The year in review

Membership year – April 2022 to March 2023

1. Introduction

The outlook for wind energy can only be regarded as exceptional. There are an unprecedented number of wind farms under construction and an exciting pipeline of development activity for both onshore and offshore wind.

Of particular note is that the Climate Change Commission [1] and Transpower [2] forecast Wind Energy meeting up to 28% of total demand with a capacity of around 6,500 MW by 2050. Clearly the industry is looking at a sustained build programme to support decarbonising of the energy sector.

This scale of required electricity infrastructure development is unparalleled in New Zealand's history and a key challenge in meeting such a large growth forecast will be ensuring policies across the energy sector, climate change and environmental domains align to support new build activity.

The wind industry itself also needs to position the sector to support the projected growth with a pipeline of consented projects ready to be built as demand increases. The sector does face significant challenges with uncertainty over whether the final form of resource management system reforms will be enabling and a global environment with accelerating demand that faces both labour and material shortages and cost increases. Due to these increased demand headwinds and supply chain challenges, the OEM's are consolidating their operations and are becoming selective with the projects that are likely to deliver the healthiest forecast margins. New Zealand developers will therefore be competing with a growing list of international projects.

2. The Outlook for New Wind Activity in NZ

Post the wind farm consenting boom period from 2000 and initial growth phase, it took until 2019 for the supply and demand balance to be such that the next development, Mercury's Turitea Wind Farm, was confirmed for construction.

Since then Tilt has built and commissioned Waipipi (133 MW), Mercury has completed the Turitea North development (119 MW), Meridian has commenced building Harapaki (176 MW) and Mercury is progressing completion of Turitea South (103 MW) and has commenced building Kaiwera Downs phase 1 (43 MW). Phase 2 of Kaiwera Downes would increase the capacity of the wind farm to 240 MW.

Post the completion of projects under construction total wind capacity will have increased from 690 MW in 2019 to 1,265 MW with wind's share of total generation increasing from around 6% to over 10%.

MainPower is expecting to reach financial close in the near future on Mt Cass (93 MW). Hiringa Energy and Balance Agri-Nutrients have had their fast-track consent approval for the 24 MW Kapuni

[1] Climate Change Commission, 2021 Final Advice, May 2021.

[2] Transpower, Whakamana I Te Mauri Hiko Report, March 2020.

Wind Farm challenged by Greenpeace which has significantly delayed the project. Mercury has obtained a consent for its proposed Northland Kaiwaikawe Wind Farm (73 MW) and NZ Wind Farms has had approval to use the fast-track consent process for their proposed repowering of Te Rere Hau (an increase of 85MW).

A consent application has been lodged for the Kaimai Wind Farm (168 MW) and Ventus Energy is also seeking a variation to its resource consent for Taumatatotara wind farm to install larger turbines and increase capacity to 48 MW. Genesis has announced it is seeking an extension for its Castle Hill Wind Farm consent to 2031 albeit at a smaller capacity of around 300 MW.

Meridian has announced it is proposing developing a 90 MW wind farm at Mt Munroe. Contact Energy has announced an accelerated focus on wind development with a pipeline of 600 MW. Similarly Manawa Energy has advised of its intention to focus on wind and solar development with a 500 MW build programme including two potential wind farm locations – 250 MW in Waikato and 78 MW in the South Island.

Several new market entrants including Yinson Renewables are also looking to develop a portfolio of wind assets.

There has also been considerable interest in developing large scale offshore wind, particularly off the South Taranaki coast and Waikato:

- BlueFloat and Elemental Group have announced plans to build a 900 MW wind farm off the South Taranaki Coast and Waikato Offshore Wind farm to be developed in phases to generate capacity of up to 1.4 GW.
- NZ Super Fund and Copenhagen Infrastructure Partners have announced a partnership to build a wind farm in the South Taranaki Bight of up to 1 GW as stage 1 with an option of a second stage for a total capacity of 2 GW.
- Parkwind has set an ambition for 500 MW to 1 GW of offshore operations with South Taranaki of prime interest.
- Oceanex has announced a portfolio of 3 projects – Taranaki A and B of 1 GW each and Waikato of also 1 GW.

The Government has recently consulted on a licensing / regulatory framework for feasibility activity, a key step to support the development of the offshore wind industry.

The development of grid scale solar has also been another area of rapid progress during the year with a significant number of new developments and partnership arrangements announced. While a number of these are unlikely to proceed it is clear that previous forecasts of solar penetration will be exceeded.

The decision of Tiwai Aluminium Smelter to seek an operational extension beyond its current contract end date of December 2024 has significant implications for new build requirements.

The NZ Battery Project has created a level of market uncertainty and it will be important for the Association to keep a close watch on the project's development. The Association supports the need to address the dry year issue and it is still far from clear which public or private sector options will progress.

Wind energy, when coupled with an upward trend in the price of carbon, is widely recognised as having the lowest levelized cost of energy along with solar [3]. Importantly wind generation's ability to support New Zealand's peak winter demand is often underestimated and an important consideration in forecasting expected generation weighted average yields. Over the past three years the quarterly generation profile of wind was 22% quarter 1, 24% quarter 2, 27% quarter 3 and 27% quarter 4 with an increase in the geographical diversity of wind farms expected to reduce short term variability.

The role of renewable electricity generation, and wind energy in particular, in enabling the decarbonisation of the energy sector is unquestioned. The fact that New Zealand has access to a high-quality wind resource presents a significant opportunity for sector growth in support of future economic prosperity. Key will be the timing of Government initiatives to reduce emissions which will stimulate electricity demand growth and the impact of resource management system reforms on the ability to consent new wind farms.

3. Global Trends

New wind installations worldwide increased by 78 GW in 2022 (previous year 94 GW) with total wind capacity now at 906 GW. While a reduction on the previous year 2022 was the wind industry's third-best year.

Onshore wind grew by 69 GW with China contributing 52% of the increase. Falling installations in the US due partly to supply chain constraints and interconnection issues was a key factor in the reduction on 2021 growth.

Offshore wind increased by 8.8 GW to total 64 GW. China also led growth with 5 GW of new installations. Asia-Pacific is now the world's largest offshore wind market. Europe however leads with floating offshore wind with 171 MW installed, equal to 91% of global floating installations.

The Global Wind Energy Council is forecasting a rebound with installations expected to exceed 100 GW in 2023 and a five-year capacity increase of 680 GW.

The forecast uplift in growth rates is primarily due to:

- Europe's renewed urgency to replace fossil fuels.
- A strong uplift in the US due to the Inflation Reduction Act.
- China's aim of having renewables contribute 80% of new electricity consumption.
- Governments' recognition of the potential of offshore wind.
- Strong growth in large emerging markets.

4. NZWEA Strategic Direction

NZWEA's vision is to e*mpower New Zealand's sustainable energy future* with an objective of *wind energy providing 20% of NZ's electricity requirements by 2035*.

The Association's strategy is to focus on three key areas:

- Leveraging New Zealand's emissions reduction imperative to enable the energy transition to renewables, particularly wind energy.

[3] Lazard levelized cost of energy analysis – version 16.0 April 2023.

- Optimising wind energy's position and ensuring the regulatory environment supports wind farm development.
- Expanding the opportunity for wind energy development to enable community and industrial projects including wind's integration with other technologies.

5. Membership

With the positive outlook for renewables NZWEA membership continues to grow. The Association has welcomed a number of new members during the year:

AB Industries	Associate
Buddle Findlay	Associate
Downer NZ	Corporate
Dynamech Limited	Associate
Gen-Net 2019 Limited	Associate
GHD	Associate
Goodman Energy	Associate
RPS Group	Senior Associate
SLR Consulting New Zealand	Senior Associate
Vertical Horizons	Associate
Yinson Renewables	Associate

6. NZWEA Activities

The Association's activities have been targeted at achieving the three key areas of strategic focus and include:

Health and Safety. The Health and Safety Group has continued to share information on safety alerts. The Association also attends the Australian Wind Safety Forum.

Government Relations. The Association has had ongoing engagement with the Minister of Energy and Resources and other Ministers particularly in relation to resource management system reforms and the impact on renewables development. Minister Woods again presented at the 2022 Wind Energy Conference and Stuart Smith, National's Energy and Resources spokesperson participated in a Conference panel discussion. A highlight of engagement has been Minister Woods committing to progressing a licensing / regulatory framework to enable offshore wind development with a discussion document released in December 2022.

Resource Management System Reform. The RM system reform is the highest priority area of focus for NZWEA.

The Government has recognised the significant deficiencies in the National Policy Statement for Renewable Electricity Generation (NPS-REG) and allocated $3 million of funding for a review. NZWEA has participated in workshops organised by MBIE to consider options to strengthen national direction.

Wider resource management system reform continues with the Government releasing the Natural and Built Environments and Spatial Planning Bills in November 2022.

NZWEA, along with other industry participants, is concerned the Bills as drafted will not enable the reconsenting or development of new renewable electricity generation (REG) at sufficient pace to meet decarbonisation targets.

The Association in its submission to the Environment Select Committee sought:

- A National Planning Framework that provides clear direction to all-purpose elements including how to resolve conflicts between environmental limits and systems outcomes.
- Systems outcomes that are equally directive with a more ambitious climate change / greenhouse gas outcome.
- Clarity over transitional provisions.
- Provisions relating to renewable electricity generation also applying to connections to local networks.
- A more defined process for obtaining exemptions (where necessary to meet climate change obligations).
- Distributed generation included in the consent duration exemption.

The Association has also joined major electricity generators in focusing on responding to the resource management reforms and prepared a collective submission to the Environment Select Committee.

NZWEA's and the Electricity Sector's full submissions can be viewed here: https://www.windenergy.org.nz/nbe-and-sp-bills

The Government has indicated it intends to pass the resource management reform legislation in 2023. Key to whether amendments to address industry concerns are progressed, will be viewed in the Select Committees Report.

It also now seems that the review of the NPS-REG will be incorporated in the wider resource management system reforms and the development of the new National Planning Framework.

New Zealand Energy Strategy. The terms of reference for the New Zealand Energy Strategy was released in October 2022 with the following objectives:

- energy affordability and energy equity for consumers.
- our energy system transitions at the pace and scale required to support a net-zero 2050.
- energy supply is secure and reliable, including as we adapt to the effects of climate change and in the face of global shocks.
- our energy system supports economic development and productivity growth aligned with the transition.

The Association's board is engaging with the Ministry of Business Innovation and Employment (MBIE) to understand the work programme and ensure wind energy can contribute to supporting the strategy objectives.

Renewable Energy Zones. Transpower released a Renewable Energy Zones National Consultation in February 2022. The Association supported the concept of renewable energy zones and the

potential benefit to New Zealand from achieving economies of scale from investment in transmission and distribution networks. NZWEA did however note that there are specific challenges in developing REZ's including the timing of major investment among generators.

NZWEA's full submissions can be viewed here: https://www.windenergy.org.nz/activities/submissions/renewable-energy-zones-(rez)-national-consultation-submission

Grid Connection Queue Management System. Transpower released a 'New generator grid connections: proposed grid connections queue management system' consultation document in June 2022. The proposed queue management system was developed to manage an unprecedented increase in the number of grid connection enquiries received.

NZWEA submitted in support of the proposed system noting that the system should reflect the differences in the proposed renewable technology being assessed and that wind energy has a longer and more complex development cycle than some other technologies. The Association also supported an appropriate application fee being charged and an increased level of disclosure of queue level activity.

NZWEA's full submissions can be viewed here: https://www.windenergy.org.nz/activities/submissions/transpower-grid-connection-queue-management-system

National Policy Statement for Indigenous Biodiversity. The Ministry for the Environment released a National Policy Statement for Indigenous Biodiversity – Exposure Draft in June 2022. The Exposure Draft was released to address substantive issues with the March 2020 National Policy Statement for Indigenous Biodiversity.

The Association submitted on both consultations and in respect of the Exposure Draft confirmed overall support in particular the elevation of an effects management hierarchy to a fundamental concept. NZWEA did propose a number of amendments including improving the alignment with Aotearoa New Zealand's climate change framework.

NZWEA's full submissions can be viewed here:

https://www.windenergy.org.nz/activities/submissions/nps-indigenous-biodiversity-exposure-draft

Electricity Authority – Promoting competition in the wholesale market. In November 2022 the Authority released an issues paper – Promoting competition in the wholesale electricity market in the transition toward 100% renewable electricity.

The Issues Paper follows the Authority's Market Monitoring Review of Structure, Conduct and Performance in the Wholesale Market (WMR) from 2019 to mid-2021 which concluded that prices had, at least to some extent, reflected underlying supply and demand conditions but that a sustained upward shift in the average price level was not fully explained, in effect questioning whether the wholesale market is competitive.

The authority also noted that the transition toward 100% renewable electricity may increase market power of generators with storable fuel, especially at those times that the electricity market relies on flexible generation and therefore published the Issues Paper.

NZWEA, in its submission, also referenced the review undertaken by the EA's Market Development Advisory Group and its conclusion that the forecast increase in wind and solar generation will cause more spot price volatility and strengthen the importance of hydro flexibility.

The Association agreed with the EA's view on the high level of market uncertainty and supported the proposed initiatives to promote wholesale competition.

NZWEA's full submissions can be viewed here:
https://www.windenergy.org.nz/promoting-competition-in-the-wholesale-electricity-market

Price Discovery in a Renewables-based Electricity System. The Electricity Authority's Market Development Advisory Group (MDAG) has initiated a project to understand how price discovery would work in the New Zealand wholesale electricity market (including spot and hedge markets) under a 100% renewable electricity system.

An issues discussion paper was published in February 2022 and which the Association provided a submission on:
https://www.windenergy.org.nz/activities/submissions/nzwea-submission-on-price-discovery-under-100-percent-reg

MDAG released a follow up options paper in December 2022 with a third recommendations paper to be prepared.

In its submission NZWEA supported MDAG's assessment as to the importance of the wholesale market to provide spot prices that signal the value of electricity. The Association also supported the proposed five key areas for future action and most of MDAG's preferred recommendations.

In particular the Association considers it important to address the capacity constraints due to the mismatch between slow start thermal and variable wind and solar generation, as identified in the Electricity Authority's Winter 2023 Consultation. Key initiatives supported include improving information, introducing a new reserve product, wholesale market product development and enhancing demand side flexibility capability.

NZWEA's full submissions can be viewed here:

https://www.windenergy.org.nz/price-discovery-in-a-renewables-based-electricity-system

Enabling Investment in Offshore Renewable Energy. MBIE released a Discussion Document in December 2022 on establishing regulatory settings to enable developers to explore the feasibility of offshore renewables development with a further consultation planned for mid-2023 on broader regulatory settings for construction, operations and decommissioning.

NZWEA is submitting in support of the preferred developer-led regulatory approach with feasibility permits issued to approved developers noting this would enable more timely assessments with clearer accountabilities than under a government-led approach.

Department of Conservation. The Association continues to engage with DoC on the Department's climate change work programme and to progress a shared approach to engagement on wind farm development which would include improving consistency and co-ordination in the assessment of wind farm consents.

NZWEA and offshore wind developers have also specifically engaged on the approach to environmental assessment in recognition of the development of a new industry and limited information on wind energy's impact on marine ecology.

Community Wind. The Association continues to support small scale wind development including community developments. NZWEA has promoted the need for Government support with planning and process advice and the need to simplify the resource management consenting process to reduce complexity and cost for small scale wind projects.

Offshore Wind. New Zealand has an internationally recognised offshore wind resource. The quality of the resource has resulted in a number of overseas developers announcing intentions to progress options, four of whom have joined the Association [4].

The area of most interest is off the Taranaki coast where there is also an opportunity to leverage existing skillsets and potentially repurpose oil and gas offshore infrastructure and support an energy transition for the region.

Interest and the pace of development of offshore wind development has accelerated significantly over the year both to meet forecast domestic demand growth and the development of hydrogen technologies.

Membership of the Offshore Wind Working Group has continued to increase and the Group has focused on progressing the regulatory regime, environmental assessments, and a Taranaki transmission study.

The Association held a successful half day Wānanga on enabling offshore wind as part of the 2022 Wind Energy Conference on the 23 August.

Programme details and presentations available here:

https://www.windenergy.org.nz/activities/offshore-wind-w%C4%81nanga-2022

Venture Taranaki and Ara Ake also hosted an Offshore Energy Forum in March 2023 which was well attended.

2022 Wind Energy Conference. The 2022 Conference was held on 24 August. Attendance was an increase on previous years with the venue at capacity and a waiting list to attend in-person.

The Conference theme was *Accelerating the Transformation* in recognition of the gathering momentum around decarbonisation of the energy sector.

Programme details and presentations available here:

https://www.windenergy.org.nz/activities/conference-2022

Training. In recognition of the exceptional outlook for the sector, and the need to support a rapidly increasing workforce, a new industry wide training programme for wind farm technicians has been developed.

The training programme has been designed in conjunction with several members and Connexis to develop technical skills at all levels. Development has been completed on the level 3 and 4 courses which cover electrical, mechanical and hydraulic components of wind farm maintenance and has been registered under the NZQA framework A third level 2 NZ Certificate in Electricity Supply with a strand in understanding wind turbines and systems used is in development.

[4] [4] BlueFloat Energy, Copenhagen Infrastructure Partners / NZ Super Fund, Oceanex Energy and Parkwind NV.

The programme will be launched in Q2 2023 and further information is available of the NZWEA website:
https://www.windenergy.org.nz/industry-training

Renewable Diversity Study. The Association has commissioned a study on the variability of wind and solar to understand how diversity, both in technology type and location, might assist with reducing the inherent intermittency of these generation types.
Key conclusions included:

- Having diversity between different types of variable renewables (i.e. having a mix of wind and solar) materially reduces the extremes of low and high generation.
- Solar's relative lack of generation in winter and early mornings and evenings make it poorly suited for meeting the need for seasonal and peaking generation.
- Wind's average output is well matched to daily and seasonal demand shapes, meaning that, on average, there will be reduced need for additional balancing energy for daily peaks and over winter in a wind-heavy future compared to a solar heavy future.
- Wind's positive correlation with winter hydro inflows means it will often exacerbate the need for dry-year firming energy.
- Having diversity in the geographical spread of renewables will further reduce the extent of extremes of both high and low generation.

The full report can be viewed here:

https://www.windenergy.org.nz/industry-studies

MEUG Renewable Energy Project. The key objective of the Project is to leverage large corporate electricity demand to stimulate early development of renewable energy and enable access to lower-cost renewable electricity.

The Association continues to engage with MEUG to introduce wind developers to the project team.

Members Portal. For the 2022 Conference the Association implemented a members portal and conference system to support registrations and enable debit and credit card payments.

The portal also contains all Association contacts and has the potential to be developed to provide a platform for members to network and connect.

Board. The Board met six times during the 2022 membership year. Activities included reviewing the Association's strategy and submissions. The Board also continued its programme of meeting with industry participants and key stakeholders to develop relationships and share information.

Annual General Meeting. The Association's AGM was held on 26 October 2022. Peter Nunns, Director of Economics at the NZ Infrastructure Commission was our guest speaker on transition challenges with a focus on renewable electricity generation:
https://www.windenergy.org.nz/store/doc/NZWEA-AGM-2022_NZ-Infrastructure-Commission-presentation.pdf

The Association's Chair and CE provided an update on international developments, strategy and NZWEA activities which can be viewed here:

https://www.windenergy.org.nz/store/doc/NZWEA-AGM-2022_Chair-and-CE-presentations.pdf

7. Other Industry Developments the Association is Monitoring

There are a number of other industry developments that are expected to be of importance to the outlook for wind generation which the Association is closely monitoring including:

Emissions Reduction Plan Implementation

In response to The Climate Change Commission's final advice and recommended emissions budgets for the period to 2035 the Government released its first emissions reduction plan (ERP) in May 2022.

The ERP is positive, having a high level of policy synergy with what the Association considers important to support renewables development and transitioning to an electricity system with a higher level of renewable electricity generation.

Many of the actions proposed in the ERP will support the continued development of wind and other renewables, key areas being the electrification of the wider energy sector to stimulate demand growth and actions to better enable renewables development.

There is opportunity for the electricity sector to consider options to accelerate domestic mitigation given there is a projected 100 Mt CO2-e shortfall between what the Plan delivers and Aotearoa New Zealand's NDC commitment to 2030. Key will be the abatement cost of additional domestic initiatives compared to offshore mitigation opportunities.

Emissions Trading Scheme

The ETS is recognised as a key mechanism to encourage decarbonisation. Prices peaked at $87 per tonne in 2021 but have recently fallen due to concerns around the direction of climate change policy following the Government's rejection of Climate Change Commission advice to curtail the number of units auctioned in order to draw down the stockpile of units obtained when the price of carbon was low.

The Government has also recently announced a review of the scheme to place greater emphasis on gross emission reduction. The Association supports this approach and it will be important to continue to submit on consultations.

Tiwai / Southern Green Hydrogen. NZAS has advised its preference for keeping Tiwai operating beyond the existing contract termination date of 31 December 2024 and that the smelter is interested in exploring how it can support security of supply via demand response mechanisms including in dry years.

Having the smelter stay further improves the outlook for wind generation with Transpower's Whakamana i Te Mauri Hiko Report Tiwai stays scenario increasing wind capacity from 5.9 GW to 6.4 GW by 2050 or 18.1 TWh to 19.5TWh.

Meridian has announced Woodside Energy as its preferred partner for a 600 MW green hydrogen production facility near the Tiwai site which will also incorporate providing dry year flexibility.

NZ Battery Project. The objective of the Project is to find a 100% renewable solution to NZ's dry year risk. A March 2023 Cabinet Paper has highlighted 3 options for ongoing evaluation:

- Lake Onslow pumped hydro.
- A 'portfolio option' of alternative technologies, primarily a biomass generation plant, flexible geothermal and a hydrogen electrolyser.

- Pumped hydro at the head of the Moawhango river.

NZWEA's position is that a longer-term dry year solution is required. This could involve direct Government involvement in electricity generation or the industry providing alternatives. All options will have implications for wind energy with a pumped a hydro scheme particularly positive as it would lead to an increase in electricity demand particularly at off peak times plus supporting the variability of wind and solar.

Transpower Net Zero Grid Pathways Project. The project was established to ensure the electricity transmission grid is able to meet the challenges in enabling the electrification of the economy and meeting NZ's decarbonisation target. The project has two phases – enhancing the grid backbone to 2035 and supporting new interconnections beyond 2035.

In December 2022 Transpower provided its first submission to the Commerce Commission for investment approval. The submission seeks approval to install a device to increase maximum electricity flow from the South to North Island on the HVDC link and upgrades to lines in the Central North Island and also the Wairakei area.

Electricity Authority Future Security and Resilience Roadmap. The electrification of the energy system is expected to be largely met by variable renewable generation. In response to the changes to the electricity system the EA and Transpower have developed a roadmap for consultation to ensure a secure, reliable and resilient electricity system. Phase 1 identifying opportunities and challenges was completed in March 2022. Phase 2 on the road map of opportunities was completed in August 2022 and the Authority has commenced phase 3 which is a multi-year programme of studies and solutions.

8. Summary

The importance of renewable electricity generation to enable decarbonisation of the wider energy sector is unquestioned as is the need to act with urgency.

The imperative to have a resource management system that recognises the national importance of renewable electricity generation and enable transmission has been well articulated by the industry. At this time it remains to be seen whether the current reforms will be an enabler.

The electricity system transformation is underway and we are already seeing challenges in managing peak demand and renewables variability with reducing thermal capacity that is not designed to meet current market demands. Encouragingly demand response and distributed energy resources are now recognised as important contributors to avoiding inefficient investment in new generation and transmission.

The resilience of the electricity system has been tested with recent weather events and we can expect to see an increased focus on climate change adaptation.

The level of renewable investment activity has significantly accelerated. With the right policy settings, the extensive economic renewable resources in Aotearoa New Zealand can be developed to support the forecast growth in electricity demand.

Thank you for your continued support of NZWEA. We hope you find value in all we do to promote wind energy in New Zealand.

Kind regards

Grenville Gaskell