easier. Instead of being required to register as both a market customer and market generator, a single registration as an IRP will be required and a new classification category of integrated resource unit (**IRU**) created to classify energy storage.

When participating in dispatch, a single bid instead of two separate bids (one from each registration category) will be required.

Registration as an IRP also removes (in all but extraordinary circumstances or at enormous scale) the risk that the Retailer Reliability Obligation will be imposed on an energy storage system as energy consumed and exported will be netted and hence the risk net consumption will exceed 10GWh in a year is very low.

However, the bankablity of the arbitrage play will remain difficult (absent significant "offtake capacity" contracts to underwrite cashflows). The arbitrage market will arguably be capped as the amount of intermittent generation (ie solar and wind without BESS) stops growing and may even reduce as those project add BESS in order to avoid generating during low market prices.

Demand for market services such as Frequency Control Ancillary Services (**FCAS**) created by these generators will also reduce as they add BESS and internalise the cost of managing the quality of their generation. Increased unreliability of failing coal fired generators will provide some demand until those generators retire. We are seeing the owners of large coal-fired generators contract the capacity of large batteries or develop and own their own batteries as a hedge against the forecast cost of the ever-increasing unreliability of their coal fired generators.

The end of system charges based on net energy?

In the draft determination AEMC proposes a significant change to the way non-energy costs are determined which will change who currently pays and is paid for providing system support services.

Instead of net energy consumed, non-energy cost recovery would be based on a participant's gross energy flows, ie gross consumed or exported energy during relevant intervals rather than the category a participant is registered in.

Consumed and sent out energy will be measured separately and not netted at the connection point, or among connection points. Importantly energy that is both produced and consumed behind a connection point will not be included for the purposes of calculating non-energy costs, for example, rooftop solar production that is consumed behind the meter will not be included.

The new calculation is in part facilitated by the additional data which will be measured as part of the implementation of the Global Settlement & Market Reconciliation rule in May next year.

This change is another recognition that the National Electricity Rules were designed for single direction energy flows where the amount of energy a participant consumes or generates is a good proxy for the system costs of that generation or consumption. The bi-directional energy flow inherent in energy storage means that proxy is no longer valid. The change will further encourage generators to manage their demand for non-energy services through actively managing their generation. In particular, it further supports the business case for installing relatively small capacity BESS as part of any renewable energy generator in order to manage demand for non-energy services (and avoid being charged for those services).

No seat at the table

AEMO has chosen not to ensure energy storage and hybrid system representation on AEMC's Reliably Panel (**Panel**). The Panel is charged with monitoring, reviewing and reporting on the safety, security and reliability of the national electricity system and advises AEMC in this regard.

Given this purpose and the importance energy storage and hybrid systems will play in the future of the NEM it is difficult to reconcile how the perspective of energy storage and hybrid system owners is not relevant to safety, security and reliability of the national electricity system. It is even more perplexing in the context of the proposed rule changes which will significantly encourage more energy storage and hybrid systems into the NEM.

Surely the Panel's review of the reliability standard and settings due in April next year would benefit from the perspective of market participants who represent the fastest growing form of generation and will be critical to ensuring reliability of the network – they will be ones keeping the lights on.

A window to the future

The proposed rule changes provide a window to the future of the NEM – a market where renewables are the dominant source of generation and energy storage provides the reliability and system support to keep the lights on 24-7.

In so doing, it anticipates the many challenges to be overcome in this transition, identifies the complexities of redesigning the market and highlights that there will be winners and losers from the transition to a decentralised, renewables dominated, demand responsive, technology driven market.

Significant changes are coming and the NEM is going to be a very different place. Those that anticipate and capitalise on the opportunities arising from these changes will dominate the future. Those that close the blinds and ignore the future will go the way of the dinosaurs. ■

read more

Consultation Paper on the Design and Structure of Long Term Energy Service Agreements Awarded Under the Electricity Infrastructure Roadmap

Authors:
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First published:
12 August 2021

On 9 August 2021, the Department of Planning, Industry and Environment released a consultation paper outlining the proposed design concepts and structural elements of long term energy service agreements (**LTSEA**).

The Department is accepting written submissions, addressing one or more of the key terms and conditions, and the design structure in general, of the proposed long term energy service agreements by 10 September 2021. The proposed types of LTSEAs are as follows:

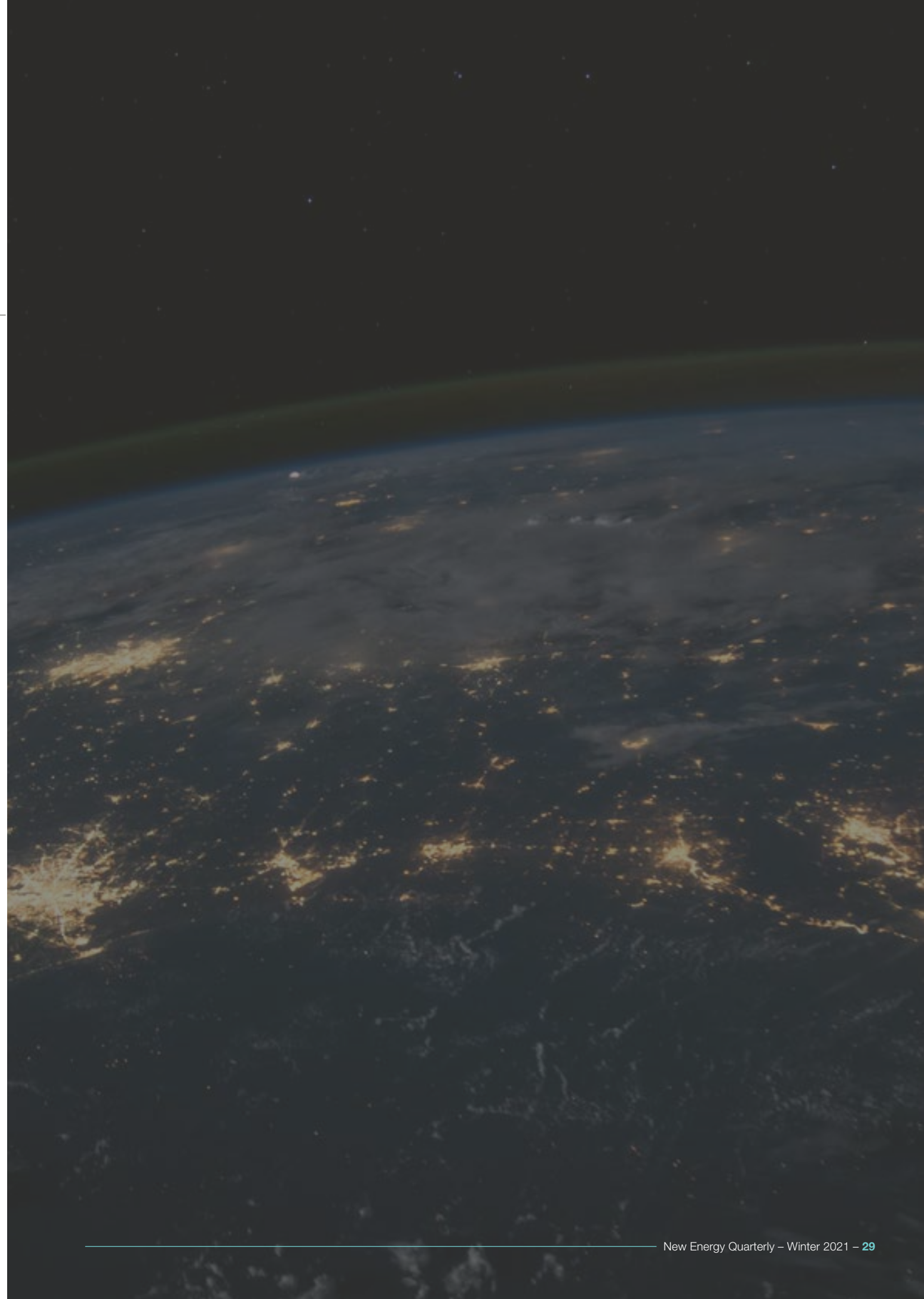
a. Generation;
b. Long duration storage.

The terms and conditions for each proposed LTSEA are discussed broadly under the following two categories:

a. Price terms – the structural and commercial features that directly impact the calculation of settlement cashflows such as the derivative put option structure, fixed price, option length, repayment mechanism, and contract volume and shape;
b. Legal and project terms – terms that impact the weighted average cost of capital, risk allocation and project development such as pre-financial close interim milestones, conditions precedent, sunset dates, bonding, sharing of project cost reductions and change in law.

The Department is also keen to hear views on key considerations on the firming LTESA design which is not considered in detail in the Consultation Paper.

We at Hamilton Locke are already engaged with our clients in relation to this inquiry and we will be assisting in preparing submissions to the Department in the coming weeks. We are also very interested to hear from other stakeholders in the sector on any of the items raised above. Please get in touch with our Energy, Infrastructure and Resources lead, Matt Baumgurtel, should you wish to discuss. ■



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Matt has over 17 years' experience, particularly focused in the energy sector. Matt approaches his work with a one firm, one team philosophy. He strives to deliver creative solutions in all of his representations, providing proactive ways to add value to client's businesses and to help achieve successful outcomes.

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.

Prior to joining Hamilton Locke, Matt was a partner and co-lead of the energy, infrastructure and resources group at K&L Gates. He was also previously the General Counsel at Fotowatio Renewable Ventures (FRV) for eight years. Prior to this, he worked for a number of leading global and national law firms, including Gilbert + Tobin and Clifford Chance.

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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. Through his collaborative, perceptive and diligent approach, David strives to provide meaningful counsel to find the best outcome for complex problems.

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).

Prior to joining Hamilton Locke, David was a lawyer with Arthur Cox in Dublin, as well as with Ashurst in Sydney.

David is admitted in Ireland and not admitted in Australia.

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