

Botched transmission is a botched transition

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What is my talk about?

- ▶ The Integrated System Plan (ISP) and its “actionable projects” (interconnectors).
- ▶ Reason and evidence to suggest the ISP, specifically its “actionable projects”, are bad mistakes, and explanation of where the errors arise.
- ▶ Suggestions on how the situation might be improved.

Context to the “actionable” ISP

- ▶ 2010 AEMO created, floats “NEMLink”: 500 kV Hobart to Brisbane “backbone”
- ▶ 2017 Finkel Review: “integrated grid plan ... signal to investors about the future of the network”
- ▶ 2017 Snowy 2.0
- ▶ 2018-20: PEC & AER
- ▶ 2020: “No transition without transmission” ... “Actionable ISP rules”
- ▶ 2020-24: And so, central planner that can ensure its plans are delivered, not just “signal to investors”, is born.

The ISP (and its “actionable projects”) make undeliverable promises

- ▶ The promise: “Optimal” quantity of generation, transmission and storage and so “lowest cost” system-wide expansion and operation cost.
- ▶ The reality:
 1. Simplified network, power system characterisation (unavoidable)
 2. Supply and demand uncertainty assumed away (unavoidable)
 3. The market is assumed away (unavoidable):
 - a) Missing money
 - b) Geographic supply diversification ignores price impact
 4. Opaque and not replicable (AEMO unable to specify objective function – largely unavoidable)

Our work, in collaboration with others, has also identified various important (but subsidiary) errors of calculation

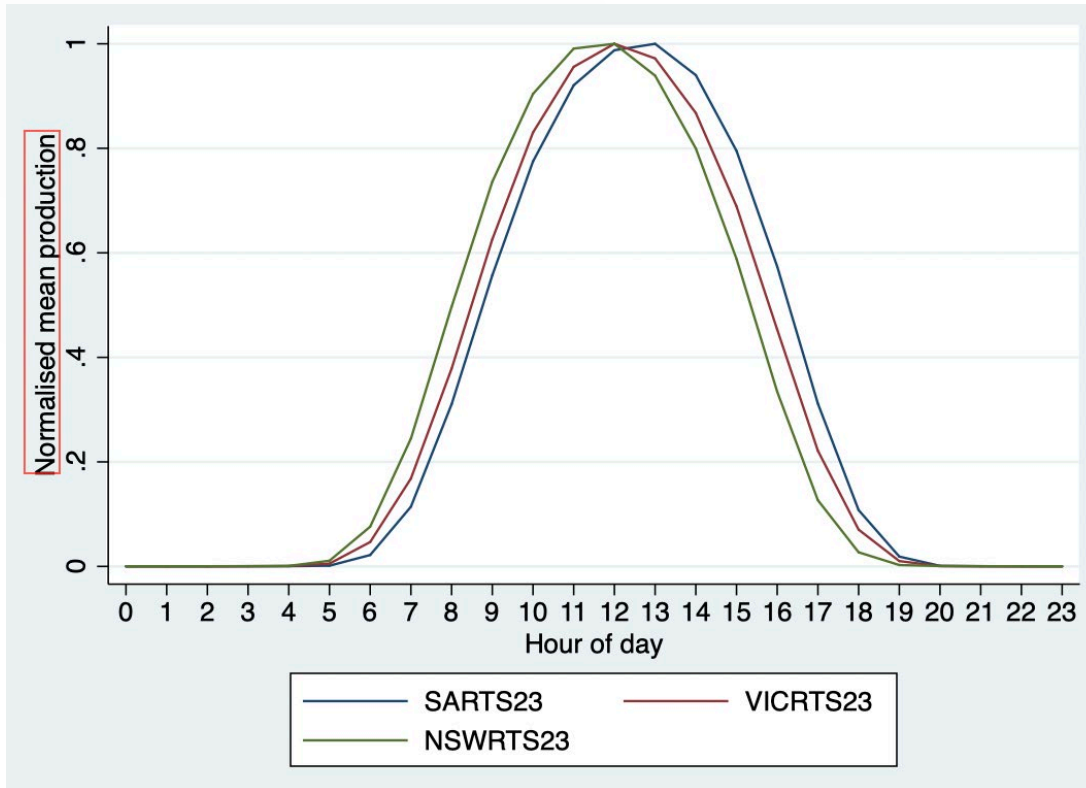
- ▶ Biased counter-factual
- ▶ GHG emissions not properly valued
- ▶ Salami slicing
- ▶ Under-costing
- ▶ Local social and environmental costs excluded
- ▶ No recognition of transmission outages

What is the “missing money” critique ?

1. Wind/solar resource (not market dispatch) used to identify optimal quantity and location.
2. Modelling ignores actual network-driven curtailment in least cost calculation e.g. even after VNI-West is built (35% curtailment on average in SW NSW REZ and similar in West Vic and Murray REZs in Vic from 2030 to 2050).
3. Wind/solar received prices in these REZs must be 54% higher to compensate for curtailment (or 81% higher after counting 0.85 marginal loss factor).
4. So, (huge) missing money ... customers and tax-payers will have to fill the hole if new projects are to be built.
5. AEMO's response? Not our problem, our plan is optimal and we don't need to include this missing money in our plan ... “NEM reform activities” will sort out.

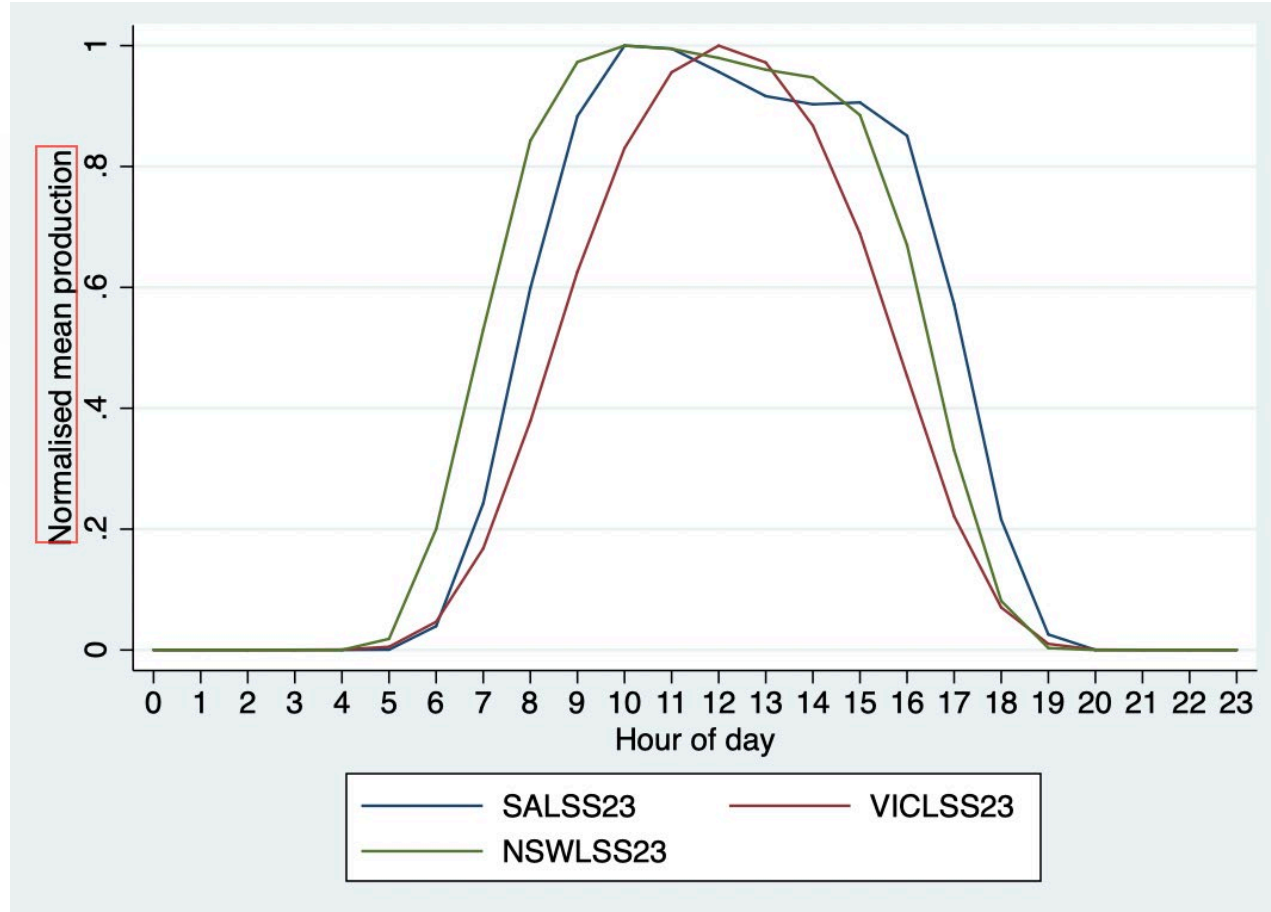
What is the diversity critique ?

Interconnection between NEM regions can be valuable if resources are plentiful in one region when they are scarce in another.



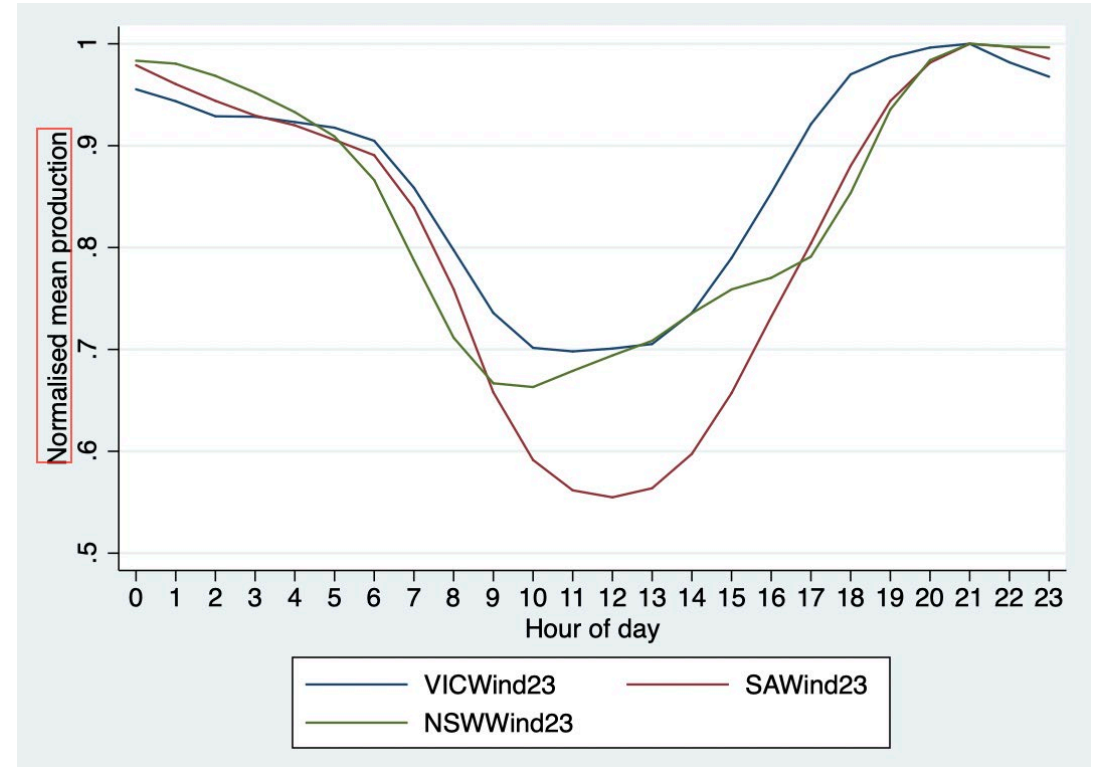
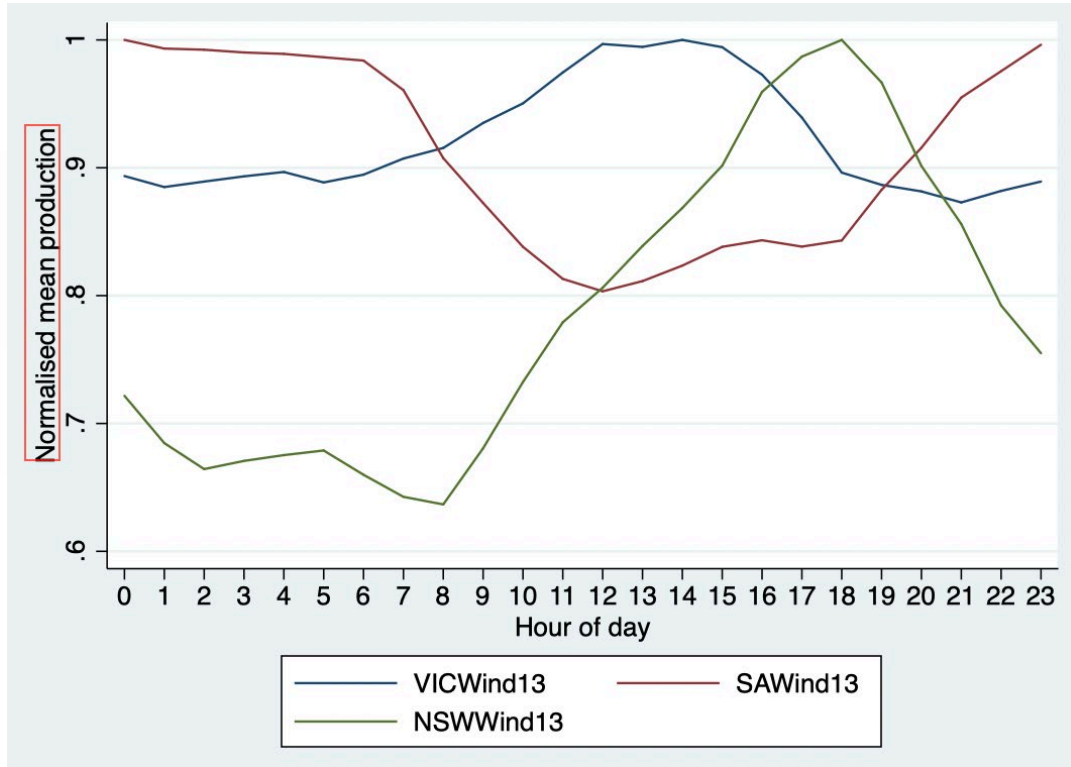
Rooftop solar (RTS) in NSW, SA and VIC is highly correlated. Expected.

What about diversity in large scale solar (LSS) ?



Not much. Again, expected

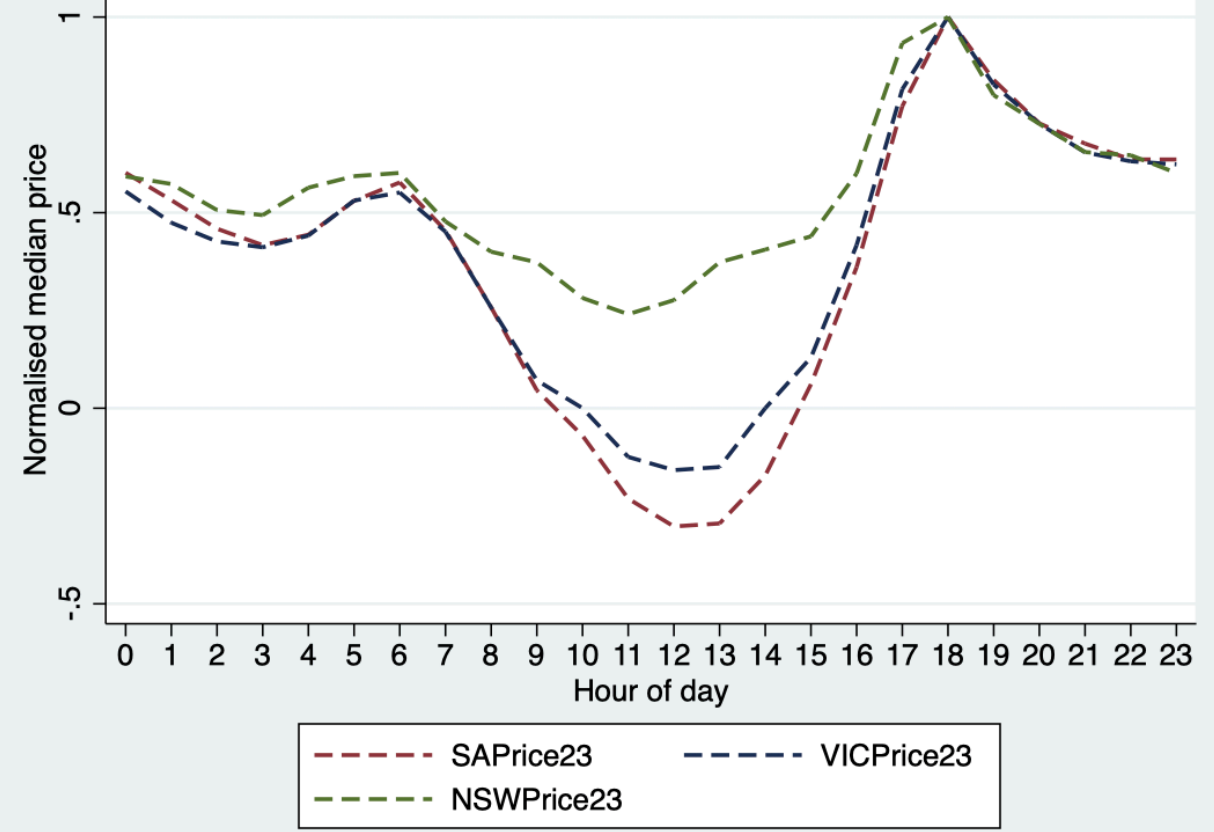
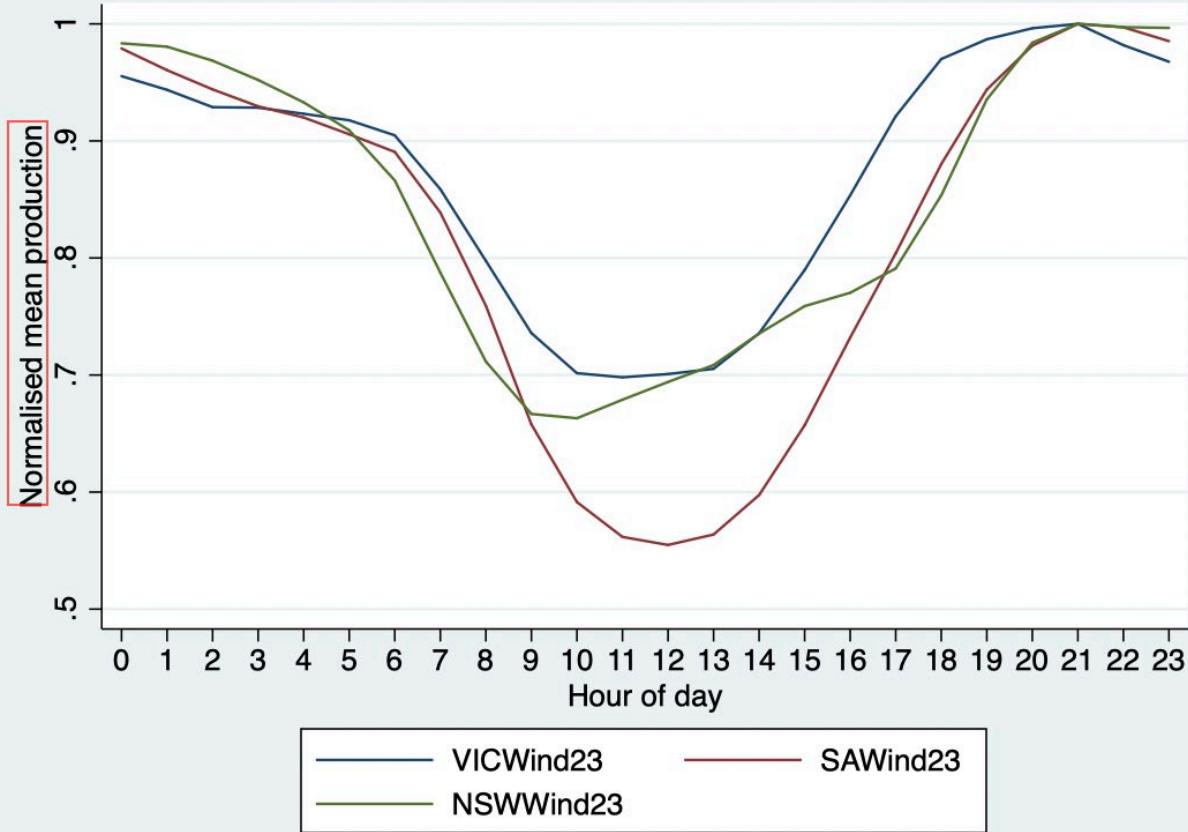
What about diversity in wind?



Looking at 2013 (left chart), prima facie evidence of regional diversity, may justify some interconnection. But by 2023 (right chart): wind farms now singing from same song-sheet.

Q: But why do the wind farms now sing from the same song-sheet?

A: They respond to prices



Wind farms (left chart) dispatching in response to prices (right chart). Wind diversity likely to reduce further as RTS grows and RET ends (no more LGCs to encourage production even when $P_{spot} < 0$).

Is it possible to fix these modelling errors ?

If we could ever be confident in our ability to model a market, we may just as well get rid of the market to save the transaction and search costs.

Implications and suggested direction for reform

1. Does the faulty AEMO modelling matter? Yes, because the higher cost solution has implications for everyone and needs to be recognized. This has not yet happened, in part because a national planning body is necessarily more remote from the interested and concerned parties.
2. Any body charged with developing a model and policy will have difficulty finding the best policy and if appropriate changing its mind, but that problem is greater if that body has “national” responsibility. Smaller planning entities offer better ability to involve all interested parties and to work out a mutually acceptable way forward.
3. Allowing a variety of different planning entities to develop their own approaches increases the chances of finding the best approach, from which others can learn.

Specific suggestions

- a) Shrink AEMO back to power system operation only. Spin out market operation to a not-for-profit association accountable to market participants and make state authorities responsible for generation connection.
- b) Make states individually responsible for transmission expansion planning, transmission and distribution economic regulation, in their states.
- c) Leave states to agree amongst themselves on interconnection and how their costs and benefits are to be shared.
- d) Revive the “inter-regional planning committee” and ask it to periodically offer perspectives on inter-regional transmission development.
- e) Federal Government to involve itself through Capacity Investment Scheme or similar to drive national emission reduction objectives.

Resources

- ▶ Data: all data is sourced from NEMWeb accessed via www.v-nem.org. Data (and Stata code) is available from the author on reasonable request.
- ▶ Humelink: <https://www.vepc.org.au/humelink>
- ▶ VNI-West: <https://www.vepc.org.au/vni-west>
- ▶ MarinusLink: <https://www.vepc.org.au/marinus-link>
- ▶ Related policy and economics: <https://www.vepc.org.au/australian-electricity-markets-policy-and-economics>