

What does climate change mean for wind and other renewable generation?

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Surface pressure changes

Seasonal mean sea level pressure change (2081-2100)

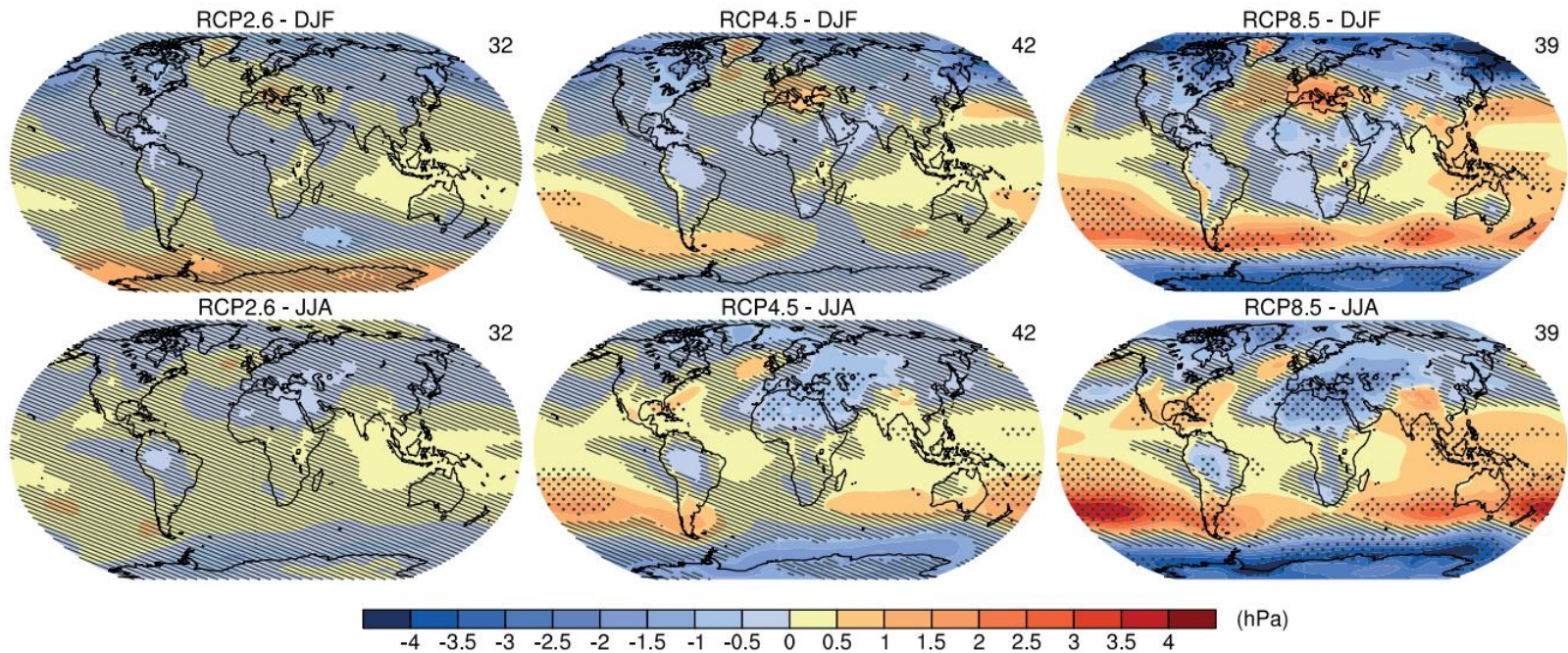


Figure 12.18 | CMIP5 multi-model ensemble average of December, January and February (DJF, top row) and June, July and August (JJA, bottom row) mean sea level pressure change (2081–2100 minus 1986–2005) for, from left to right, RCP2.6, 4.5 and 8.5. Hatching indicates regions where the multi-model mean change is less than one standard deviation of internal variability. Stippling indicates regions where the multi-model mean change is greater than two standard deviations of internal variability and where at least 90% of models agree on the sign of change (see Box 12.1).

East-west wind changes

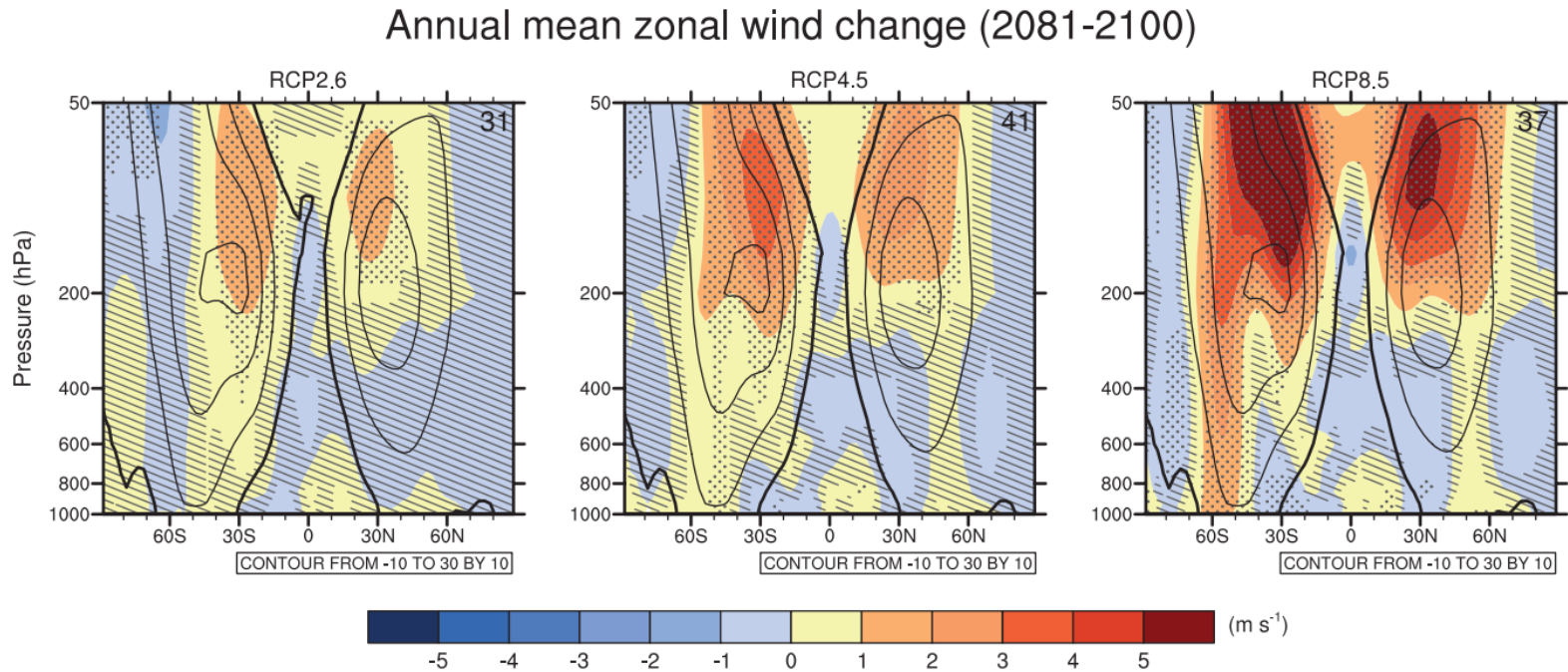
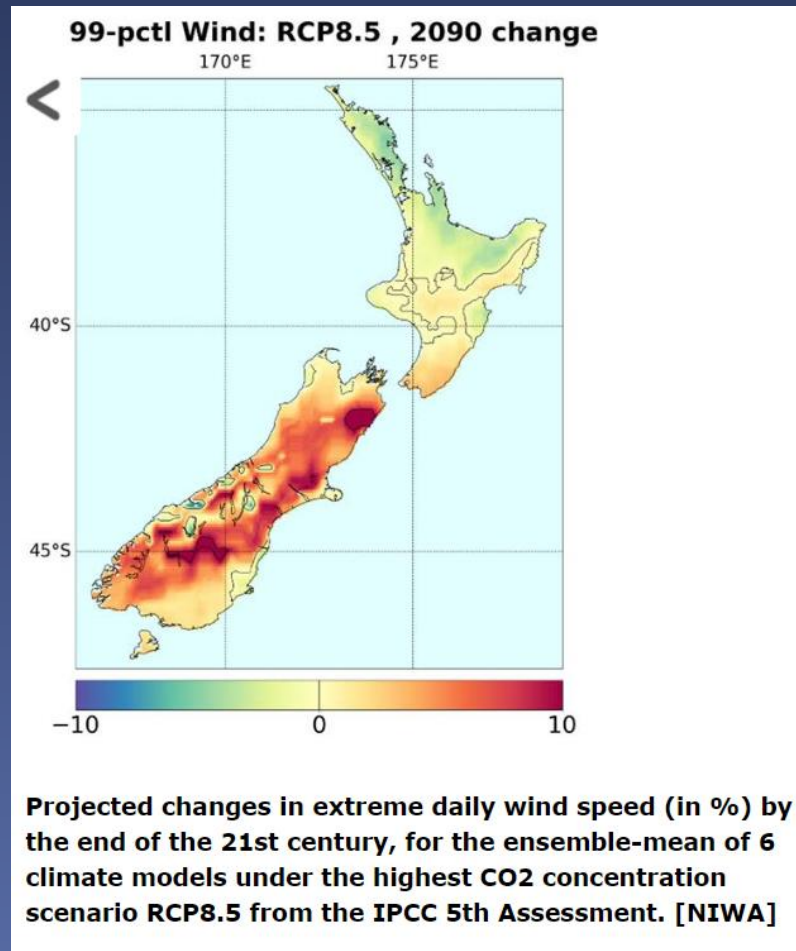


Figure 12.19 | Coupled Model Intercomparison Project Phase 5 (CMIP5) multi-model ensemble average of zonal and annual mean wind change (2081–2100 minus 1986–2005) for, from left to right, Representative Concentration Pathway 2.6 (RCP2.6), 4.5 and 8.5. Black contours represent the multi-model average for the 1986–2005 base period. Hatching indicates regions where the multi-model mean change is less than one standard deviation of internal variability. Stippling indicates regions where the multi-model mean change is greater than two standard deviations of internal variability and where at least 90% of models agree on the sign of change (see Box 12.1).

Summary for New Zealand

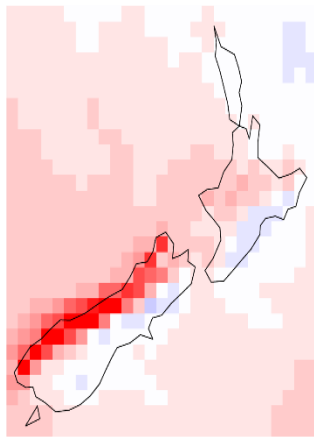
- The storm track intensifies as the pressure difference between the subtropics and polar airmass intensifies
- This means the westerlies are expected to intensify
- Especially in the lower North Island and across the South Island
- Likely to be partially offset by ozone recovery signal

Extreme winds likely to increase

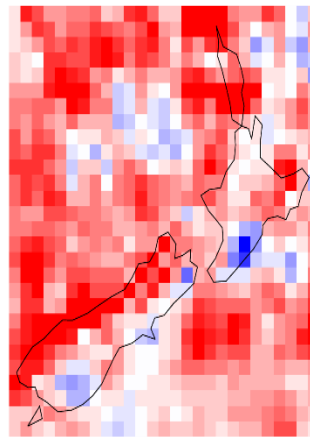


This also drives shift in rainfall

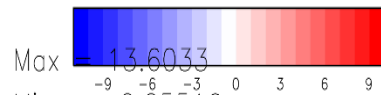
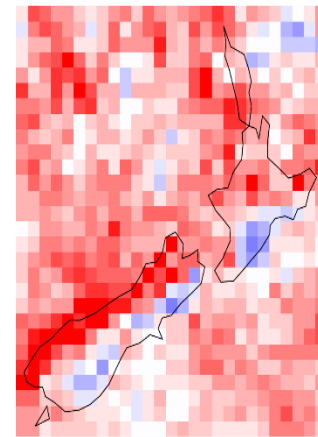
Rx1d for Jun (mm) ensMean
ALL minus NAT (2015)



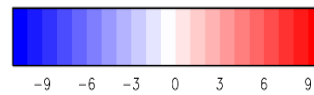
Rx1d for Jun (mm) mean of > 98 pcile
ALL minus NAT (2015)



Rx1d for Jun (mm) value at 98 pcile
ALL minus NAT (2015)



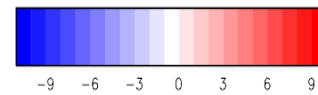
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Min = -2.25516



-9 -6 -3 0 3 6 9

Max = 19.0536
Min = -10.1545

Max = 17.1525
Min = -5.71503



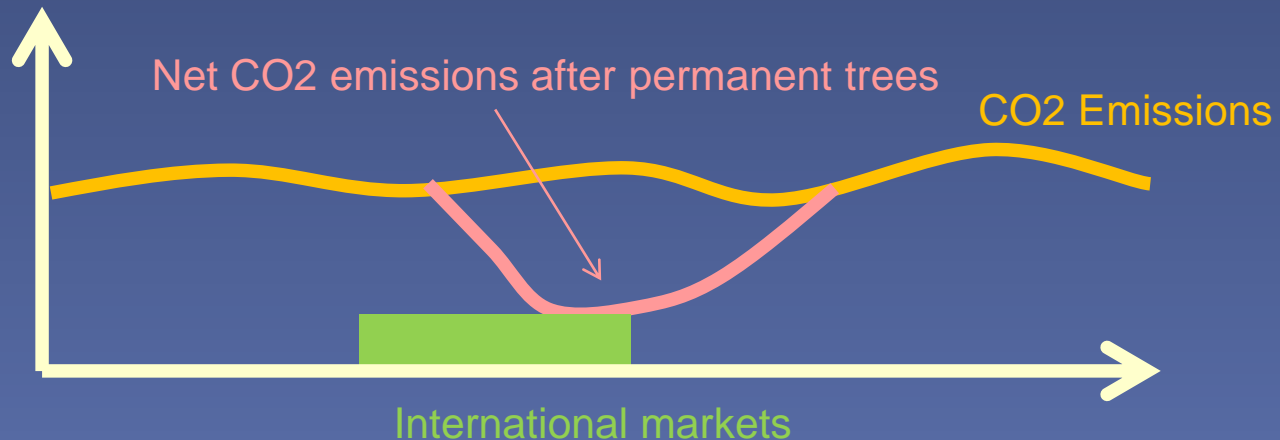
-9 -6 -3 0 3 6 9

Climate policy thoughts

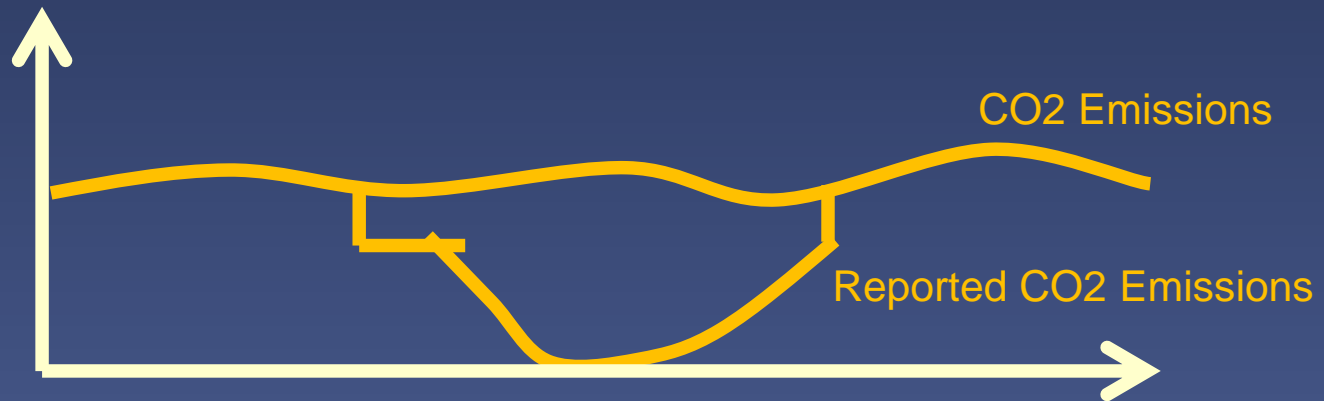
- The operating context for renewables will depend quite a bit on policy choices
 - Certainty around Tiwai
 - Commitment to a specific fraction of renewable generation
 - Electrification of vehicle fleet vs hydrogen fuel cells vs public transport vs shifts in behaviour
- A meaningful commitment to “net zero” emissions should not involve dodgy accounting tricks
 - I read the PCE, Prod Com reports as making this point
 - Understanding stocks and flows is vital

Stocks and flows in emissions accounting

Stocks	Flows
Domestic CO ₂ emissions	
	Domestic CH ₄ emissions
International CO ₂ purchases	International CO ₂ purchases
Permanent forests	Temporary forests



Everything except permanent CO2 reductions is a temporary expedient



- If we rely on international purchases of CO2 credits and forestry sequestration to achieve net zero CO2, we will still have the bulk of the job of climate policy ahead of us in 2050, even if we are technically Net Zero in 2050.