

“Yes We Can” Symposium Wind Energy Overview



1. Purpose

- The purpose of this paper is to provide an overview of wind energy trends, both domestically and internationally, and outline how wind energy can contribute to the meeting New Zealand's greenhouse gas emission reduction targets.

2. Wind in New Zealand

- 19 wind farms with an Installed capacity of 690MW which is around 7% of NZ's total.
- On an annual basis wind generates around 6% of total generation.
- Consents have been issued for over 2,000MW of new wind generation.
- NZ has the highest capacity wind site in the World and in general has capacity factors well above the international average.
- An assessment of New Zealand's wind resource identified that wind has the potential to generate over three times New Zealand's current annual electricity demand (approximately 40,000 GWh).

3. International Trends

- Wind is the fastest growing means of electricity generation in the world with 63GW of new generation installed in 2015. Capacity is doubling every 3 years.
- In total there are around 200,000 wind turbines in operation with a total installed capacity of over 430,000MW.
- The United States and EU countries have traditionally lead the world in wind power development, however China now accounts for half of new installations.
- In 2015, 44% of all new EU generating capacity was wind power with wind comprising 11% of total generation.
- Denmark leads the way in wind production comprising 40% of its electricity generation.
- Wind is now approximately 4% of total worldwide electricity usage.

4. Wind's Advantage

- Is renewable, requires no fuel, and cheaper than any other form of new energy generation.
- Produces no greenhouse gasses during operation and uses little land.
- Achieves carbon closure, from manufacturing of turbines and deployment, within 6 months of operation.
- Windfarm investigation costs are lower and less risky than other forms of generation.
- Wind farms are scalable and can be built as a large national grid connected asset or smaller distributed network connected farms.
- Wind is a consistent resource from year to year and, when multiple geographically dispersed wind farms are operating, has the attributes of baseload generation.
- Technology improvements are increasing turbine performance and wind economics. New technologies such as battery storage could further increase the potential uptake.
- There is strong public support for wind power. Over 80% of EU citizens support development and the level of support in NZ is at a similar level.

5. Wind Challenges

- Wind farms can have significant variability over short timescales creating forecasting issues and requiring reserve generation support. This has historically created market integration issues and has required market rule changes.
- Improvements in forecasting capability coupled with a greater understanding of how wind actually performs, particularly when a series of farms are operating, have assisted in wind becoming more accepted.
- Historically noise has been an issue for those living close to wind farms. International standards have been agreed to mitigate the impact.

6. The NZ Opportunity

- NZ's location and topography, combined with a high level of hydro generation, create a unique opportunity for wind development.
- Wind energy has a natural synergy with New Zealand's existing hydro resources which is regarded as the most economic reserve generation to manage wind's variability.
- In 2013, the latest available data, emissions from thermal electricity generation was 5,043 kt CO₂-e which was 16% of total energy sector emissions.
- On the basis of 2013 data for every GWh of thermal generation substituted for wind energy there would be a reduction in over 585 tons of greenhouse gas emissions.
- Expand the renewable electricity market to mirror the transformation that has occurred in the residential segment with the uptake of efficient heat pumps replacing other methods of heating:
 - Renewable energy to replace the thermal fuels used by commercial and industrial consumers to provide heat. Total manufacturing emissions in 2013 were 5,955 kt CO₂-e of which the food sector (largely dairy processing) was 2,155 kt CO₂-e.
 - Renewable energy to power electric vehicles to reduce emissions in the transport sector. Domestic road emissions totalled 12,688 kt CO₂-e.

7. What is Required to Fulfil the Opportunity

- Introduce an effective price on carbon. When initially introduced the ETS was expected to increase the retail price of electricity through higher thermal generation costs. The low cost of carbon credits has meant there has been no discernible impact on either wholesale or retail electricity prices. What is needed is an effective mechanism for pricing carbon emissions.
- Enhance policy settings for renewable generation. The 2011 National Policy Statement for Renewable Energy Generation (NPSREG) recognises the national significance of renewable electricity generation and sets a target of 90% of electricity generated should be derived from renewable energy sources by 2025. The NPSREG is currently under review and in order to meet climate targets change by way of domestic mitigation the target should be increased.
- Ensure the consistent use of the National Standard for wind farm noise limits. In 2010 a new standard NZS 6808 was developed to recommend limits on noise from windfarms. The standard reflects international best practice and is adhered to by all NZWEA members. There is however no requirement for local authorities to adhere to the Standard when making consenting decisions under the RMA. Incorporating NZ6808 into the RMA would provide greater consistency in wind farm consent decisions and provide certainty to applicants, thereby reducing consent timeframes and costs.
- Offer the renewables sector a similar level of subsidies and tax benefits that are provided to the fossil fuel industry.

8. Summary

- While NZ already has an internationally high level of renewable electricity generation, wind as a source of electricity production, is lower than in many developed economies.
- NZ's unique advantage in having high wind farm capacity factors, combined with the internationally recognised environmental and economic benefits of wind, result in it being a key strategy in meeting greenhouse gas emission reduction targets by way of domestic mitigation in the electricity, heat and transport sectors.
- The specific opportunities are:
 - Wind to replace current thermal electricity generation which would reduce NZ's energy CO₂-e emissions by 16%.
 - Wind to provide the electricity to replace the thermal fuels used for commercial and industrial heat.
 - Wind to provide the electricity to power a replacement vehicle fleet of electric vehicles.

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.

Note: Greenhouse gas emission levels sourced from 2013 MBIE Energy Greenhouse Gas Emissions Report.