



**What is the Role of Wind Energy?**

In meeting New Zealand's Renewable Energy Target and Beyond

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New Zealand Wind Energy Association Conference Workshop, 13 April 2017



- Energy requirements to meet 90% and 100% renewable electricity
- Renewable wind generation and grid security
- The Future: beyond 100% renewable electricity to renewable energy

## Energy requirements to meet 90% and 100% renewable energy

- 90%: 34,000 GWh to 37,800 GWh (difference = 4,200 GWh)
- 100%: 34,000 GWh to 42,000 GWh (difference = 8,000 GWh)

# Energy requirements to meet 90% and 100% renewable energy



3,000 MW consented wind generation  $\equiv$   $\sim$ 10,500 GWh



300 MW consented  $\equiv$   $\sim$ 2,400 GWh



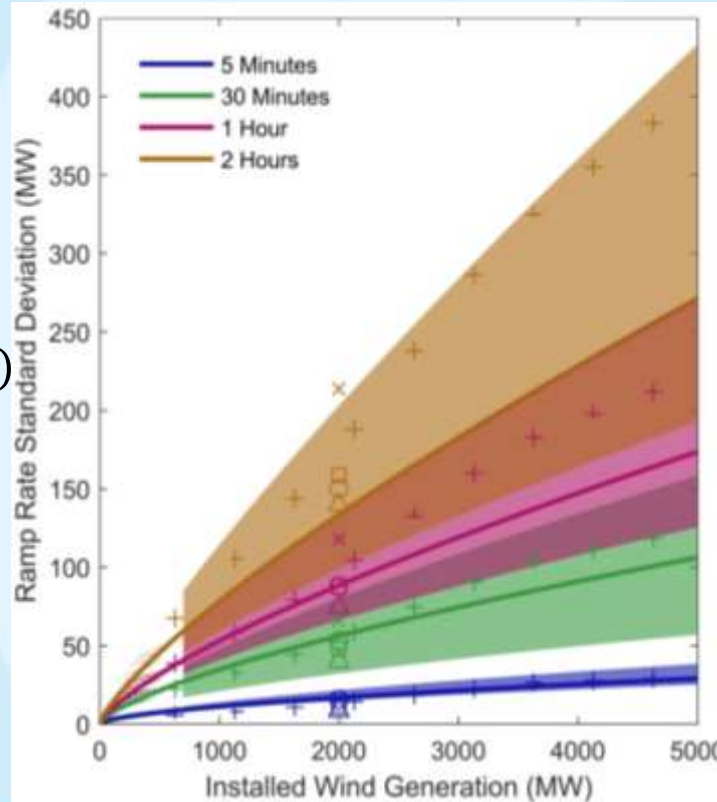
1,000 MWp solar PV (215 Wp/p)  $\equiv$   $\sim$ 3,700 GWh

# Renewable wind generation and grid security

- Can the grid cope with 3,000 MW of wind?

# Increasing wind generation – impact on variability

$\sigma(\Delta VRE)$

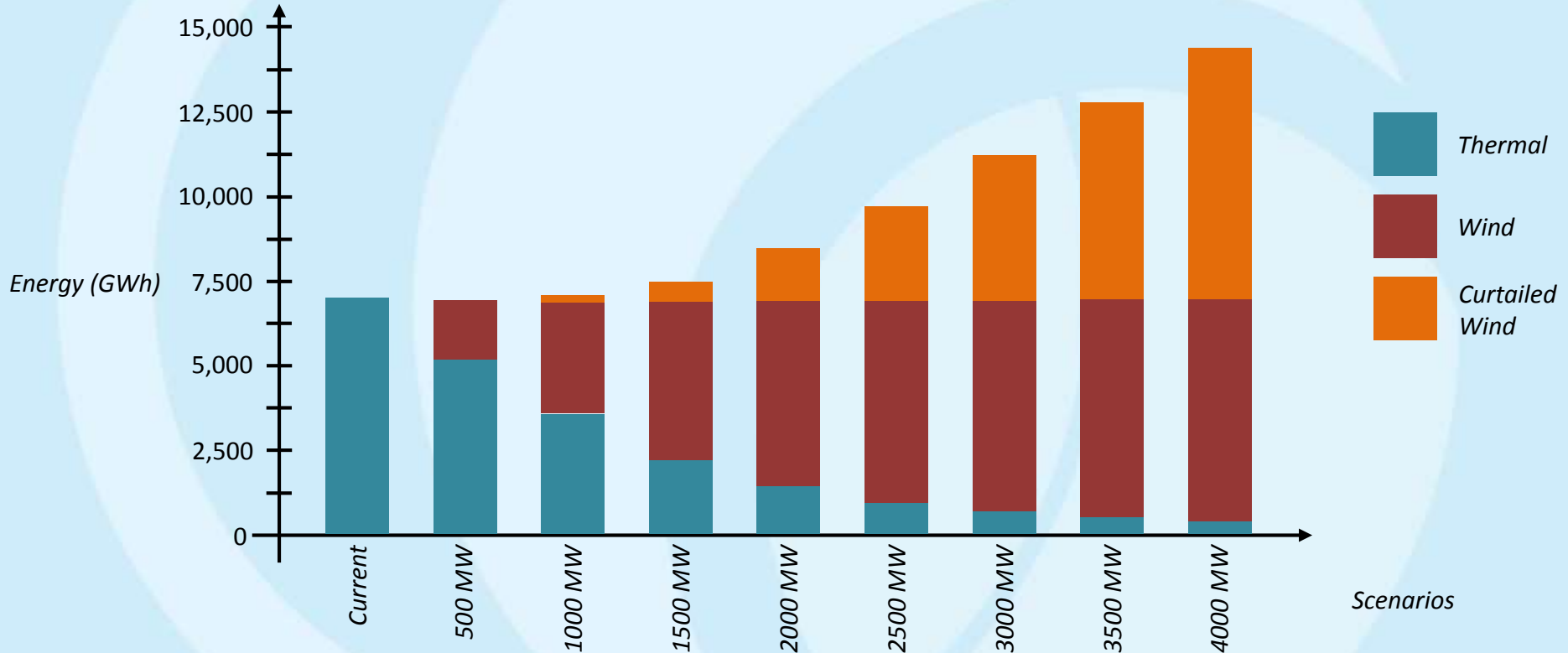


Dispatch

Frequency Keeping  
(Governor Response)



# Increasing wind generation – impact on contingency management?



# The Future: electrification to reduce greenhouse gas emissions

- Current annual electricity generation:
  - 42,000 GWh (34,000 GWh of this is renewably generated)
- Current annual replaceable non-renewable fuel use in transport and stationary energy (excluding air transport):
- Annual energy requirement from same processes powered by electricity:
- Reduction in delivered energy requirements for transport and stationary energy:
- Increase in renewable electricity generation requirements:
- Reduction in New Zealand's CO<sub>2</sub> emissions:



## Conclusion

- Planned wind is sufficient to meet 100% renewable energy in NZ
- Technically possible, but will require more ancillary services
- More geothermal and wind generation will be required beyond this to meet New Zealand's climate change NDC

### **Problem Statement:**

- **Is there sufficient incentive to build more wind generation to reach 100% renewable energy in NZ**
- **If not, how do we ensure sufficient incentive?**

Premium  
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Members



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