



Wind Power in New Zealand

Dougal McQueen

PhD candidate, GREEN Grid, EPEC, University of Canterbury:
Assessing the benefits of the spatial diversification of wind
energy in New Zealand

Wind energy consultant: Hyland McQueen Limited

Project review



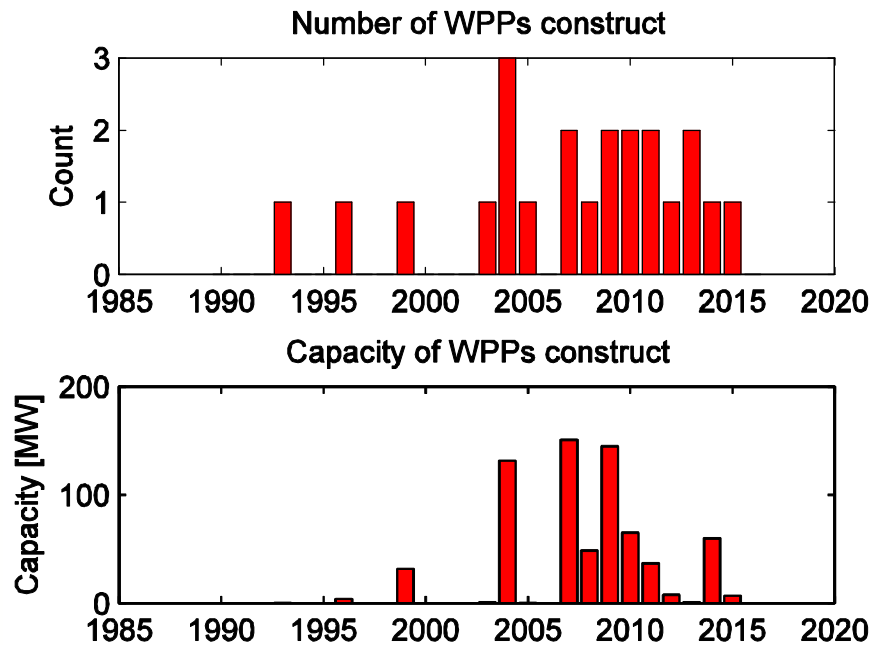
Search of internet based media releases:

- Operational
- Notified
- Consented
- Withdrawn

Data is not 100% as information has not always been archived or recorded.

Wind Power Plants operational

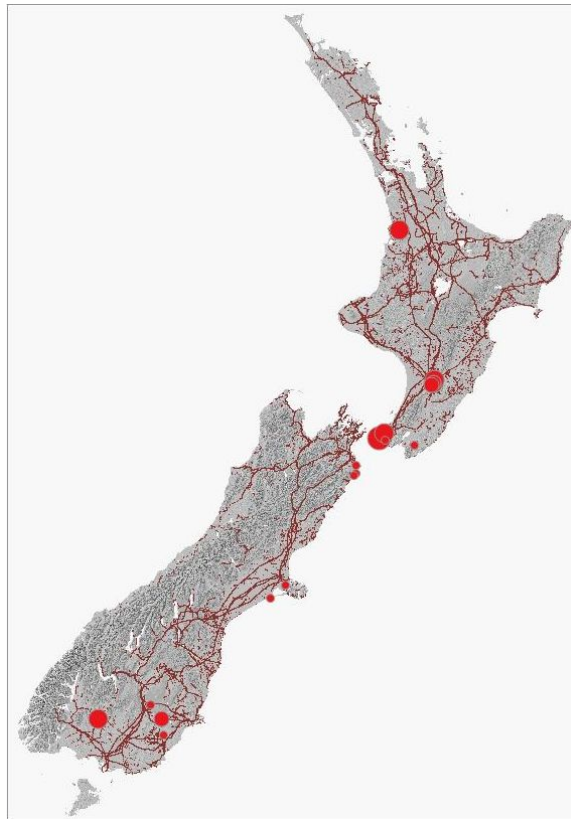
Brooklyn
Hau Nui 1
Tararua 1
Gebbies Pass
Hau Nui 2
Tararua 2
Te Apiti
Southbridge
Tararua 3
White Hill
Te Rere Hau



West Wind
Horseshoe Bend
Weld Cone
Te Uku
Lulworth
Mahinerangi
Mt Stuart
Chatham Islands
Lake Grassmere
Mill Creek
Flat Hill

WPPs operational

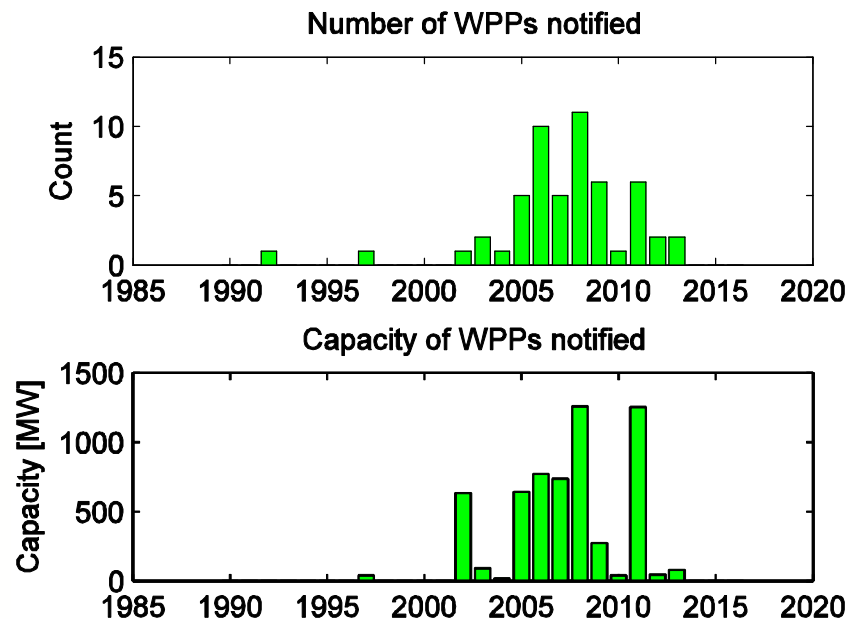
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West Wind
Horseshoe Bend
Weld Cone
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Mt Stuart
Chatham Islands
Lake Grassmere
Mill Creek
Flat Hill
Ross Island

WPPs notified

Project Hayes ('02)
Hauauru ma raki ('08)
Pouto Forest ('07)
Hawkes Bay ('05)
Kaiwera Downs ('07)
Mahinerangi ('05)
Puketoi ('11)
Cape Campbell ('11)

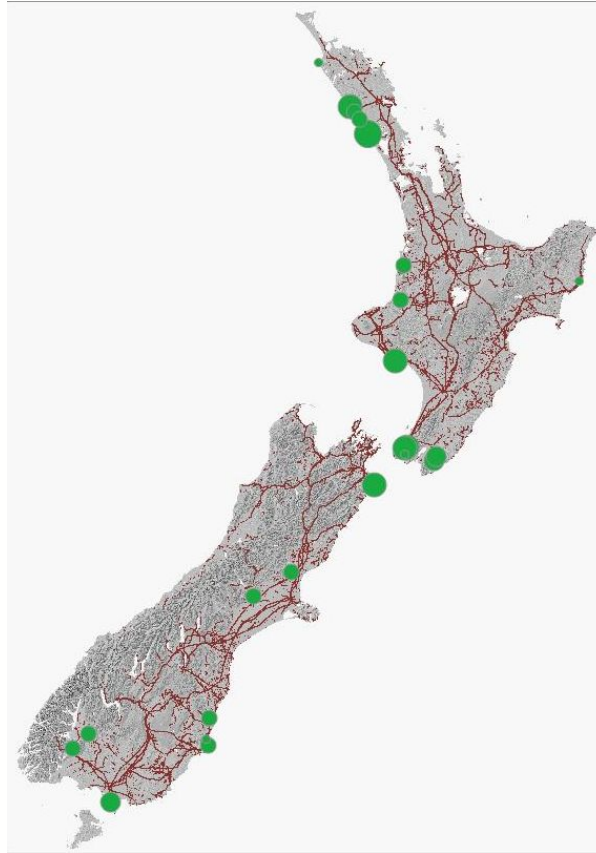


Why are projects notified?

- Advertising
 - Engaging community
 - Commercial positioning
- WPP capacity notified not necessarily indicative of realistic build

Project Hayes ('02)
Hauauru ma raki ('08)
Pouto Forest ('07)
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WPPs notified



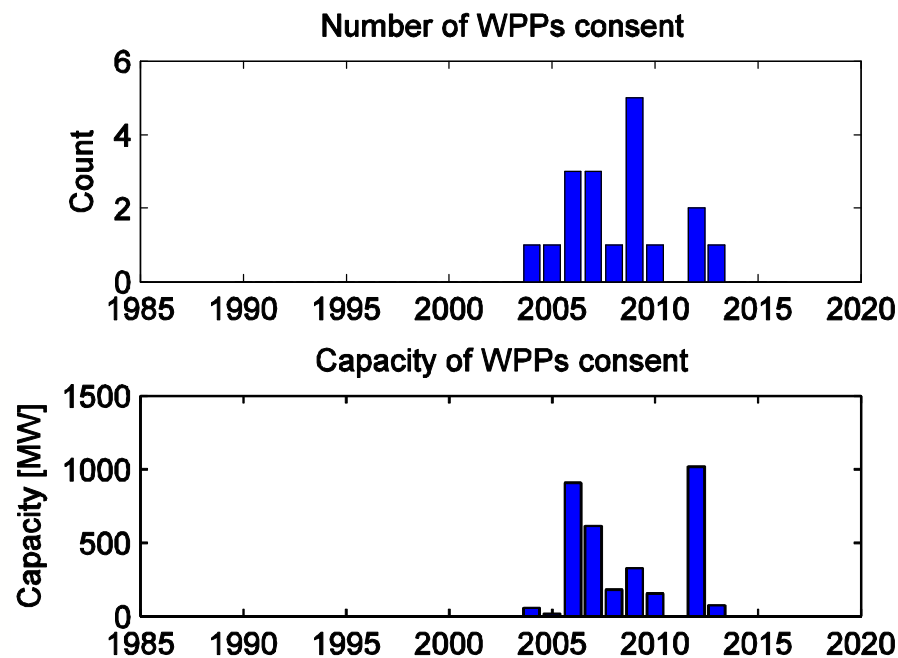
Why are projects notified?

- Advertising
- Engaging community
- Commercial positioning

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WPPs consented

Hawkes Bay
Motorimu
Puketoi
Central Wind
Hurunui
Castle Hill
Long Gully
Awhitu
Mahinerangi
Project Hayes
Kaiwera Downs
Mt Cass



What is consented:

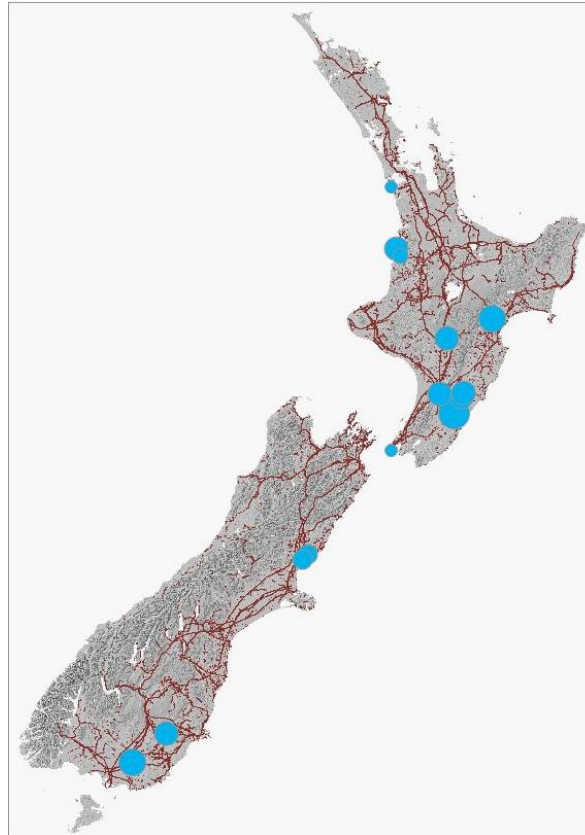
- No. WTs / capacity
- Length of consent?
- Conditions?
- Appeals...

Have not read consents!

Earlier WPPs reporting not in media

WPPs consented

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What is consented:

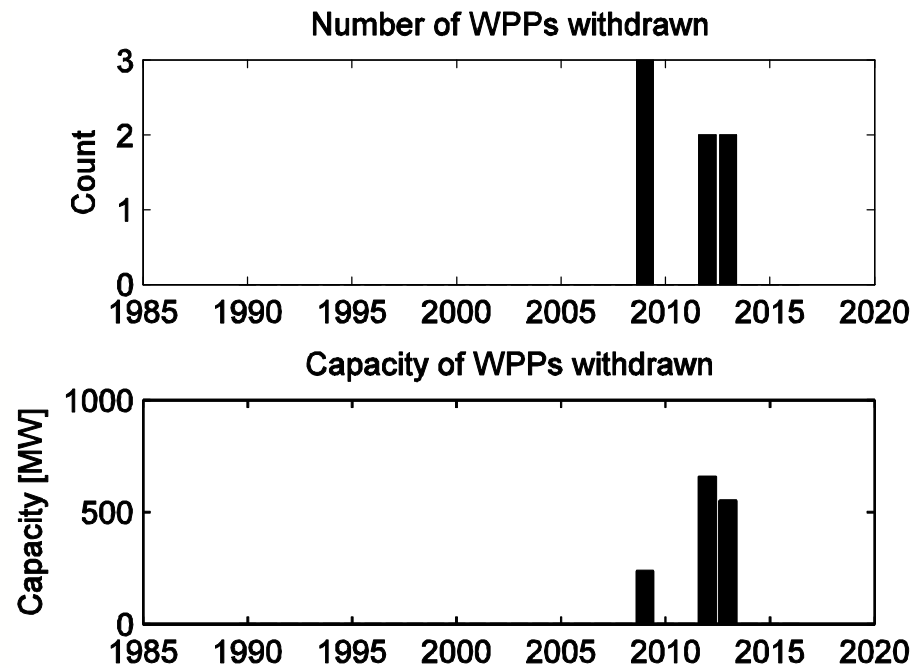
- No. WTs / capacity
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Have not read
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Earlier WPPs reporting
not in media

WPPs withdrawn!

Maungatua
Motorimu
Project Hayes
Rock and Pillar
Hauauru ma raki
Mt Munro

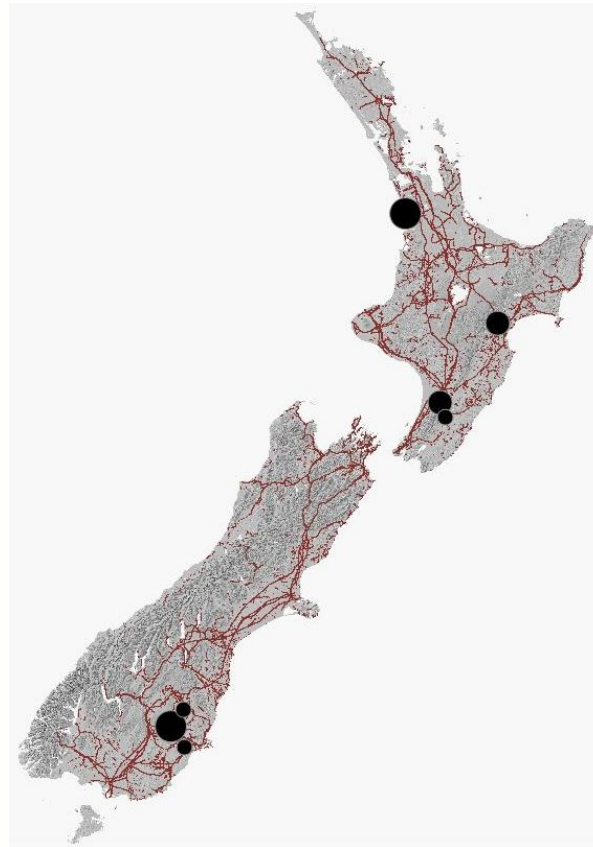


Have not included statements: "Project will not proceed in foreseeable future"

What is the motivation for withdrawing projects?

WPPs withdrawn!

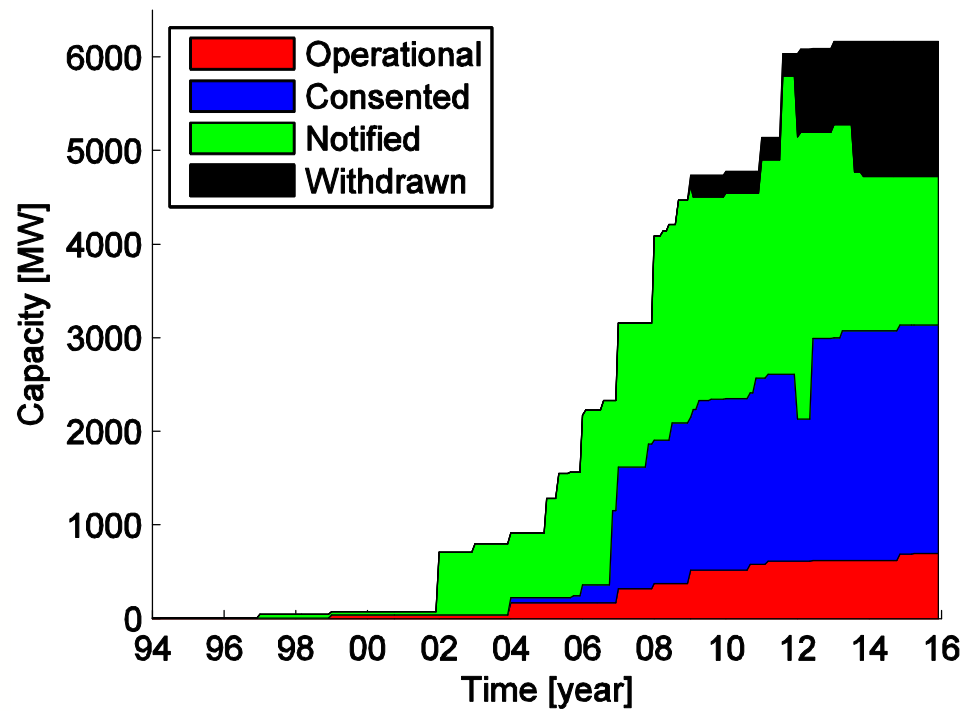
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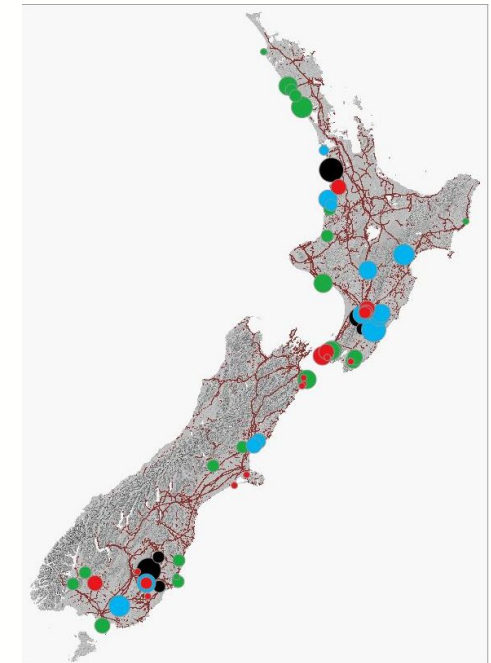
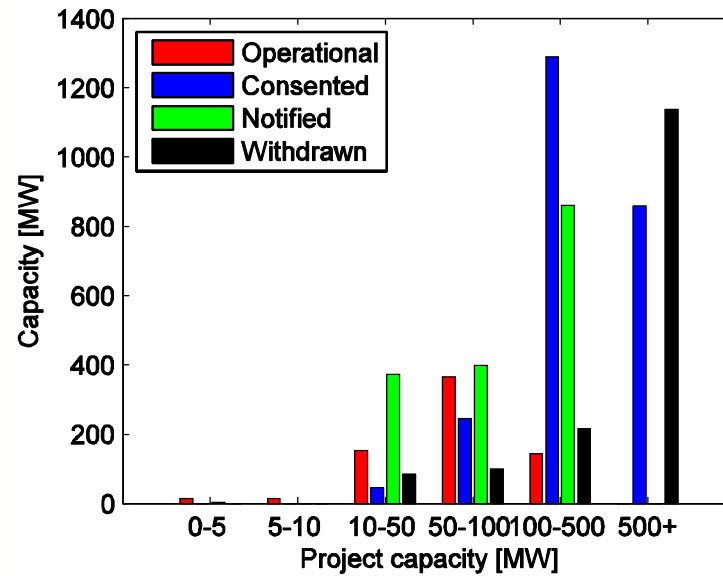
What is the motivation for withdrawing projects?

Capacity by time



Where are we now?

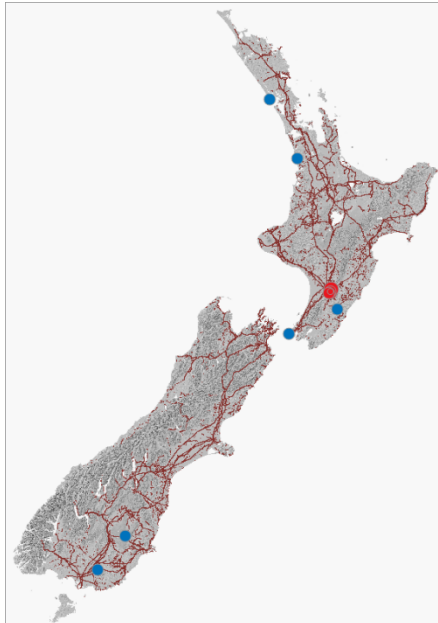
690 MW operational
1586 MW notified
2449 MW consented
1443 MW withdrawn



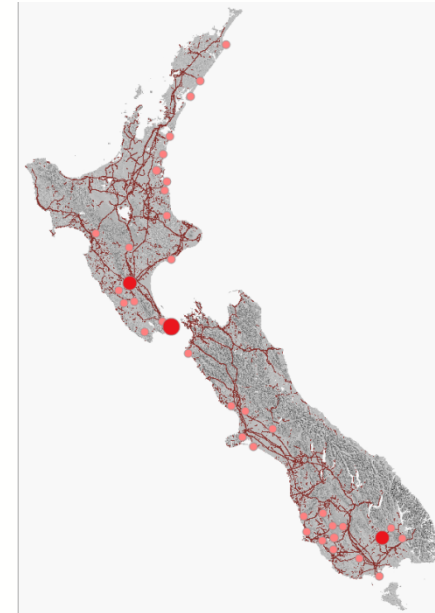
What is realistic?

- Wind resource (cherries picked?) – turbine technology near mature but longer blades.
- Transmission – voltage, span, capacity, Transmission to enable renewables... is the approach right?
- Access and civils
- Resource consenting
- Project cost (exchange rates, interest rates)
- Changing demand... EVs

Spatial diversity



Centralised: blue
Te Apiti + Tararua 1 2 & 3
+ Te Rere Hau (300 MW)



Diversified: red
Te Apiti + West Wind +
White Hill (300 MW)

Benefit spatial diversification

Centralised

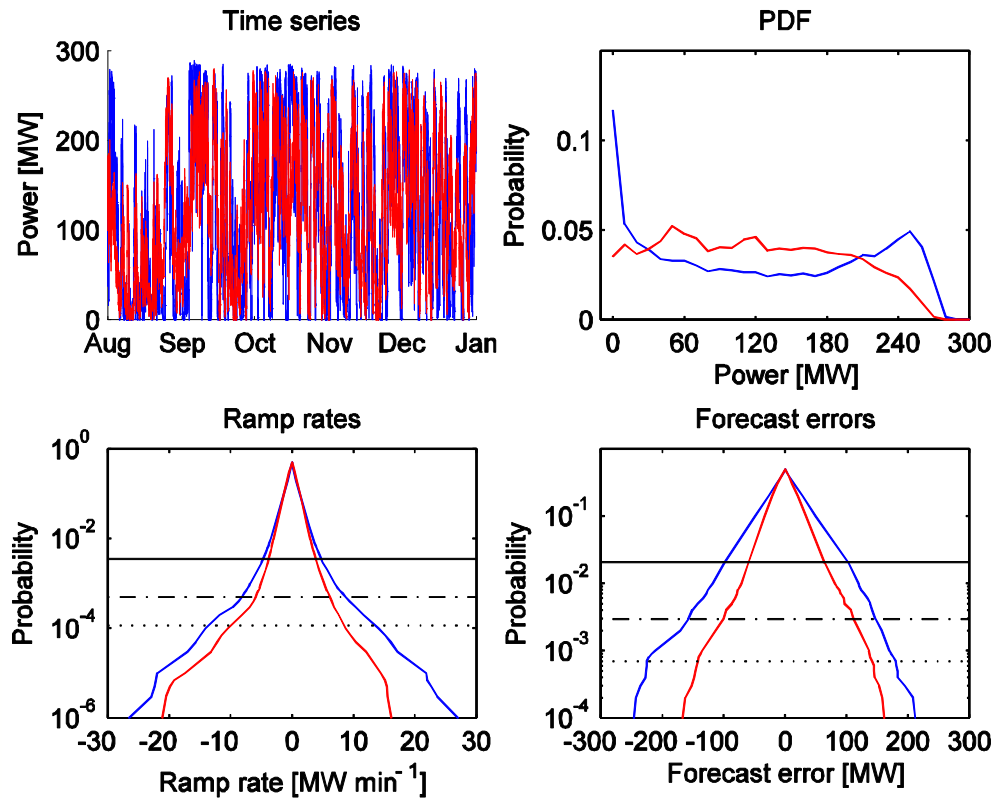
Te Apiti + Tararua 1 2 & 3 +
Te Rere Hau (300 MW)

Diversified

Te Apiti + West Wind +
White Hill (300 MW)

Less variable

(5min ramp rates =
reserves window)



More reliable
(lower variance)

More predictable
(2 hr offer close =
persistence)



Research papers



<http://www.epecentre.ac.nz/research/papers.shtml>

Dynamic Wind Farm Power Simulation

Dougal McQueen, Alan Wood, Dr Allan Miller, 14th Wind Integration Workshop, Brussels, October 2015

Wind Power Simulation Using Correlated Innovation Matrix and Wavelet Multi-Resolution Analysis Approaches

Dougal McQueen, Alan Wood, Dr Allan Miller, 14th Wind Integration Workshop, Brussels, October 2015



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