



SOLAR PV

UNDERSTANDING THE IMPACTS TO THE GRID

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GENERAL MANAGER INNOVATION AND SYSTEM OPERATIONS



TRANSPower

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POWERING NEW ZEALAND TODAY + TOMORROW

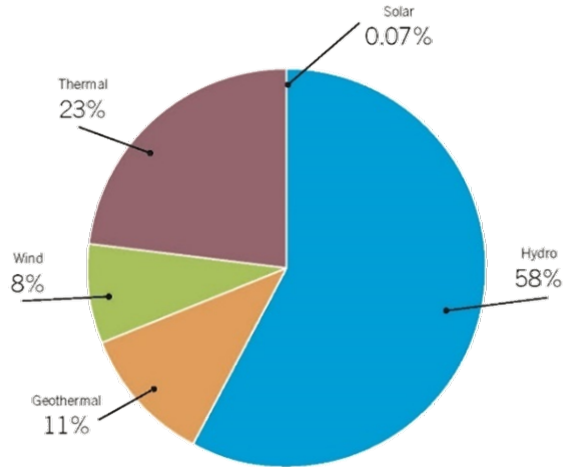


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**HOW WILL THE POWER SYSTEM RESPOND TO A
SIGNIFICANT INCREASE IN SOLAR PV?**

SOLAR PV CONTINUES TO GROW IN NZ

NEW ZEALAND ELECTRICITY SYSTEM GENERATION CAPACITY MIX



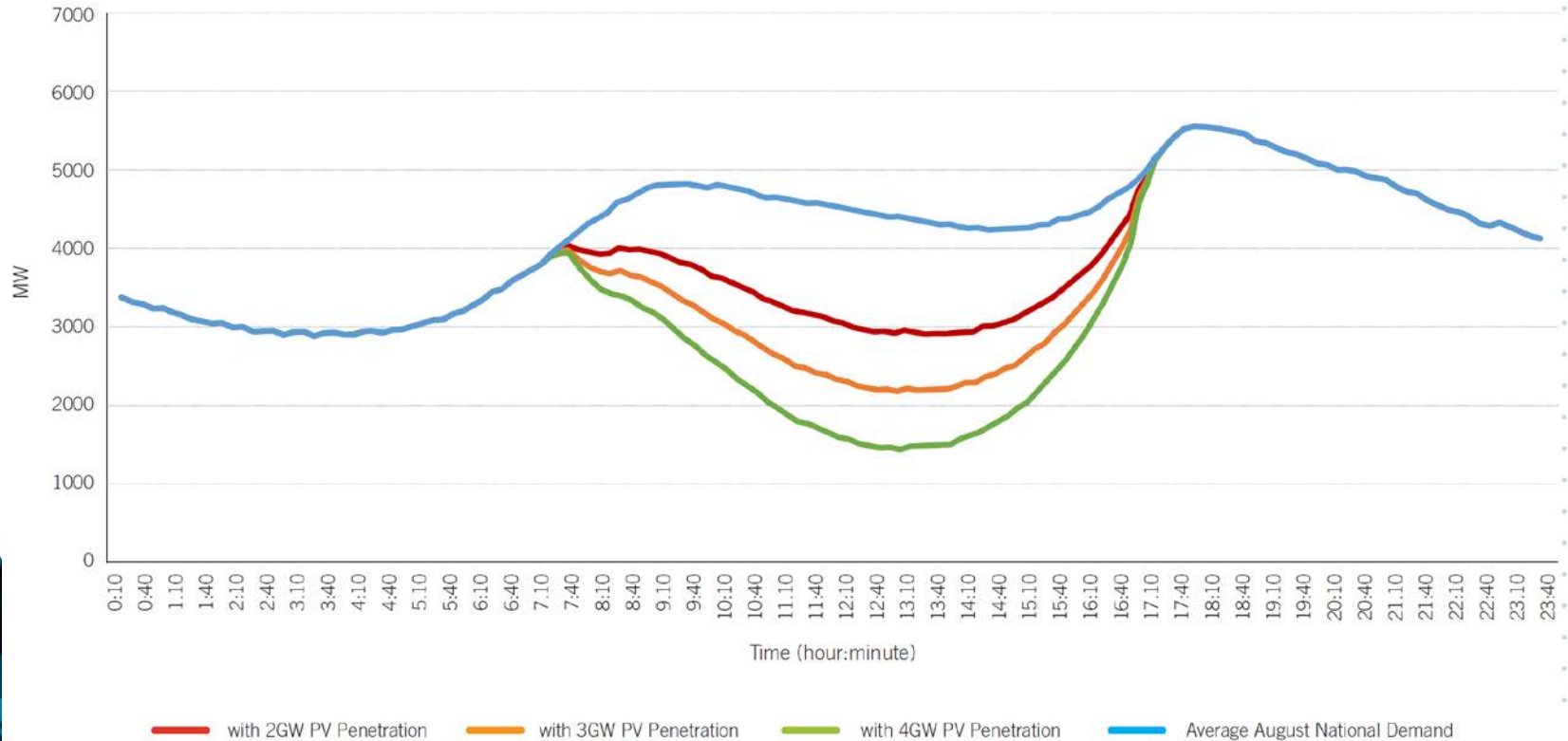
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OUR RESEARCH SCENARIO



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“DUCK CURVES” – COMPARING AVERAGE DEMAND IN AUGUST



KEY FINDINGS

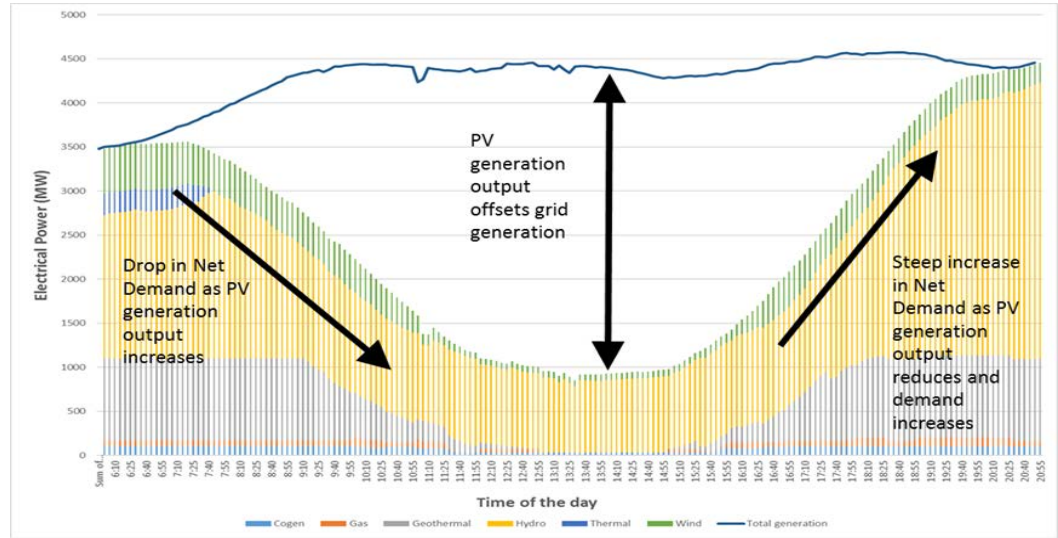
The power system is an enabler – the core transmission network can comfortably accommodate up to 2 GW of distributed PV generation.

Over 2 GW, operational management of the power system begins to be impacted and requires active management by the system operator, and potential investment in reactive power support to meet our existing performance standards.

PV inverters that do not comply with the requirements standard will cause issues, imposing costs and limitations on power system capability in the future.

OUR AREAS OF STUDY

- Generation dispatch - ramping
- Frequency management
- Voltage management
- Transient stability



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HIGH-LEVEL FINDINGS

Generation dispatch

- Larger synchronous generators were displaced off the system during the day, which reduced system inertia.
- Existing dispatchable generation had sufficient ramping capacity to be able to balance load and demand due to rapid changes in PV generation.

Frequency management

- Frequency performance will be acceptable in most likely scenarios.
- The rate of change of frequency will increase with solar PV, which will likely require modifications to under-frequency event management objectives and controls such as AUFLS/extended reserves.

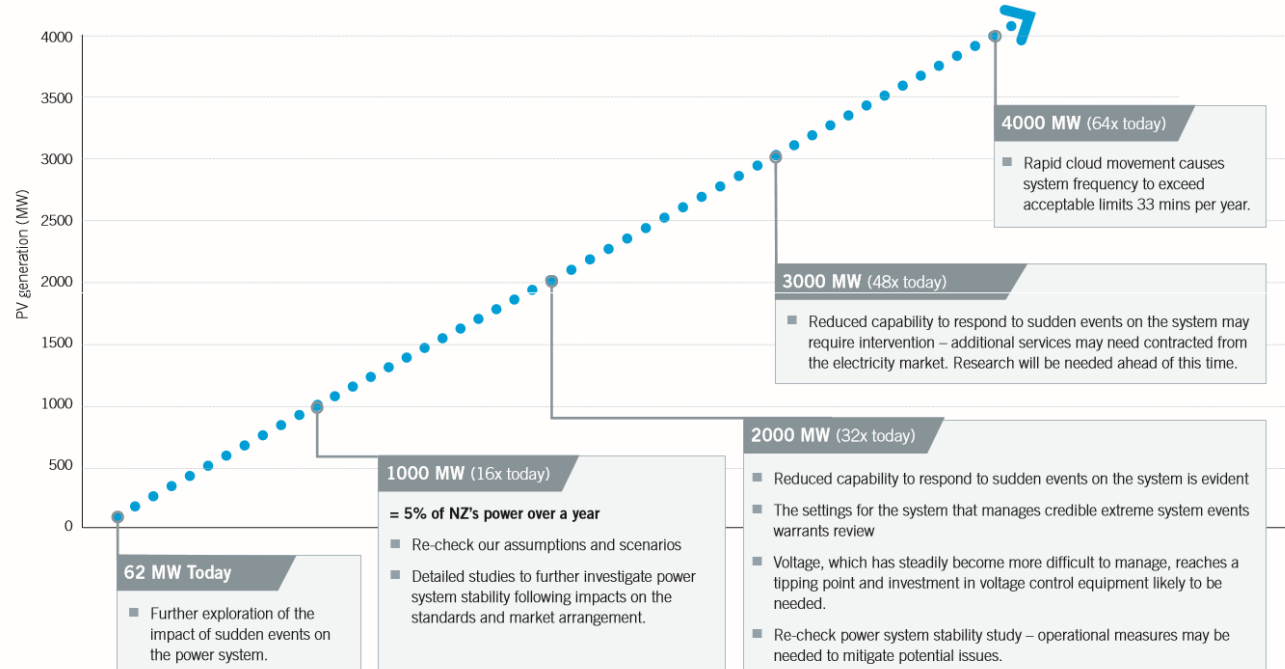
Voltage management

- Above 2GW of solar PV, more active high voltage management will be required during the day.
- Inverter technology must comply with AS/NZS 4777.2 and be able to ride through power system events. One common inverter modelled was non-compliant in this regard.

Transient stability

- The transient stability of the power system will be as good if not better than the existing system.

FUTURE STUDIES

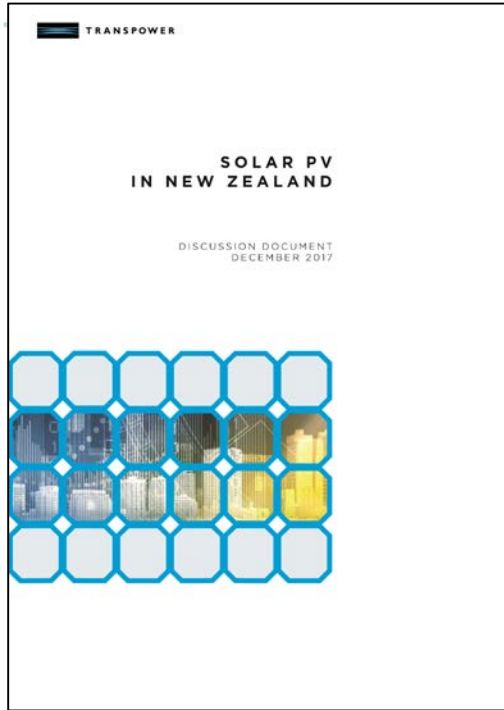


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An aerial photograph of a large solar farm installed on rolling hills. The sun is low on the horizon, creating a warm, golden glow across the sky and landscape. The solar panels are arranged in neat, rectangular rows that follow the contours of the hills. In the background, a range of mountains is visible under the hazy sky. The overall scene conveys a sense of clean energy and sustainable development.

FUTURE GENERATION MIX?

WHAT ROLE WILL DISTRIBUTED SOLAR PV PLAY?



READ MORE AT [TRANSPOWER.CO.NZ/SOLAR](https://transpower.co.nz/solar)

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A photograph of two people, a woman with dark hair on the left and a man with blonde hair on the right, looking at a computer monitor. The monitor displays several financial charts, including a green line graph and a yellow area chart. The word "QUESTIONS" is overlaid in large white capital letters across the center of the image.

QUESTIONS