

Wind Development Potential including Small Scale Opportunities

Paul Botha

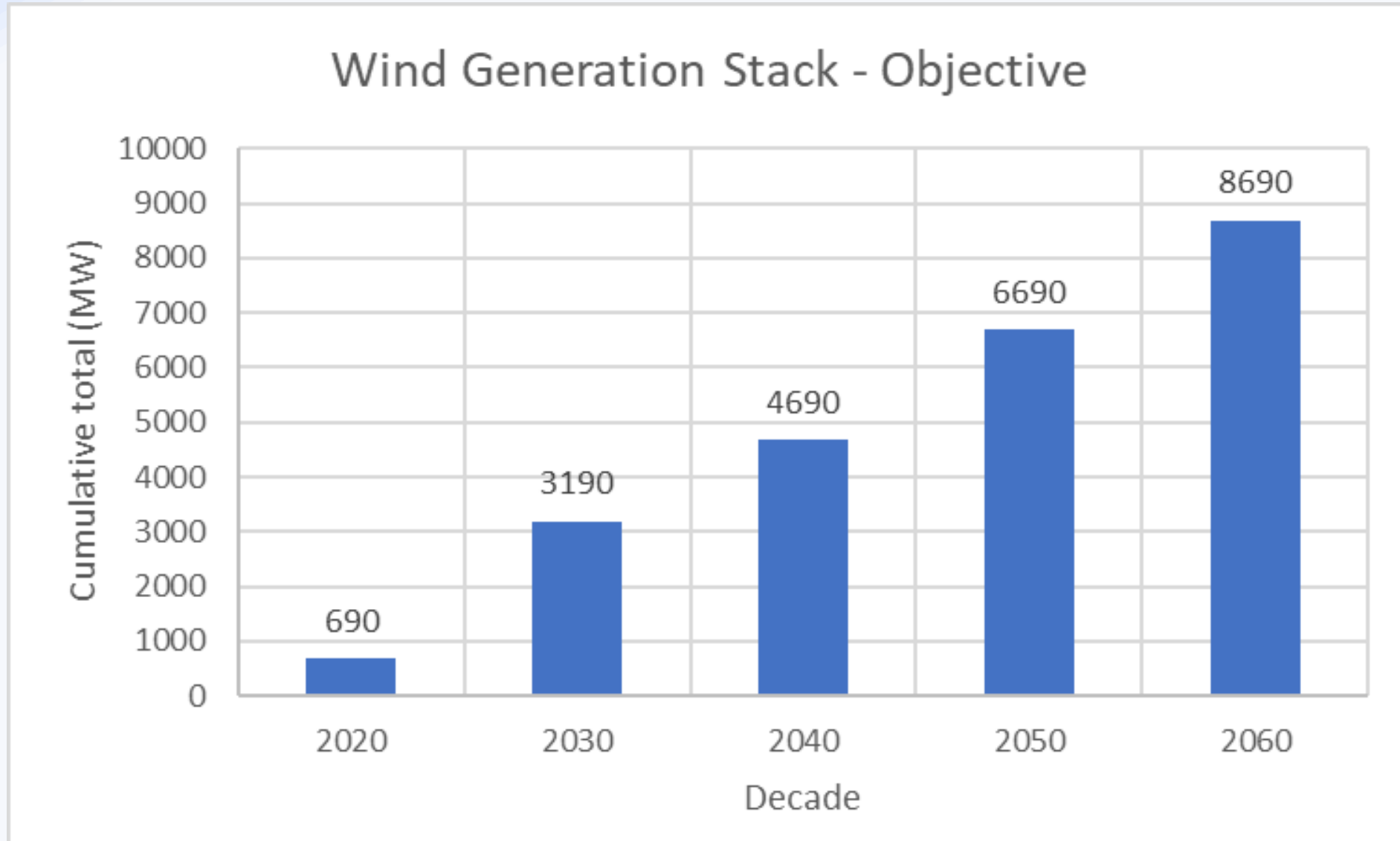
NZWEA Conference

12 May 2021

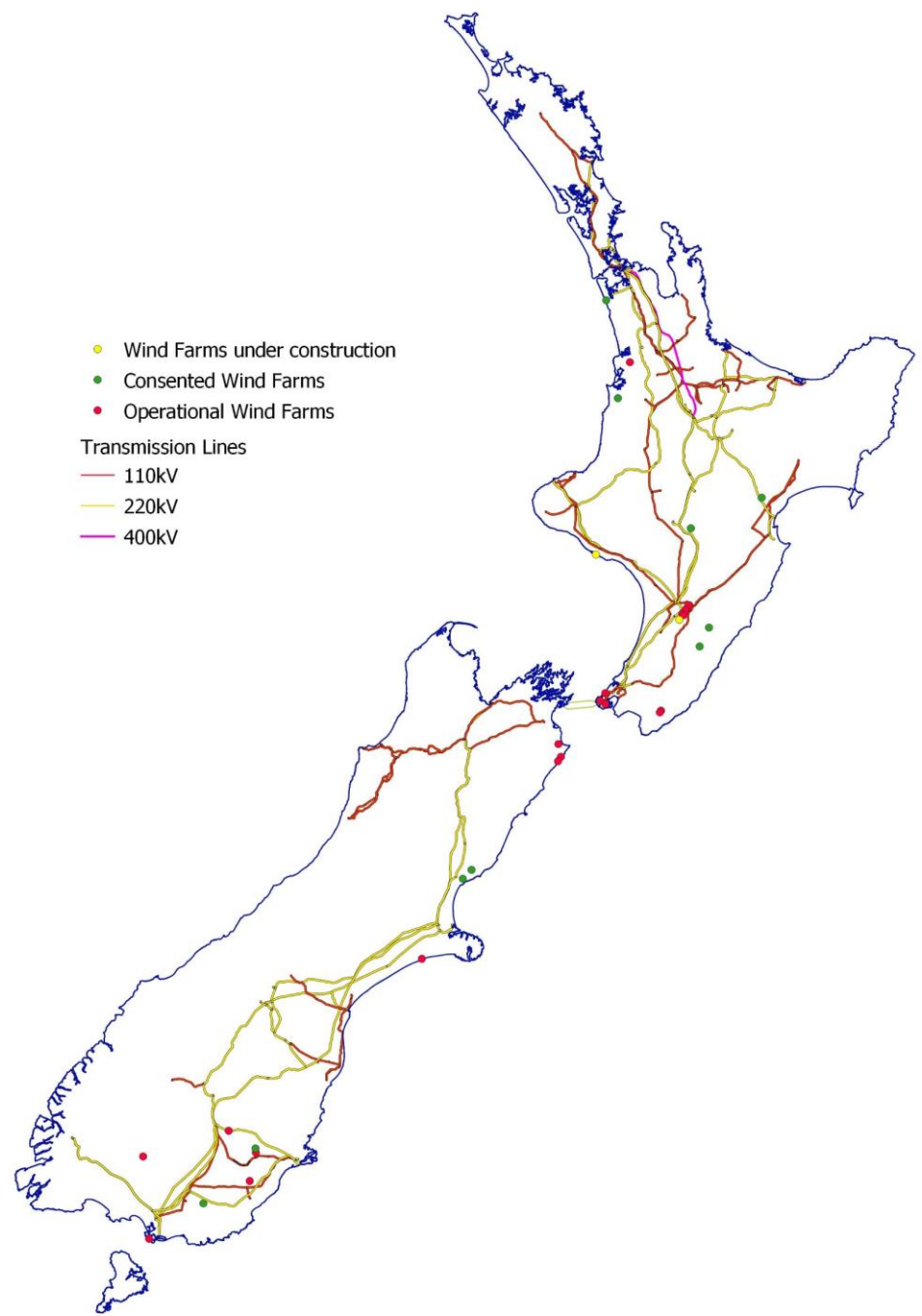


Roaring40s
Wind Power

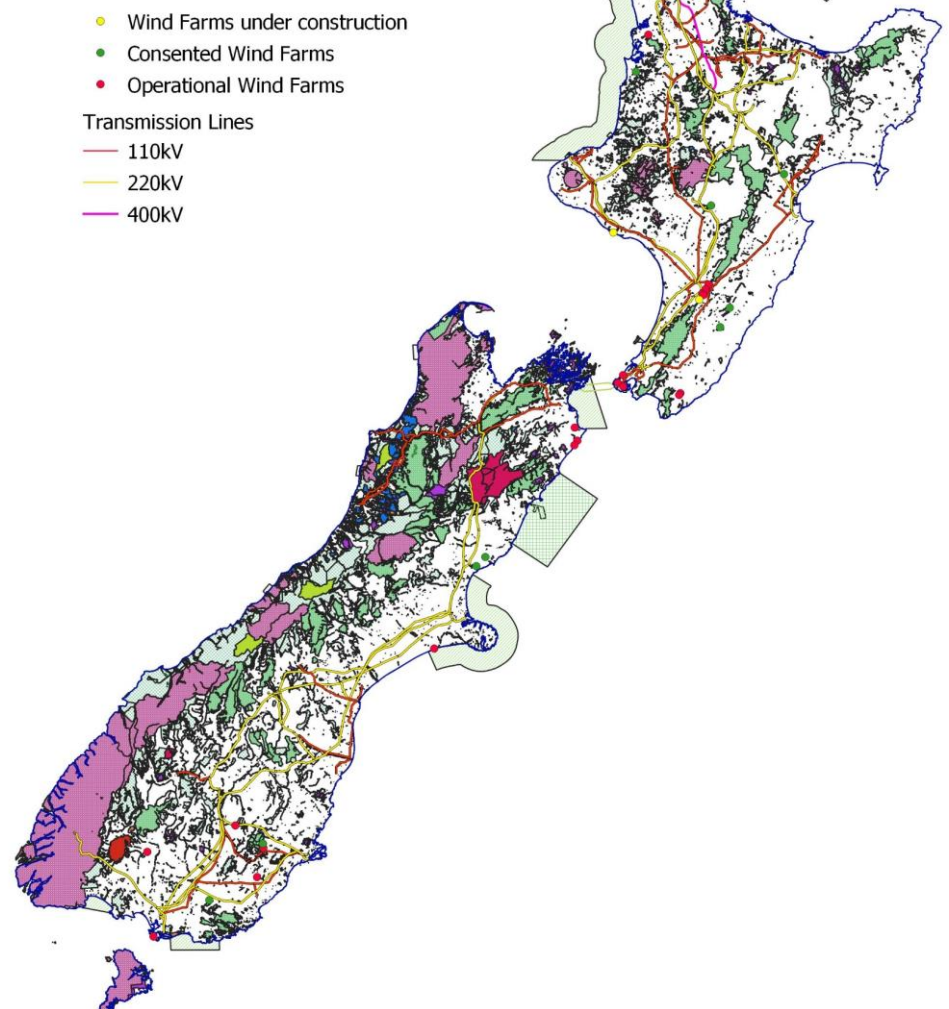
MBIE – WGS Objective



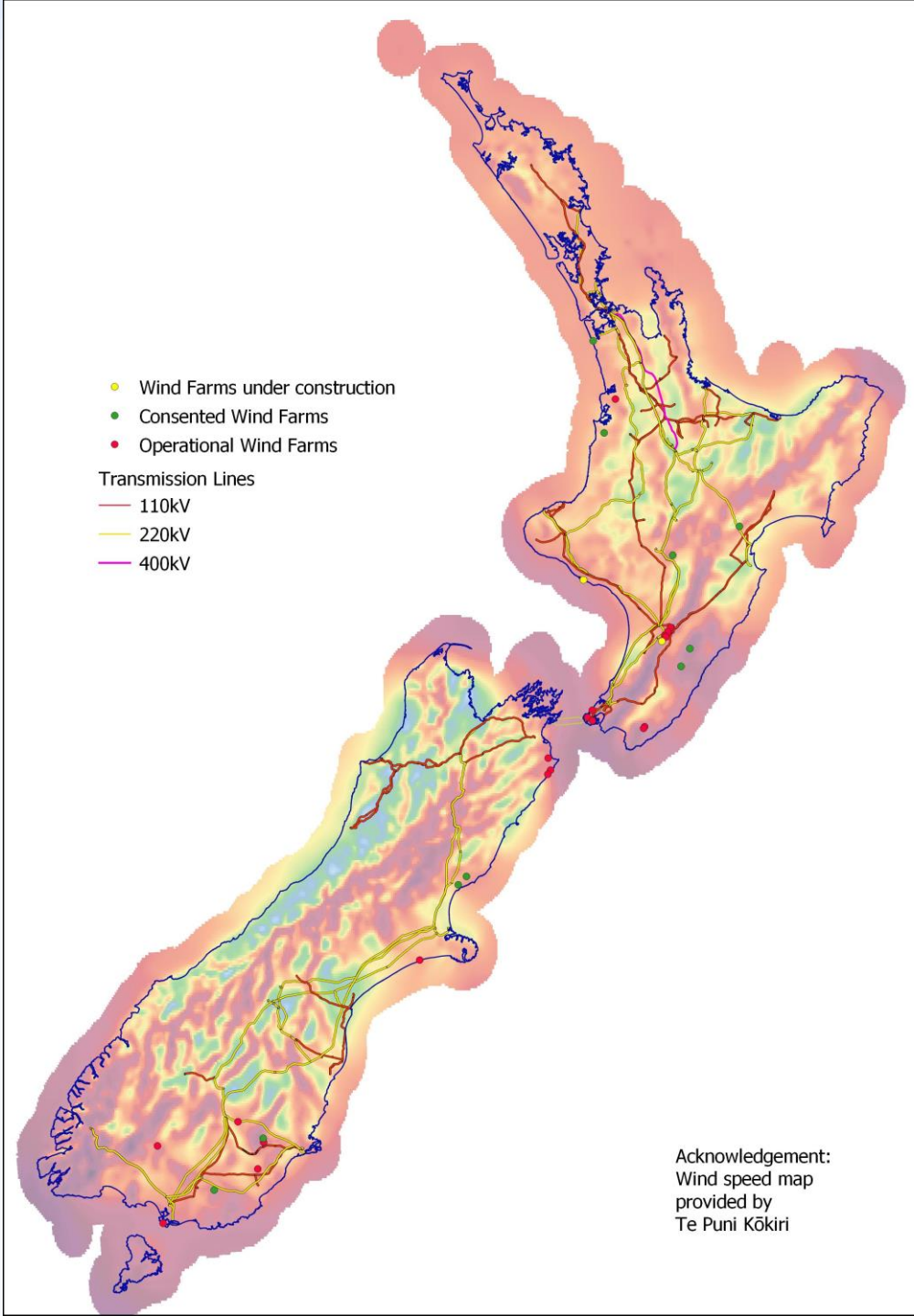
Transmission Grid



DOC Areas + transmission

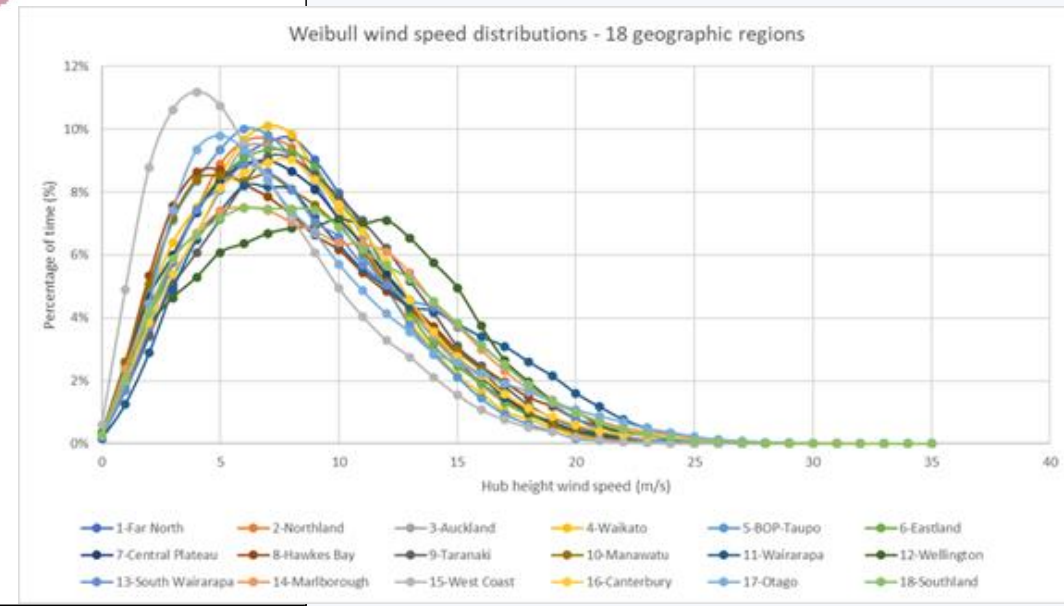
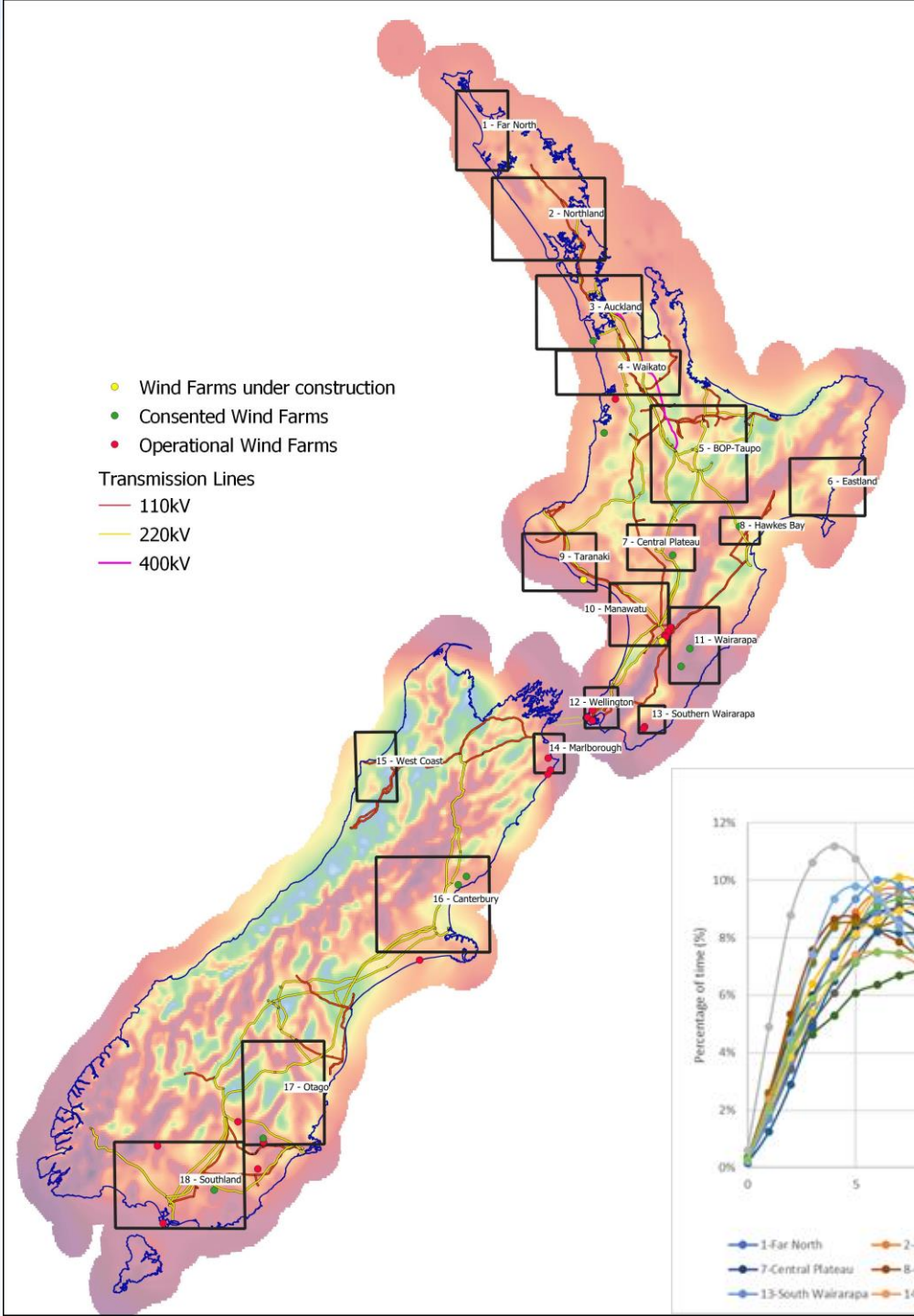


Wind speed at 120m

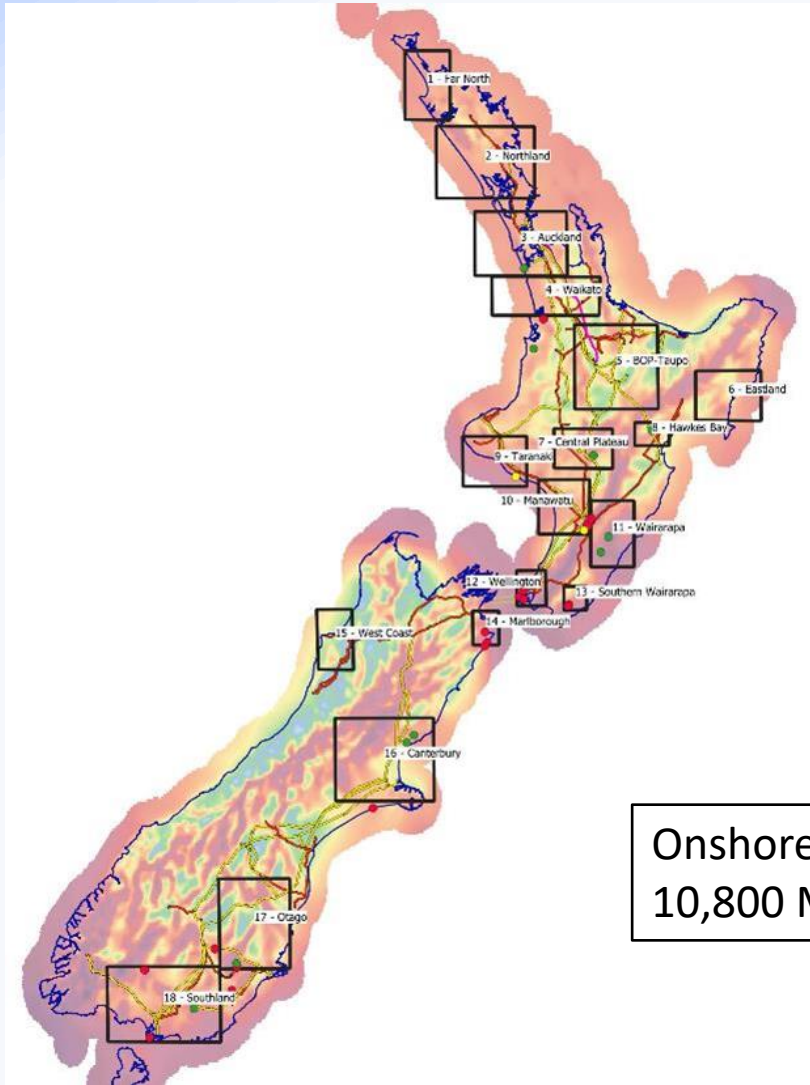


Acknowledgement:
Wind speed map
provided by
Te Puni Kōkiri

R40s Geographical regions containing identified sites

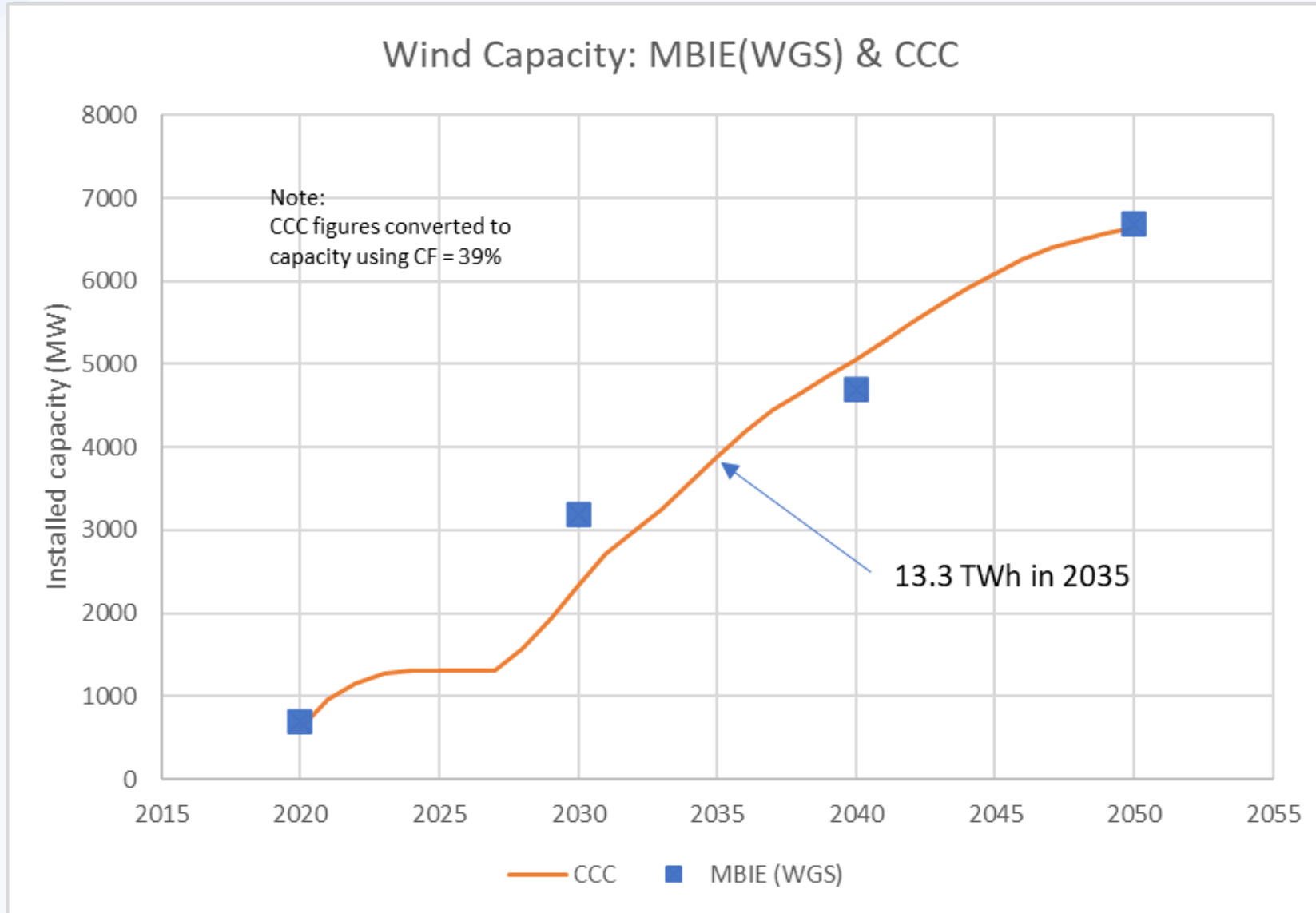


Site Identification Summary



| R40s geographical region | R40s geographical region - Name | Number of projects | Wind Speed (m/s) | Total capacity (MW) | Regional contribution of total onshore | Lower estimate - Net generation (GWh/yr) | Upper estimate - Net generation (GWh/yr) |
|-----------------------------|---------------------------------|--------------------|------------------|---------------------|--|--|--|
| ONSHORE | | | | | | | |
| 1 | Far North | 3 | 8.5 | 350 | 3.2% | 1,247 | 1,413 |
| 2 | Northland | 7 | 8.3 | 960 | 8.9% | 3,269 | 3,705 |
| 3 | Auckland | 5 | 8.2 | 500 | 4.6% | 1,685 | 1,909 |
| 4 | Waikato | 6 | 7.9 | 625 | 5.8% | 2,061 | 2,336 |
| 5 | BOP-Taupo | 8 | 7.7 | 1,160 | 10.8% | 3,645 | 4,131 |
| 6 | Eastland | 4 | 8.3 | 475 | 4.4% | 1,633 | 1,851 |
| 7 | Central Plateau | 4 | 8.3 | 675 | 6.3% | 2,226 | 2,523 |
| 8 | Hawkes Bay | 1 | 8.4 | 100 | 0.9% | 335 | 379 |
| 9 | Taranaki | 3 | 8.6 | 500 | 4.6% | 1,772 | 2,009 |
| 10 | Manawatu | 5 | 7.8 | 850 | 7.9% | 2,665 | 3,021 |
| 11 | Wairarapa | 6 | 9.8 | 1,250 | 11.6% | 4,847 | 5,494 |
| 12 | Wellington | 3 | 9.7 | 215 | 2.0% | 824 | 934 |
| 13 | Southern Wairarapa | 2 | 8.9 | 250 | 2.3% | 897 | 1,017 |
| Total - North Island | | 57 | | 7,900 | 73.4% | 27,100 | 30,700 |
| 14 | Marlborough | 2 | 9.3 | 125 | 1.2% | 446 | 505 |
| 15 | West Coast | 1 | 6.6 | 75 | 0.7% | 181 | 205 |
| 16 | Canterbury | 5 | 8.9 | 545 | 5.1% | 1,914 | 2,169 |
| 17 | Otago | 5 | 8.5 | 1,250 | 11.6% | 4,116 | 4,665 |
| 18 | Southland | 8 | 9.2 | 875 | 8.1% | 3,123 | 3,539 |
| Total - South Island | | 21 | | 2,900 | 26.6% | 9,800 | 11,100 |
| Total NZ - Onshore | | 78 | | 10,800 | 100.0% | 36,900 | 41,800 |
| OFFSHORE | | | | | | | |
| 4-0 | Waikato | 1 | 8.3 | 4,000 | | 13,721 | 15,551 |
| 3-0 | Auckland | 1 | 8.3 | 2,000 | | 6,870 | 7,786 |
| 9-0 | Taranaki | 1 | 9.6 | 2,000 | | 7,703 | 8,730 |
| Total - Offshore | | 3 | | 8,000 | | 28,300 | 32,100 |

CCC – Forecast vs WGS

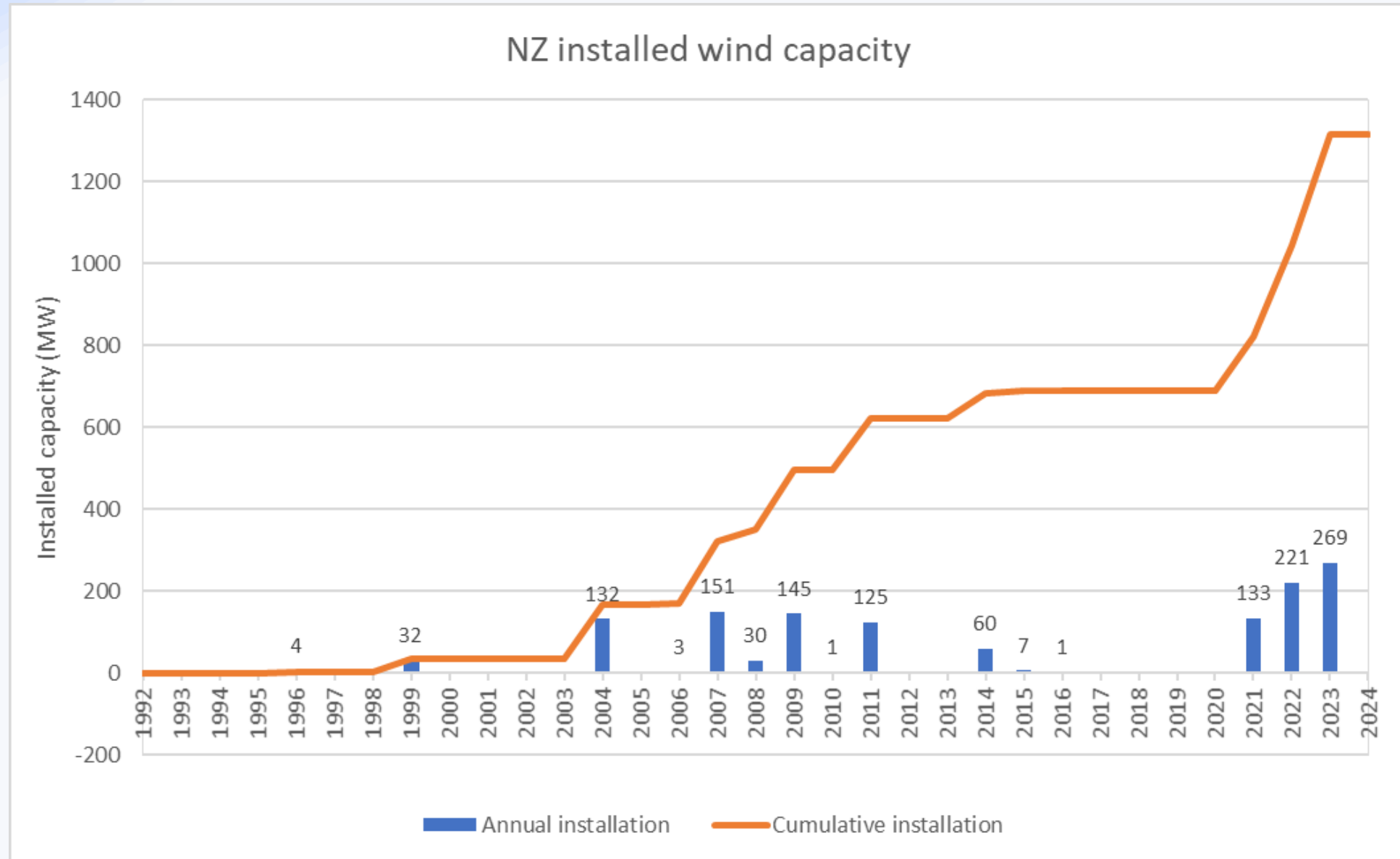


Observations from MBIE work

- The analysis suggests there are enough technically possible wind farm sites to achieve in excess of 200 MW/year growth.
- 6,690 MW of wind farms in 2050 would occupy 669 km² of land.
- 0.25% of NZ's land area.
- DOC = 30 % of NZ's land area.
- Parts of the grid does not match the wind resource.
- Onshore wind costs are predicted to continue to fall to 2050 and beyond.

| Country | MW Onshore Wind 2020 | % Land used for Wind 2020 |
|---------|----------------------|---------------------------|
| Germany | 55,122 | 1.54% |
| UK | 13,731 | 0.57% |
| France | 17,946 | 0.28% |
| Sweden | 9,811 | 0.22% |

New Zealand Wind Farm Installations



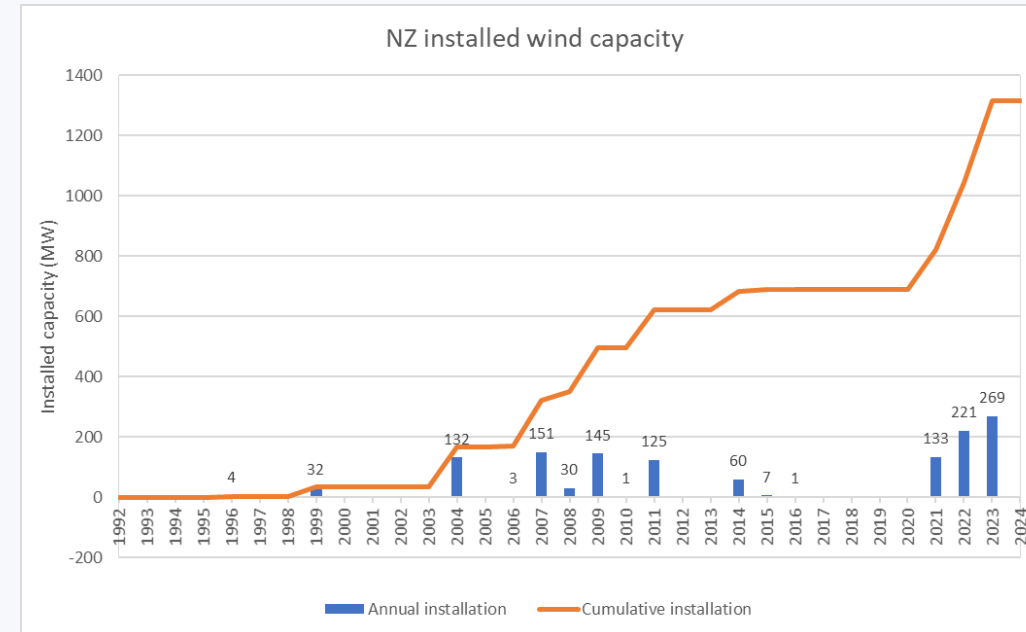
Observations from NZ Historical Installations

- 26 year between 1993 and 2019, 690 MW installed.
- Equates to approximately 27 MW per year.

HOWEVER

- 4 years 2020 to 2023, expected 623 MW to be installed.
- Equates to approximately 156 MW per year.

• Recent construction rate not too dis-similar to rate required going forward.



We can't forget Repowering

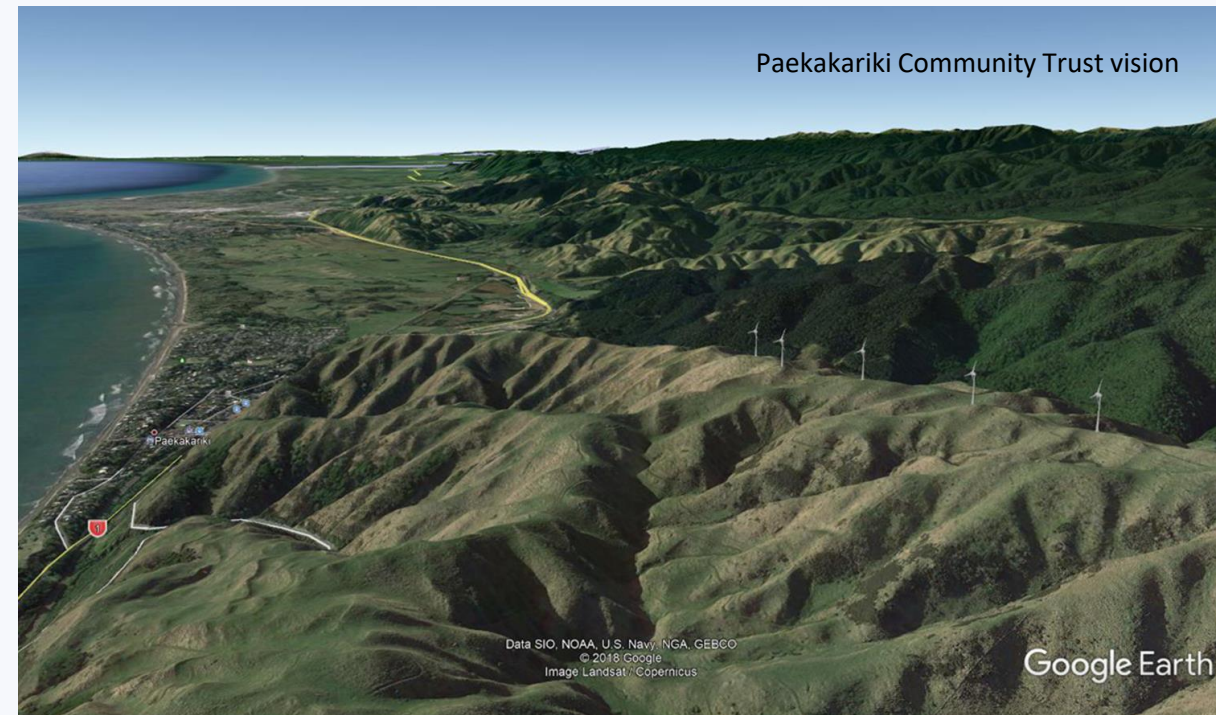
- All wind forecasts assume that the installed wind continues to operate “indefinitely”.
- Wind farms will need to be re-powered at some point, however many are first likely to benefit from life-extensions.
- Wind farms which are re-powered are likely to use larger and re-positioned turbines and will therefore most likely require new or significantly modified resource consents.
- Regulatory support for re-consenting as they are an established ‘existing use’ by now, e.g. designation such as airports.



Small & Community Opportunities

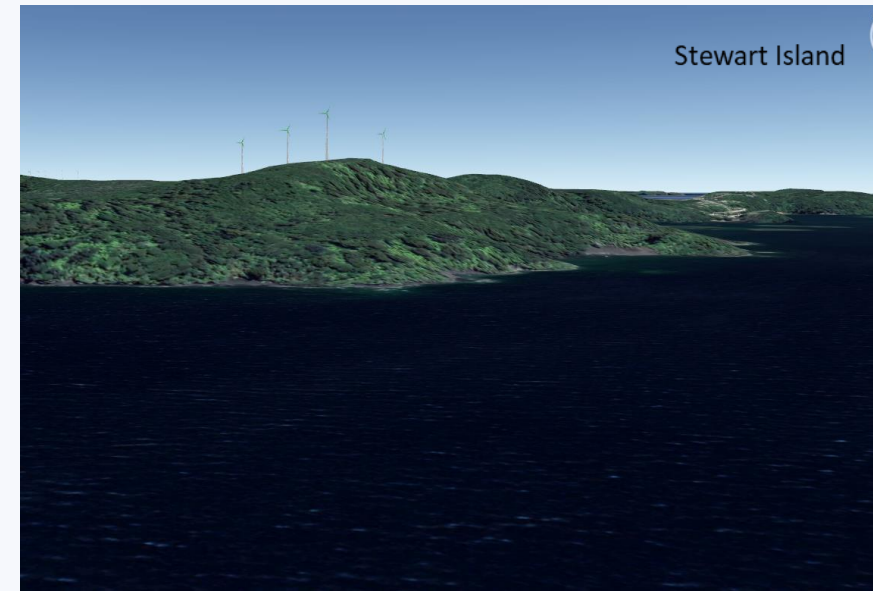
- Replacement of diesel generation, e.g. Stewart Island, Chatham Islands.
- Community initiated projects, e.g. Paekakariki Wind, Blueskin.
- Specific industry related – embedded.
- Private domestic / rural installations.

- There are no community owned wind farms in New Zealand but significant numbers internationally.



Community Projects

- A number of issues getting community projects progressed but also resulting opportunities.
- Stewart Island. 200 kW to 400 kW, consenting costs in the order of \$0.5m to \$1.0m per MW.
- Paekakariki Wind. Significant local support and community wanting to show local commitment to climate change.



Observations – Community Wind

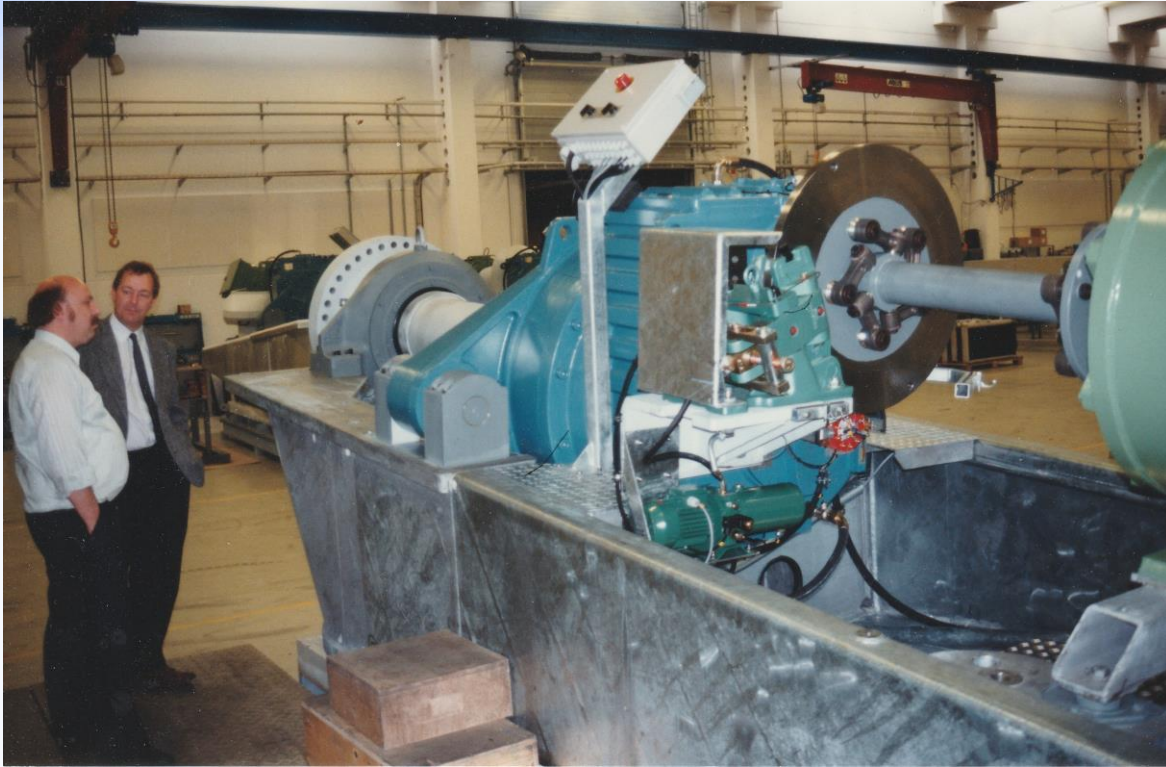
- Land access is still key, as is the case for larger wind farms.
- Small projects will help NZ meet a 2,000 MW / decade forecast growth but are likely to be small in absolute MW contribution, without policy support.
- Other benefits from small and community projects likely to be valuable to the wider wind industry.
- Community wind doesn't have the support that it deserves.

- In 2016, 67% of Denmark on-shore wind was “citizen-owned”.
- A 2020 EU report estimates that by 2030, energy communities could own 17% of wind generation in the EU.

In Summary

- There are sufficient sites for onshore wind farms to meet the CCC's forecast growth rate.
- Recent experience shows projected construction rate can be achieved.
- Repowering of about 690 MW of existing wind farms will be required prior to 2050.
- Smaller and community projects will assist wind in playing its part in NZ's decarbonisation targets.
- While a couple of wind farms are currently in the consenting phase, the industry requires a sustained period of projects being consented in order to meet the future demand growth.
- The transmission grid will need strengthening in many areas to facilitate the growth of wind farms.

Questions



mid 90's

2020

