Low emissions scenarios for the NEM

Mapping near-least-cost portfolios
Or
"Wind is King"

Ben Elliston, Jenny Riesz
Centre for Energy and Environmental Markets (CEEM)
University of New South Wales (UNSW Australia)
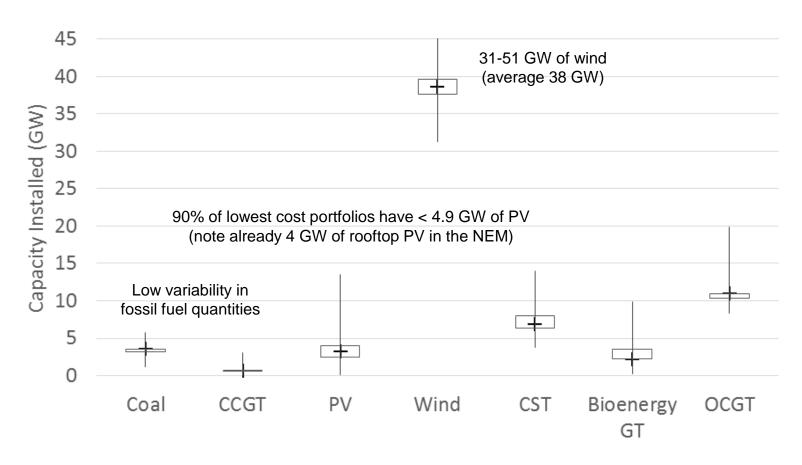
Approach

- Modelling with NEMO
  - Genetic algorithm to optimise a generation portfolio to meet hourly demand profiles, to the required reliability standard (0.002% USE), at lowest cost
- Technology costs from Australian Energy Technology Assessment (AETA) 2013
  - Coal, CCGT, OCGT, PV, wind, CST with storage, hydro, pumped storage hydro, biogas turbines
- Greenhouse gas emissions limited to ¼ of current NEM emissions
- Calculated cost for 20,000 candidate portfolios
  - Analysed those within $10/MWh (15%) of least cost (8,200 portfolios)
- Aiming to understand diversity of low cost scenarios
  - Identify aspects that are key to achieving low costs

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Portfolios within $10/MWh (15%) of lowest cost

31-51 GW of wind
(average 38 GW)

90% of lowest cost portfolios have < 4.9 GW of PV
(note already 4 GW of rooftop PV in the NEM)

Low variability in
fossil fuel quantities

Boxes: 1st & 3rd Quartiles, Lines: Max & Min, Crosses: Median

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Conclusions

- All lowest cost portfolios include significant quantities of wind generation (31-51 GW)
    - Suggests policy frameworks to facilitate major wind development and grid integration should be a high priority
- Much less PV (90% < 4.9 GW)
    - Policies to promote PV may be unwarranted, without storage/DSP
- "Baseload" low emission technologies relatively unimportant
    - To achieve emissions ¼ of present NEM

Centre for Energy and Environmental Markets

Contact me at:
Jenny.riesz@gmail.com

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