Action for Healthy Waterways - Discussion Document

NZ Wind Energy Association Submission

October 2019

Freshwater submissions
Ministry for the Environment

By email: consultation.freshwater@mfe.govt.nz

Introduction

1. The New Zealand Wind Energy Association (NZWEA) welcomes the opportunity to provide a submission on the Action for Healthy Waterways Discussion Document.
2. The Association's focus is on promoting the development of wind as a reliable, sustainable, clean and commercially viable energy source.
3. NZWEA recognises the need to improve freshwater quality as a Government priority and the challenge that comes from competing interests such as combating climate change and the broader plan to build a productive, sustainable and inclusive economy.
4. NZWEA does not have expertise in freshwater management and the purpose of this submission is to outline the importance of hydro generation in supporting New Zealand's low-emissions future and the expected growth in the electricity sector and in particular wind energy.

Executive Summary

5. Hydro generation is key to meeting New Zealand's electricity demand both in terms of total renewable energy produced and generation flexibility. Protecting the electricity output and generation flexibility is a matter of national significance as it is widely recognised that electricity is one of the fundamentals of modern society and essential to quality of life.
6. The Association considers that the second objective of the NPS, the essential health needs of people, is able to be interpreted to include the provision of a reliable and affordable electricity supply.
7. The alternatives to using hydro generation to firm the variable output of solar and wind are demand side management initiatives, battery storage or thermal peaking generation with a high short run marginal cost of operation and high carbon emissions. When thermal peaking generation is required this has traditionally set the wholesale market price which is then applied to all other generation dispatched at the time.
8. As electricity demand increases through the implementation of decarbonisation strategies there will be a significant increase in renewable generation particularly wind energy.
9. Preserving hydro output and flexibility will support the future energy mix and best enable the three key goals of an electricity system of minimising emissions, ensuring security of supply and affordability for consumers to be met.
10. The Association endorses the policy direction of supporting renewable energy targets by providing regional councils the discretion to exempt major – hydro-electric schemes from some freshwater management requirements. In particular clause 3.22(2) recognising the importance of not adversely impacting generation capacity, storage and operational flexibility. NZWEA notes the policy intent that the changes are not expected to result in

any change to current consent requirements for managing water flows and environmental impacts. [1]

11. The Association considers that the provision is consistent with the intent of the current National Policy Statement for Freshwater Management (NPS-FM) 2014 Policy CA3. However if regional councils are provided with the discretion to a set higher national bottom lines for hydro catchments this does create a risk that current consent arrangements may change.
12. The Association also considers that, given the essential role of hydro generation in New Zealand's electricity system, there is merit in either removing or strengthening the "must have regard to" wording in the draft NPS-FM section 3.22(2) to more directive wording that provides greater confidence that the benefits of hydro generation are retained.
13. Doing so would limit the opportunity for local decision making to trump national direction and benefits and reduce the risk of the inconsistencies that followed the introduction of the National Policy Statement for Renewable Electricity Generation (NPS-REG) impacting the NPS-FM.
14. The wind integration study referenced in paras 26 and 27 highlights the important role of hydro: that the costs and ease of dealing with intermittency in NZ are much lower than comparable international power systems due to the inherent flexibility of 5.5GW of existing hydro.
15. The Action for healthy waterways notes "While other schemes are significant in their own right, we believe there is a need for pragmatism – a general exception would allow too many rivers and lakes to potentially be exempt from national bottom lines". [2]
16. In addition to the support for the exception for the large hydro schemes the Association's considers further economic analysis, particularly at a regional level, is required to understand the potential impact on other hydro schemes and the effects the proposed NPS and NES may have on their generation output and operations.
17. It may well be that while, depending on regional council decisions, a high percentage of hydro generation capability is preserved the regional impacts of requiring smaller schemes to meet minimum standards are significant and may also limit the future development of smaller scale community wind energy schemes.
18. The cost of wind energy has significantly reduced due to the investment in technological improvements and economies of scale from wider deployment. New Zealand has clearly benefited from these trends. In addition New Zealand has been uniquely advantaged in having an excellent wind resource and a high level of flexible hydro generation to lower the cost of supporting wind's variability.
19. Restricting either the ability to store water or the flexibility of hydro to support other renewables has the potential to impact security of supply, higher electricity sector carbon emissions and in cost to consumers.
20. The importance of hydro flexibility and storage can only increase as NZ deploys more wind generation. To ensure New Zealand's renewable energy future will require strong regulatory alignment and the treatment of hydro in the draft NPS-FM is a positive step in seeking to achieve balance across competing interests in key resource management legislation.
21. As outlined in the section on regulatory and policy consistency the Association considers the NPS-FM would also benefit from including an objective recognising the importance of addressing climate change.

The New Zealand Electricity System

[1] Action for healthy waterways, section 1.1 Summary of proposals.

[2] Action for healthy waterways, section 4.6 – Exceptions for major hydro schemes to support renewable energy targets.

22. The operation of the NZ electricity system is well understood with hydropower comprising around 60% of total annual generation depending on hydrology.

23. Demand for electricity peaks in the morning and evening and also varies with the season with usage highest in winter.

24. While hydro storage is relatively low compared to annual generation NZ hydro generation is unique in that it can provide baseload generation along with fossil fuel and geothermal plants as well as fast response peaking generation which in other markets is often provided by low efficiency high cost gas plants.

25. NZ is advantaged by having such a high level of Hydro generation and the flexibility it provides to meet NZ electricity needs without producing carbon emissions. As the Interim Climate Change Commission (ICCC) recently stated: [3]

New Zealand has long benefitted from a high percentage of renewable electricity generated from hydro power and, increasingly, from wind. As a result, electricity generation is responsible for only 5% of New Zealand's emissions, whereas transport and process heat account for nearly 30%.

26. A New Zealand Wind Integration Study highlighted the benefits hydro generation provides to wind energy that is not available in most other power systems: [4]

Unlike thermal generation based power systems in which capacity value of wind is determined by the availability of wind during peak demand conditions, the capacity value of wind in New Zealand is:

- High due to high load factors of wind resource
- Enhanced by the presence of hydro generation
- Reduced by the large variations in relatively small period of time that need increased amounts of reserves

27. The Wind Integration Study also noted:

Hydro increases capacity credit [5] of wind. However, at higher penetrations the contribution of hydro to firm up wind power reduces.

Capacity credit of wind generation in the NZ's hydro dominated system is higher than in other thermal based systems, however it also declines with rise in wind penetration level.

28. The challenge with New Zealand's heavy reliance on hydro generation is coping with the "dry year" when inflows are low. Key to managing these periods is generators having the operating flexibility to determine the optimal time to generate to ensure security of supply within existing consent requirements.

29. While wind and solar output are both variable and they do not produce emissions they have difference characteristics.

30. Wind generation, on a seasonal [6] and annual basis is consistent, but it does vary over short periods of time. As more wind farms are built in geographical locations subject to different weather patterns variability will further reduce but will still require the support of hydro generation to meet demand.

31. Solar sees a significant reduction in generation when NZ needs it most for morning and evening peaks especially in winter.

32. The variability of renewables is generally managed by utilising additional peaking generation or by changing demand by having users reduce demand during these periods

[3] Accelerated Electrification Report, April 2019, page 5.

[4] Summary of Findings, NZ Wind Integration Study, April 2008, Imperial College London and Meridian Energy.

[5] The capacity credit is the contribution of variable output wind power to systems security.

[6] Quarterly averages over 4 years to end 2018 – March 23%, June 26%, September 25%, December 26%.

by changing usage patterns or reducing consumption. Internationally hydro is regarded as ideal for supporting the variability of other renewables and providing ancillary services to maintain quality.

Addressing the Climate Change Imperative

33. New Zealand's annual and cumulative emissions have continued to increase and it recognised there is a current shortfall of around 200 million tonnes of carbon dioxide equivalent to meet the 2030 the Paris Agreement in accordance with the United Nations Framework Convention on Climate Change.
34. The Zero Carbon Bill, when passed, will set in legislation a net emissions target for greenhouse gases, other than biogenic methane, of zero by 2050.
35. In addition the Government's has set an aspirational target of having 100% of our electricity produced from renewable sources by 2035 in an average hydrology year.
36. The ICCC in their April 2019 Report Accelerated Electrification considered options to meet the Government's 100% renewable electricity target.
37. The ICCC recommended the accelerated electrification of transport and process heat over pursuing the 100% renewable target as this could result in greater greenhouse emissions savings while keeping electricity prices affordable. [7]
38. The ICCC noted the need to provide for the development of wind generation at scale:

    New wind generation (and its associated transmission and distribution infrastructure) will play a vital role in achieving emissions reductions. The modelling indicates that around 2,600 MW would be built in an accelerated electrification future – four times more than is currently in the system.

39. The ICCC also recommended that: [8]

    The Government ensures the value of existing hydro generation to New Zealand's climate change objectives is given sufficient weight when decisions about freshwater are made, including by:

    a. Strengthening and clarifying national direction on making trade-offs between hydro generation and freshwater objectives across National Policy Statements.

    b. Working collaboratively with iwi/Māori to co-design solutions so that rights and interests in freshwater are resolved within the context of the Māori-Crown partnership

40. Other studies such as the Productivity Commission's Low-emissions Economy Report and Transpower's Te Mauri Hiko Energy Futures White Paper also forecast that new renewable electricity generation over the next several decades is expected to be dominated by wind and solar.
41. In January 2019 Transpower published an addition to Te Mauri Hiko on solar energy.[9] In this report Transpower noted that solar produces the least energy when New Zealand needs it the most, such as during cold, dark winter months. The Report developed a "Roaring 40's" scenario which has wind generation doubling from the 17 TWh's to around 30TWh's.
42. Wind energy is therefore widely regarded as key to meeting New Zealand's climate change aspirations. As the ICCC stated: [10]

    The modelling suggests wind will be the dominant form of new renewable generation out to 2035. This is because New Zealand has an abundance of quality wind-farm sites, and

[7] ICCC Accelerated Electrification recommendation 1(a).

[8] ICCC Accelerated Electrification recommendation 4(a) and (b).

[9] The sun rises on a solar future published January 2019.

[10] ICCC Accelerated Electrification Report, section 6.2.

wind is the lowest-cost form of new generation.

43. With the age of existing thermal generation plant plus growth in demand a renewables energy future will require wind and hydro as essential components of the energy mix.

Energy Affordability

44. Energy affordability is a key issue in the electricity sector with the Electricity Price Review's (EPR) Final Report noting: [11]

Energy hardship emerged as one of the most pressing problems we uncovered. More than 100,000 households are in this situation. Worryingly, children live in many of these homes.

Looking ahead, a low-emissions economy will mean more demand for electricity, more grid-connected wind, hydro and geothermal power, widespread use of electric vehicles, and the emergence of a two-way flow of electricity as consumers install solar panels and sophisticated battery technology. Managed well, these changes, and the country's responses to climate change, should not necessarily lead to big price increases. But avoiding steep increases will require more co-ordinated planning and action among government agencies – not just energy regulators – than has been seen to date.

45. Wind energy is generally regarded as having the lowest long run marginal cost of new generation in New Zealand and in most other geographies.

46. The future replacement of thermal generation with renewables is expected to enable a significant growth in demand without price increases. As Credit Suisse noted in their 2018 Report: [12]

Normally, prospective demand growth should elicit a boost in valuations – but in this case we believe risk may be skewing towards lower electricity prices*. On our assessment of cost for new wind projects, we see a strong risk the long run price outlook will decline even if carbon prices rise. Price will remain the most important driver of sector valuations (as opposed to generation volume growth or new project NPVs).*

47. THE ICCC's Accelerated Electrification Report referenced a modelling exercise, commissioned by the Ministry for the Environment and Ministry for Primary Industries in 2015 looking at the impact of reduced flows on hydro generation: [13]

It examined seven separate reduced flow scenarios in different catchments, as well as a further scenario which combined the effects of the seven separate scenarios. The impact was most visible in the combined scenario which significantly increased minimum flows across several catchments, and resulted in an average annual increase in short-run marginal cost of $15 to $31 per MWh.

The average total deficit in generation for the six years studied (2020-2025) was about 110 GWh. Greenhouse gas emissions also increased compared to the model's base case, on average by about 0.5 Mt CO2 per year (an 11% increase).

48. Key to the longer-term outlook for electricity prices is decarbonisation and reducing fossil fuel use particularly for gas peaking generation and ensuring the flexibility of current hydro generation is retained.

49. The other aspect is the link between electricity prices and the decarbonisation opportunity. The importance of electricity in our lives will increase as we decarbonise the energy sector. As the ICCC stated: [14]

Reducing emissions from transport and industry will largely rely on switching from fossil fuels to

[11] Electricity Price Review, Overview, page 1.

[12] Credit Suisse NZ Electricity Generators: Decarbonisation beckons – but at what price? August 2018 summary.

[13] Accelerated Electrification Report, section 6.1.

[14] Accelerated Electrification Report, April 2019, page 5.

electricity. Electricity will become an even more important pillar of our economy. It is vital then that it is affordable – to encourage substitution and to be accessible for the less well-off.

Security of Supply

50. New Zealand's "dry year risk" following periods of low inflows into storage lakes has been well documented. The Executive Summary of Transpower's Te Mauri Hiko White Papers comments: [15]

    New Zealand's electricity system is unique. There is no other country in the world that generates its electricity from the same mix of generation sources with the same low levels of energy storage and without a grid connection to another country's energy resources.

51. One of the key challenges, as the electricity sector increases its percentage of renewable generation, is managing the dry year / winter peaking of electricity demand.
52. As Transpower note in the Te Mauri Hiko report the dry year / winter shortfall is around 6 TWh's. Historically where hydro generation is curtailed thermal generation has met the shortfall.
53. Transpower's forecasts are for 12 TWH shortfall in 2050 which would be exacerbated by increases in solar penetration without a storage solution and the expected reduction in thermal generation capacity.
54. Their Report notes: [16]

    Several potential technical solutions for managing New Zealand's unique winter and dry-year energy issue have been identified but none appear definitely feasible and economically attractive.

55. Also noted is that one of the options assessed is retaining gas peakers:

    Gas-fired peakers might be retained as a reserve-of-last-resort and to make use of existing assets and infrastructure. That might be politically challenging, and keeping gas peakers open could create a risk of insufficient gas availability domestically. Further, keeping existing gas peakers open would not provide sufficient capacity, so additional peaker capacity or a combination of solutions would still be required.

56. In situations where water quality is below a national bottom line for existing hydro catchments without the proposal to require regional councils to have regard to the importance of not adversely impacting generation, storage and operational flexibility future security of supply risks increase. This is in addition the potential impact of hydro curtailment on new renewables development, carbon reduction initiatives and market prices.

Regulatory and Policy Consistency

57. The complexity and challenge of achieving regulatory and policy consistency when balancing ecological, environmental, economic and social interests and wellbeing is well understood and has been central to the RMA's purpose of the sustainable management of natural and physical resources.
58. The view of the EPR on the need for alignment in summarised in para 43.
59. The ICCC also stated: [17]

[15] Te Mauri Hiko Energy Futures White Paper, page 2.

[16] Te Mauri Hiko Energy Futures White Paper, 31 and 32.

[17] ICCC Accelerated Electrification Report, executive summary, page 7.

A responsive regulatory system must facilitate changes in the market, while ensuring that appropriate consumer protections are in place. The Committee recommends that regulators be required to take emissions reductions objectives into account, as well as facilitating and enabling new generation and both market and distribution innovation.

60. NZWEA recognises the primary driver of the changes proposed is the need to improve freshwater management and that, because of the significance of New Zealand's hydro generation assets, the Government's proposal to require regional councils to have regard to the importance of not adversely impacting the generation, storage and operational flexibility of hydro generation when establishing measures to address other national priorities around freshwater management is a mechanism to balance competing interests.

61. The Association considers that, given the essential role of hydro generation in New Zealand's electricity system, there is merit in strengthening or deleting the "must have regard to" wording in the draft NPS-FM section 3.22(2) to more directive wording that provides greater confidence that the benefits of hydro generation are retained.

62. The electricity industry's experience with the National Policy Statement for Renewable Electricity Generation which also has "regard to" wording has been disappointing. The Ministry for the Environment's Report on the Outcome Evaluation of the NPS-REG commented: [18]

The NPSREG does not appear to have resulted in noticeably more certainty for resource consent applicants for REG projects. The NPS has not resulted in nationally consistent approaches to the drafting of regional and district plans.

63. The Productivity Commission in their Low Emission Report further stated: [19]

The National Policy Statement for Renewable Electricity Generation 2011 (NPS-REG) is not well-reflected in the planning documents of local authorities and has made no difference to the time, complexity and cost of obtaining consents for renewable electricity generation investments (particularly wind- and hydro-generation). The language of the NPS-REG is not sufficiently directive to give weight to the central role of renewable electricity generation in New Zealand's transition to a low-emissions economy over the next several decades.

64. The risk therefore is that with the current wording in the draft NPS-RM clause 3.22we risk repeating a past unintended consequence.

65. The management of the effects of and effects on climate change are also an important consideration for freshwater management under the draft NPS-FM and is directly related to the effects on wellbeing of people, communities, human health and ecosystems.

66. The Association considers there is merit in reviewing objective 2.1 to recognise the need enable people and communities to contribute towards climate change, adaption, mitigation and resilience. In doing so we are addressing what is the rationale for establishing the Climate Change Commission to develop budgets and plans to advise the Government on how to New Zealand can take action to address the impacts of global warming.

67. If objective 2.1 is not reviewed the Association supports including a policy in the NPS-FM regarding the importance of climate change.

[18] Report on the Outcome Evaluation of the National Policy Statement for Renewable Electricity Generation, December 2016, page 7.

[19] Productivity Commission Low-Emissions Inquiry, Fact 13.4.

About the NZ Wind Energy Association (NZWEA)

- The NZWEA is an industry association that promotes the development of wind as a reliable, sustainable, clean and commercially viable energy source
- We aim to fairly represent wind energy to the public, Government and energy sector
- Our members are involved in the wind energy sector and include electricity generators, wind farm developers, lines companies, turbine manufacturers, consulting organisations and other providers of services to the wind sector
- By being a member of NZWEA you are assisting the development of wind energy in New Zealand and helping to reduce our greenhouse gas emissions to meet climate change targets.

Contact details in relation to this submission:

Grenville Gaskell
Chief Executive
New Zealand Wind Energy Association
PO Box 553
Wellington 6140

grenville@nzwea.org.nz