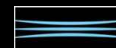


A person in a red and black harness is rappelling down a rope. The background is a dense forest of green trees, with several power lines stretching across the scene from the top left towards the bottom right. The lighting is bright, suggesting a sunny day.

# FUTURE POWER SYSTEM RESILIENCE AND THE ROLE OF WIND ENERGY

**JOHN CLARKE, GM SYSTEM OPERATIONS**



**TRANSPOWER**

# INTRODUCTION

The South Australian system black event: could it happen here?

The current power system reliability framework – challenge with greater variable renewables

**My problem statement** – managing dry year risk with 100% renewables – how will we achieve this?



# SOUTH AUSTRALIA

- System configuration, asset performance and operational risk management in a very dynamic situation
- Similar scenario possible in NZ – eg: storm event near Wellington
- Loss of wind output risk already being managed as a credible event - other mitigations include understanding of system controls like AUFLS
- Similar outcome unlikely, but raises some good questions about resilience.



# MANAGING SYSTEM RELIABILITY WITH INCREASING VARIABLE RENEWABLES

## Moving towards 100% renewable

Existing penetration of variable renewables (Wind/Solar) currently 5%.

Could be significantly greater if electricity demand grows due to electrification

## Current reliability framework

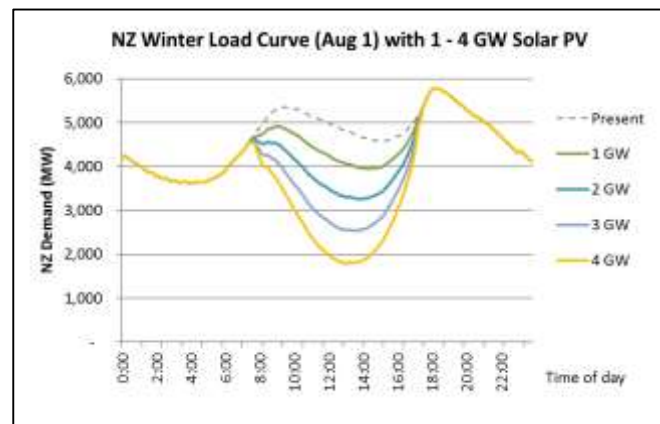
Sets performance objectives for SO role, performance obligations on asset owners to ensure system performance

Identifies credible events and controls.



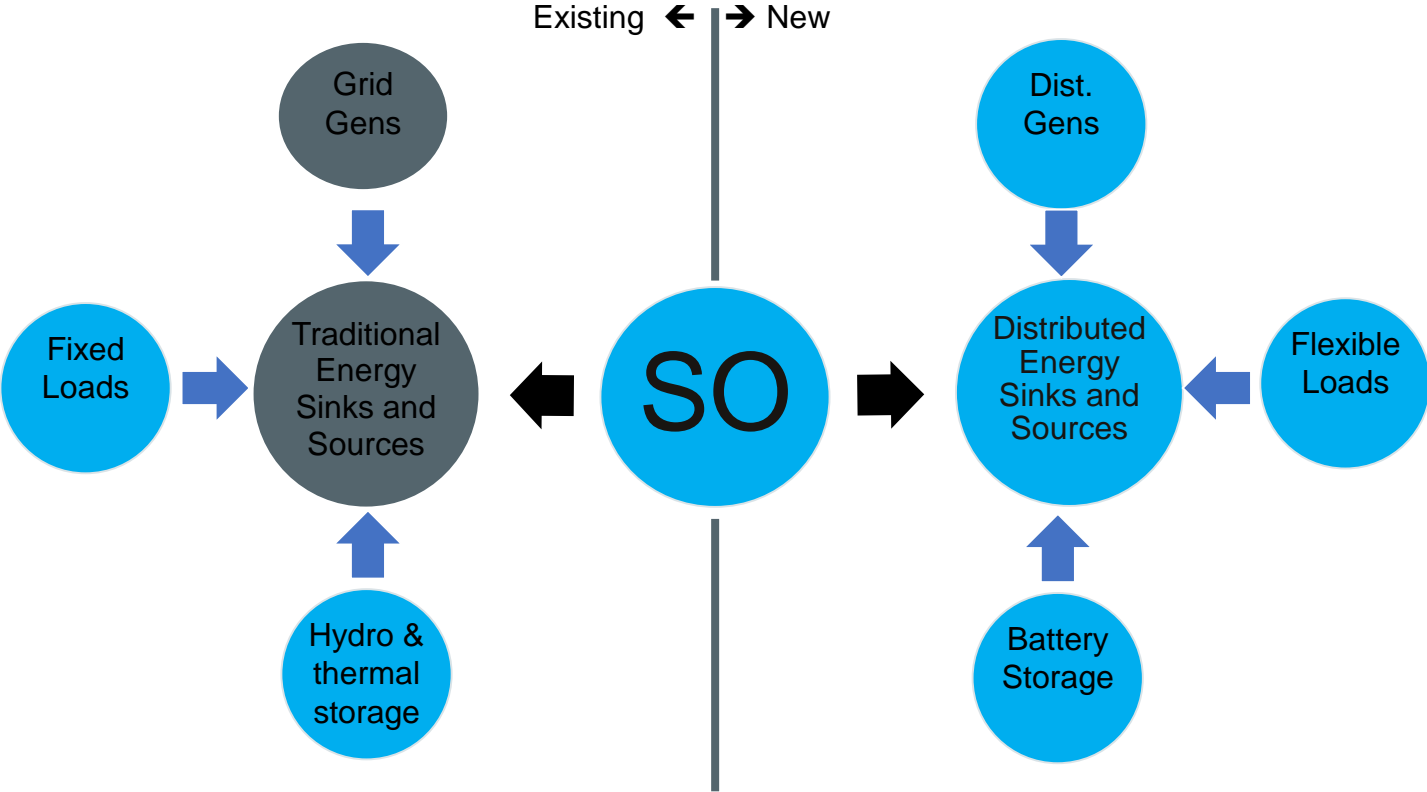
# MANAGING SYSTEM RELIABILITY WITH INCREASING VARIABLE RENEWABLES

- Reviewed ability to meet these power system performance objectives assuming up to 20% wind penetration in 2007
- Reviewing impact of extensive solar (July 2017) then extensive storage
- Asking if the current obligations, credible events and controls are appropriate for a 100% renewable future



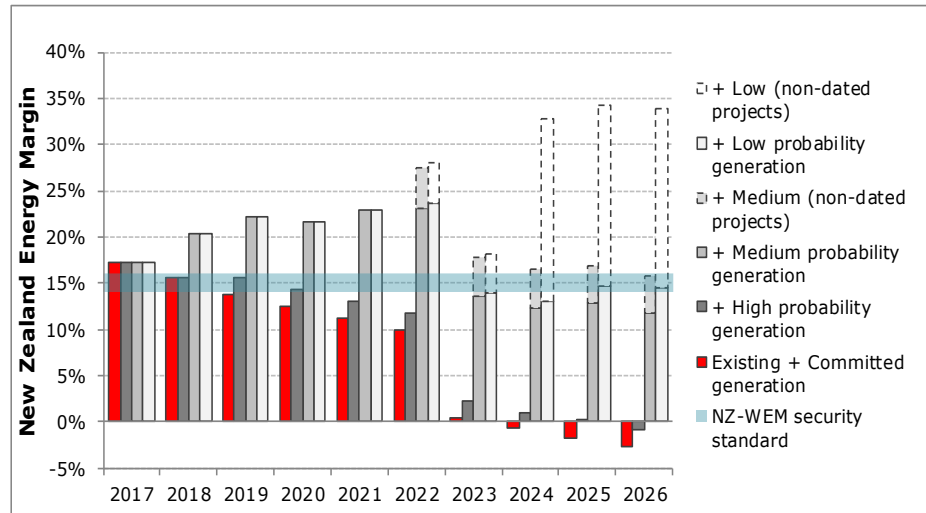
*Generation ramping study...*

# CO-ORDINATION CHALLENGE TO ENSURE RESILIENCE



# CHALLENGE WITH 100% RENEWABLES

- Resilience to a period of sustained low hydro inflows
- If thermals close, no recourse to gas or coal as a back up



# THE PROBLEM – A DRY YEAR (MEDIUM TERM SECURITY OF SUPPLY)

- **Dry year risk,**
- Who is **responsible?**  
Electricity Market – are the incentives and settings right?
- What are our **choices** –  
greater risk, over capacity,  
other?
- What is the role of **wind**  
energy?





# FIVE QUESTIONS





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