



Poverty of vision holds back Australia

David Leitch, ITK, April 2018

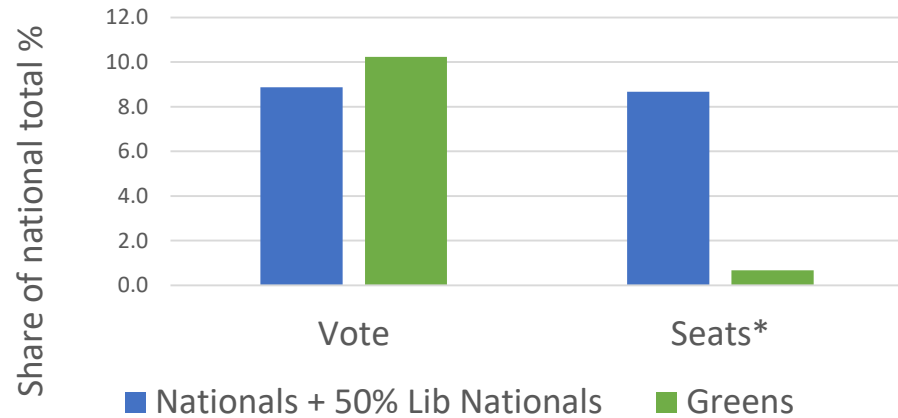


About ITK

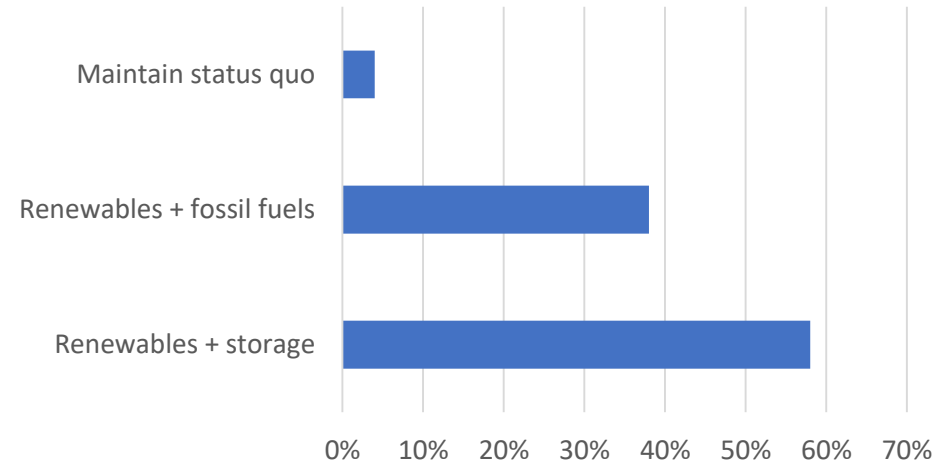
- David Leitch – Principal ITK
 - Research analyst at UBS, JPMorgan and predecessor firms for 33 years. David's various teams achieved No 1 in Greenwich survey in 3 separate sectors over that time period. Consistent top 3 in utilities 2004-2016.
- Analysis of electricity, gas and decarbonisation.
 - Company analysis
 - Investment second opinions
 - Market reviews
- Some work is done on voluntary basis and found at www.reneweconomy.com.au.

Politics- The people are ahead of the pollies

Lower house of Parliament doesn't represent national opinion

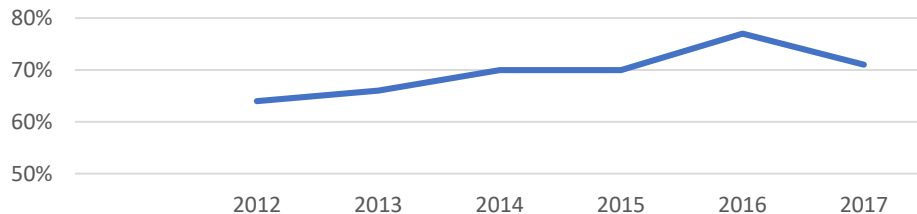


How should we power Australia?



Source: Climate Institute survey 2017

Australians who accept climate change, includes 64% of Liberal voters and 54% of National voters



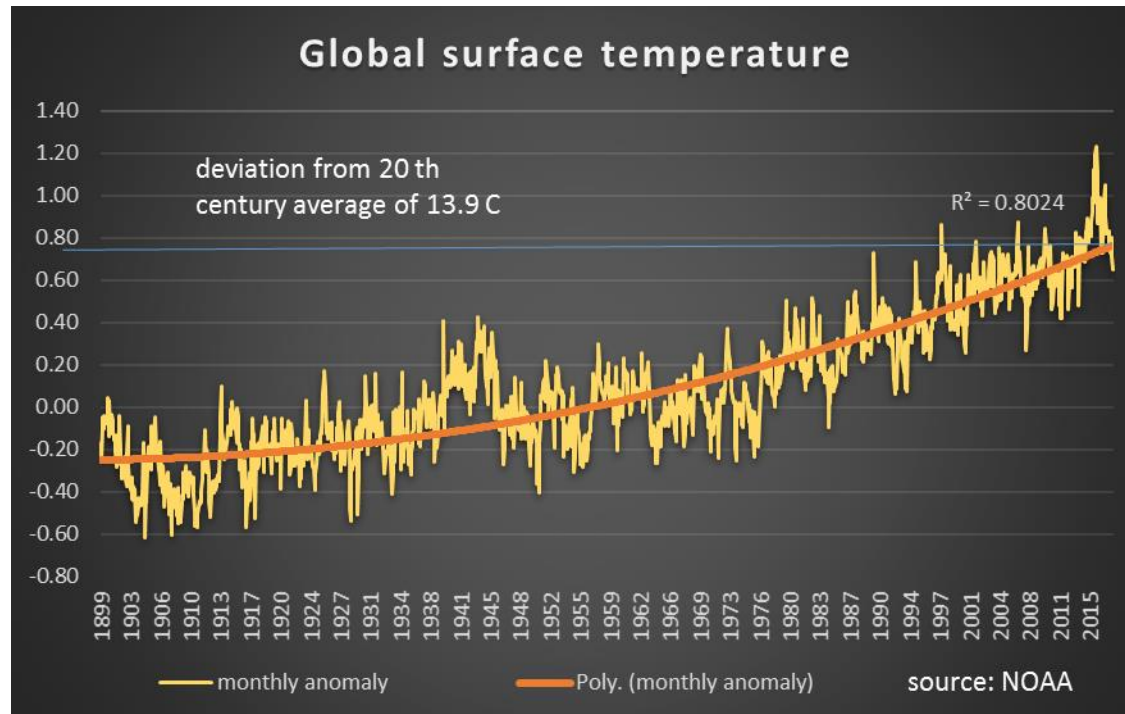
Source: Climate Institute survey 2017

Despite high power prices the sitting party in Victoria, the ALP, is regarded by voters as more likely than the Coalition to maintain electricity supply and keep power prices lower

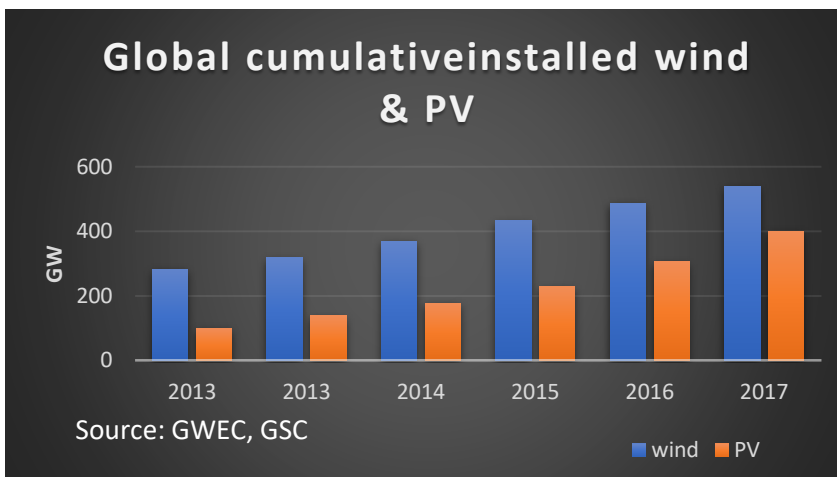
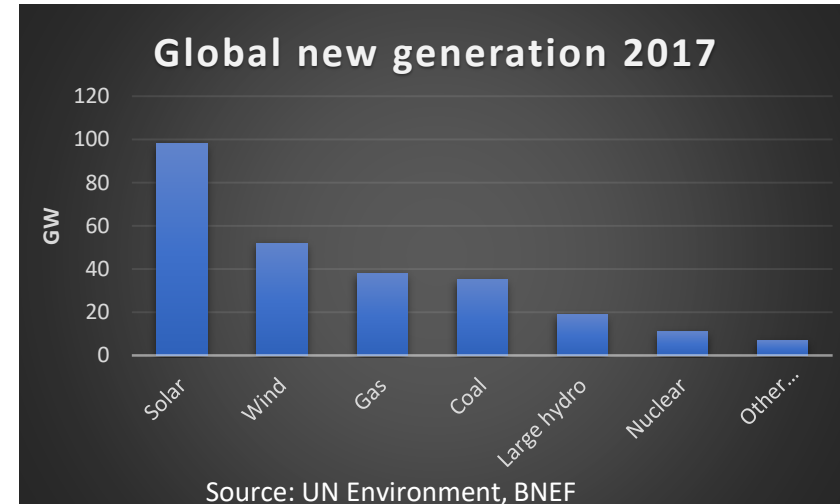
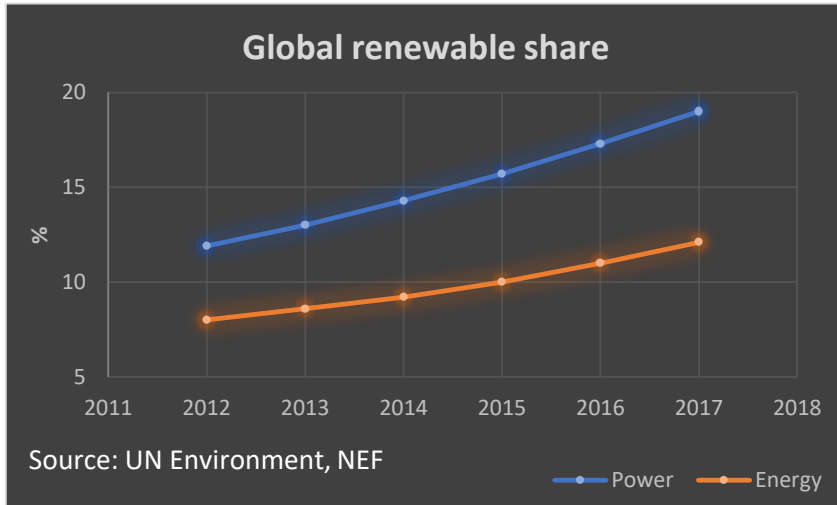
Home owners vote with their wallets

- Based on 480,000 USA property sales
 - Properties projected to be exposed to sea level rise sell at 7% discount relative to otherwise similar properties
 - This discount is not in rents just in sales price
 - Properties notionally exposed to 1 foot of expected rise sell at a 22% discount
 - There was no discount in 2007
 - The price discount is consistent with the “severe” sea level rise forecasts of climate change models
 - *Source: Bernstein Gustafson & Lewis 2017*

Temperature rising, alarms are flashing



World view in 30 seconds



LCOE based on global learning rate				
	Growth	Years	Annual	LCOE
	Per year	To double	Reduction	in 2022
	A\$/MWh			
Wind	8%	9	2.5%	49
PV	30%	2.5	8.5%	47

Policy for a high VRE grid

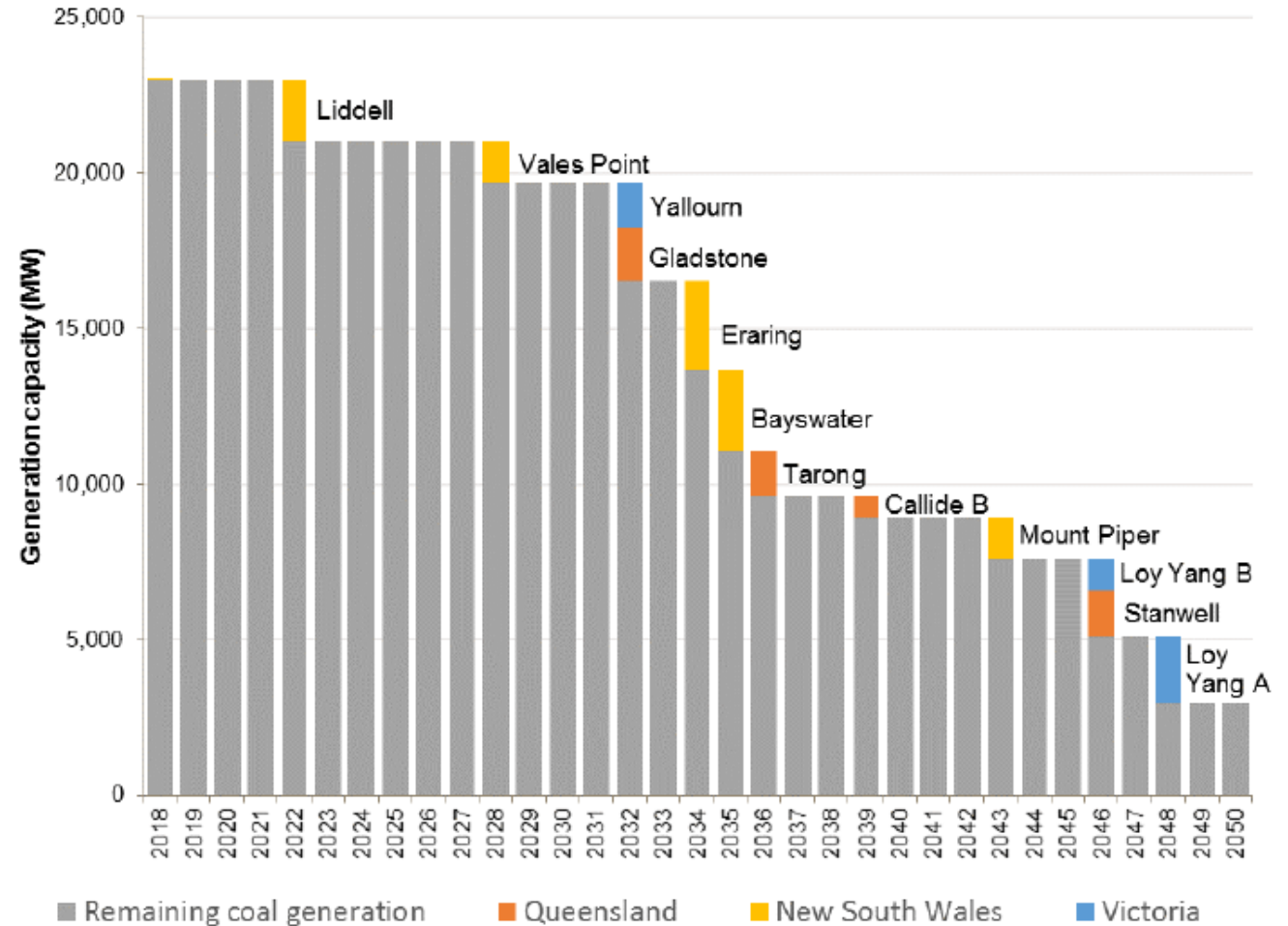
- Reduce risk to VRE investors to keep WACC low
- Reduce connection costs by building transmission to new renewable zones
- Minimise amount of dispatchable generation required, but start building it now.
- Continue to support behind the meter for system resilience

Renewables much more sensitive to WACC requirement			
		PV	Gas
Capacity	MW	200	200
Capex	\$M	330	278
LCOE for 6.5% project IRR*	\$MWh	66	82.5
LCOE for 7.5% project IRR*	\$MWh	72	84.8
Change	%	9%	3%
*\$8 GJ gas			



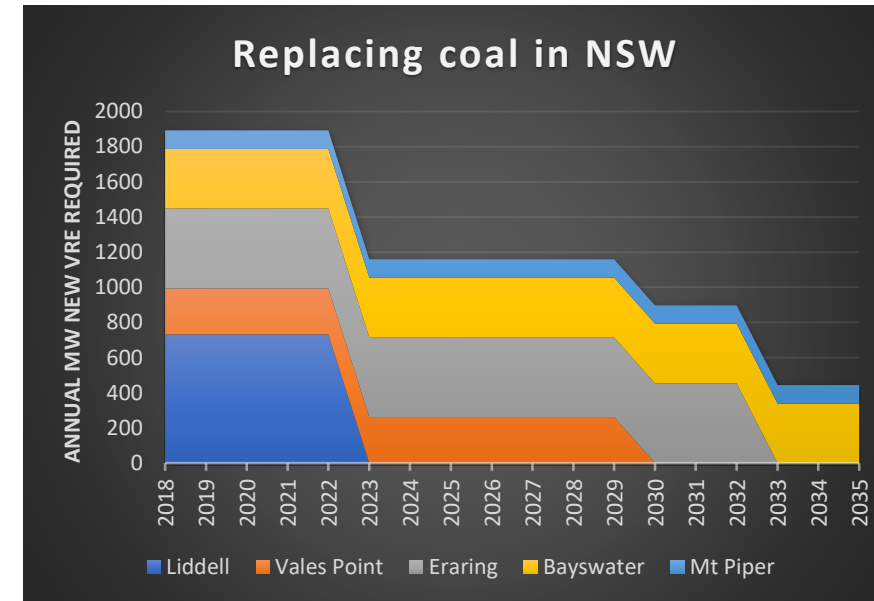
More than half of NSW coal fleet to close by 2035 – more likely to be earlier than later?

- 4/5 NSW coal generators to close in next 14 years
- NSW coal costs are rising
- Gladstone in QLD and Yallourn in Victoria also likely to close by 2032 or thereabouts



Depending on mix about 20 GW new power needed in NSW

NSW needsd 20 GW power by 2035							
	Closure		Years	Annual new build	Annual MW Power at	Total power	Comment
	TWh	Date	to close	TWh	@ 32% cap factor	GW	
Liddell	8.2	2022	4	2.1	732	2.9	Announced
Vales Point	8.1	2029	11	0.7	262	2.9	
Eraring	17.8	2032	14	1.3	454	6.4	Announced
Bayswater	16.2	2035	17	1.0	339	5.8	Announced
Mt Piper	7.3	2043	25	0.3	105	2.6	
Total	57.6						
NSW demand	70.8			5.31	1893	21	

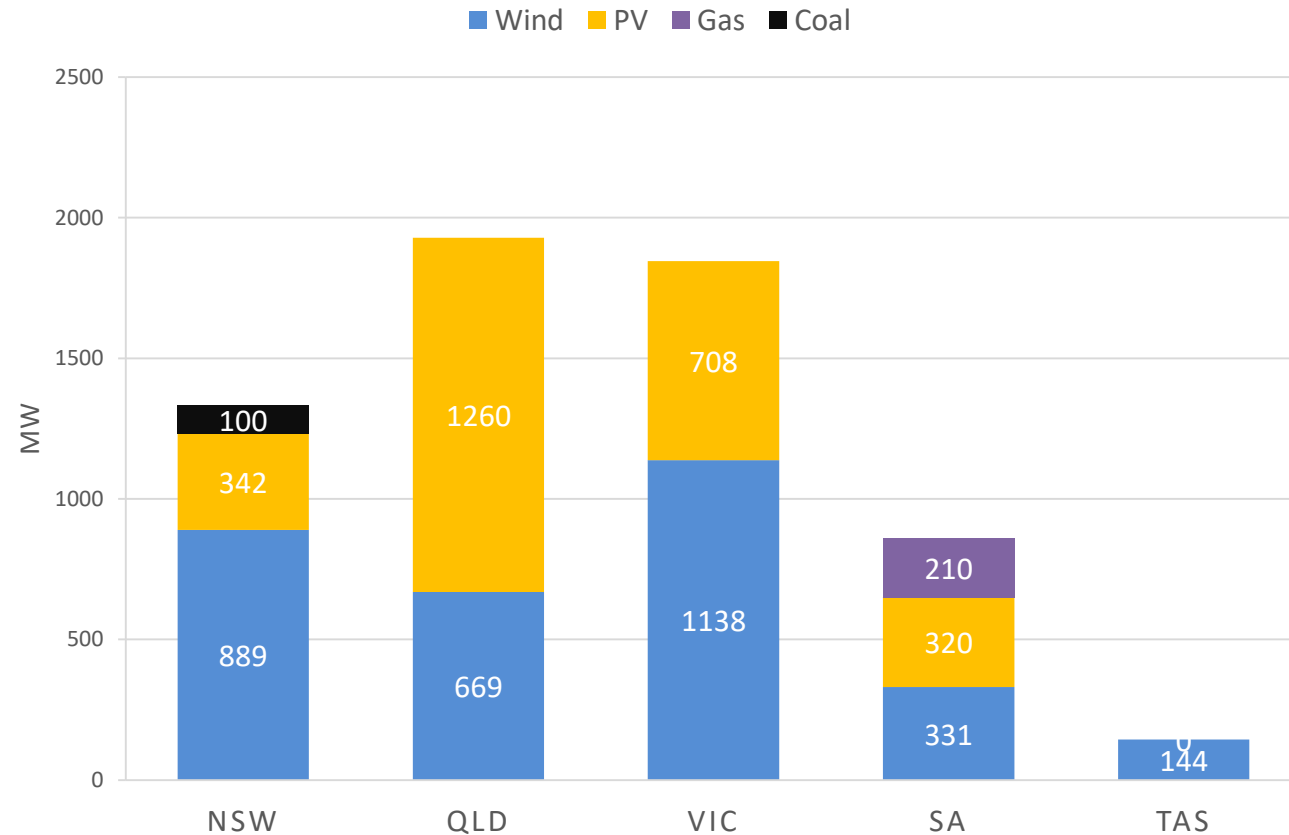


- More if batteries, pumped hydro have to be recharged
- More for EVs
- But how much dispatchable power?
- What policy will minimise price and reliability uncertainty facing this demand?

New supply is inadequate in NSW

- Many PV projects appear to be running behind schedule across the NEM, particularly QLD

NEW GENERATION UNDER CONSTRUCTION



Policy what it needs to be

Goal	Maintain reliability standard at efficient cost consistent with decarbonisation
Objective	Not so gradual replacement of ageing coal fuelled electricity with VRE, assisted by zero or much lower emission firming generation and demand response
Method	<ol style="list-style-type: none"> 1. Study – Identify how much dispatchable power needed for given level of VRE 2. Plan – What has to be built first? What the obstacles? Who is responsible and who has authority? 3. ACT – build consensus, implement plan
Policy	How much central control, how much is left to markets? Should the market be capacity or energy or both. What is the role of Federal and State Govt?

Is there an architect in the house?

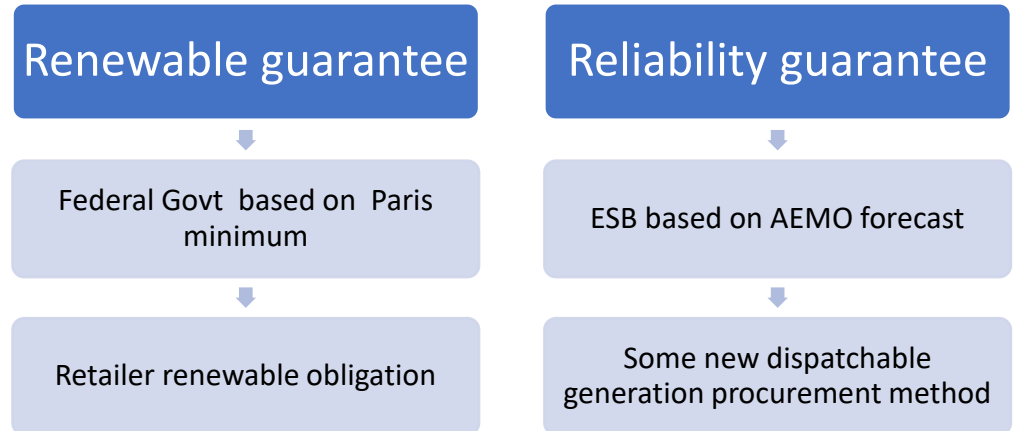
- Energy markets will likely lead to periods of undersupply in the first instance leads to high prices and reliability issues
 - Current new supply is arguably mostly result of LGC scheme rather than response to NEM price signals
- Some form of planning is needed for new transmission anyway. So
 - Capacity auctions, or Govt PPAs with the objective of incentivising new supply before its needed.
 - Govt bears cost, passed to consumers
 - Potentially a higher cost, but lower risk than waiting for oligopolistic energy market to solve blackout problem
 - Essentially there is a system architect, is it so bad?

The rule making process has no vision or goal



Balance technologies expensive but how much is needed?

- Demand management
- Battery
- Pumped hydro
- Concentrating thermal
- Biomass
- Hydrogen
- Gas
- Remaining coal



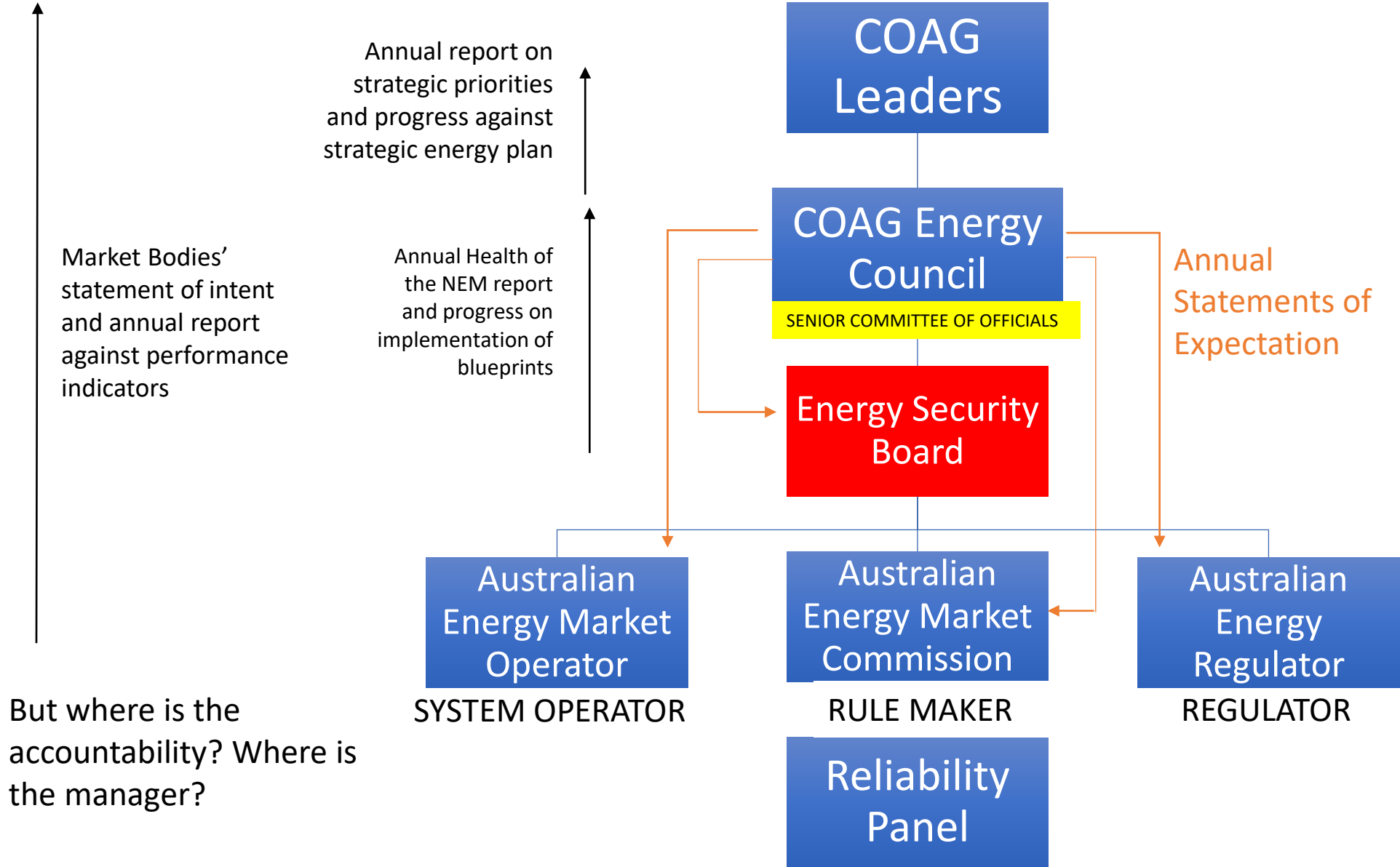


A plan is required

“By mid-2018, the COAG Energy Council should develop and maintain a strategic energy plan informed by the Panel’s blueprint to guide the operation and evolution of the National Electricity Market.” Finkel recommendation 7.1



Execution of plan formally rests with the Energy Security Board

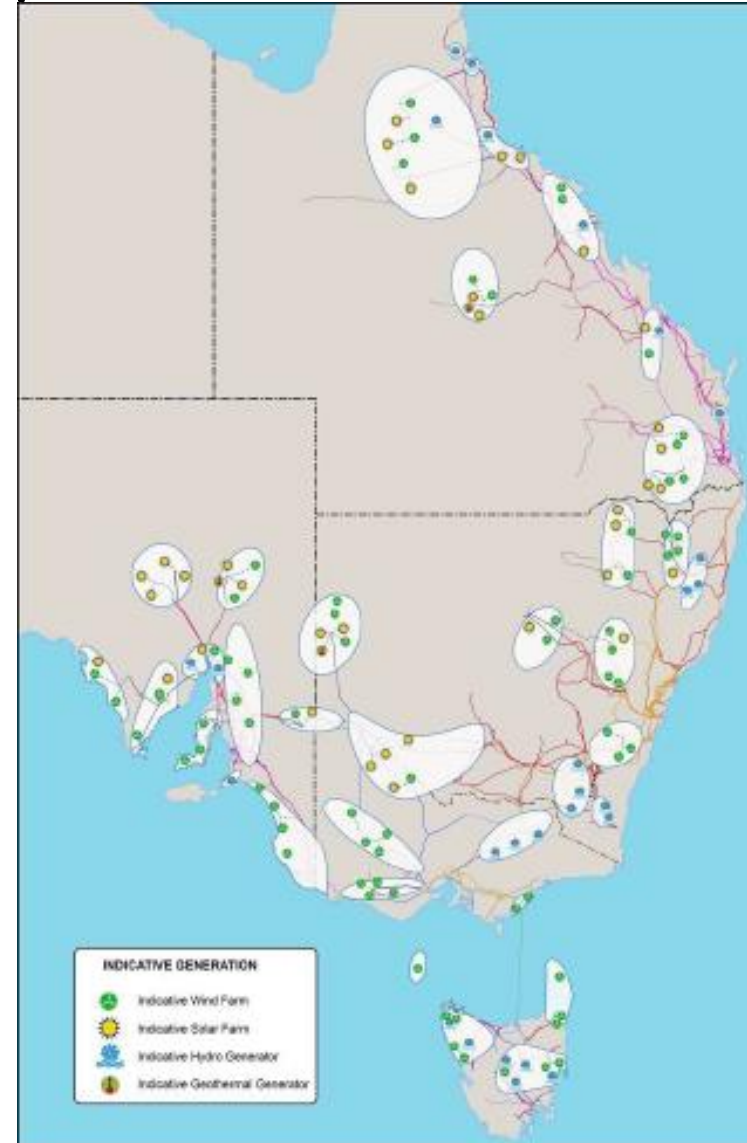


Investor considerations

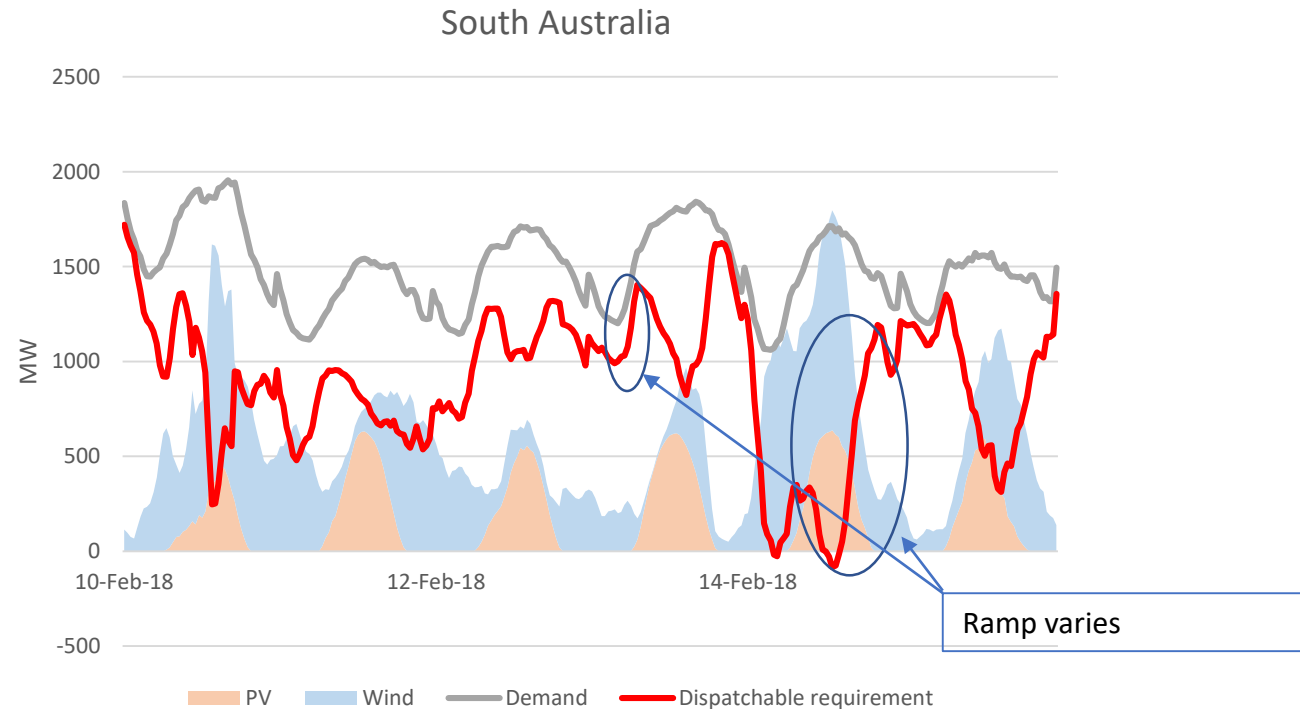
- Incumbents incentivised to wait
 - Benefit from keeping supply tight
 - Expect new build costs to fall, leave it to the last minute
 - But risk losing market share if new entrants go early
 - Risk regulation, or Govt penalty if seen to be too obviously gouging
- New entrants
 - Encouraged to take risk by spot price
 - But need to protect investment longer term
 - Need low barriers to entry
 - Easier with access to end user markets

AEMO has the beginnings of a plan

- The plan will lead to lots of relatively low cost VRE
- But does not yet incorporate firming
- Does not incorporate overall system targets
- It's not a universally accepted plan



Impact of VRE on grid

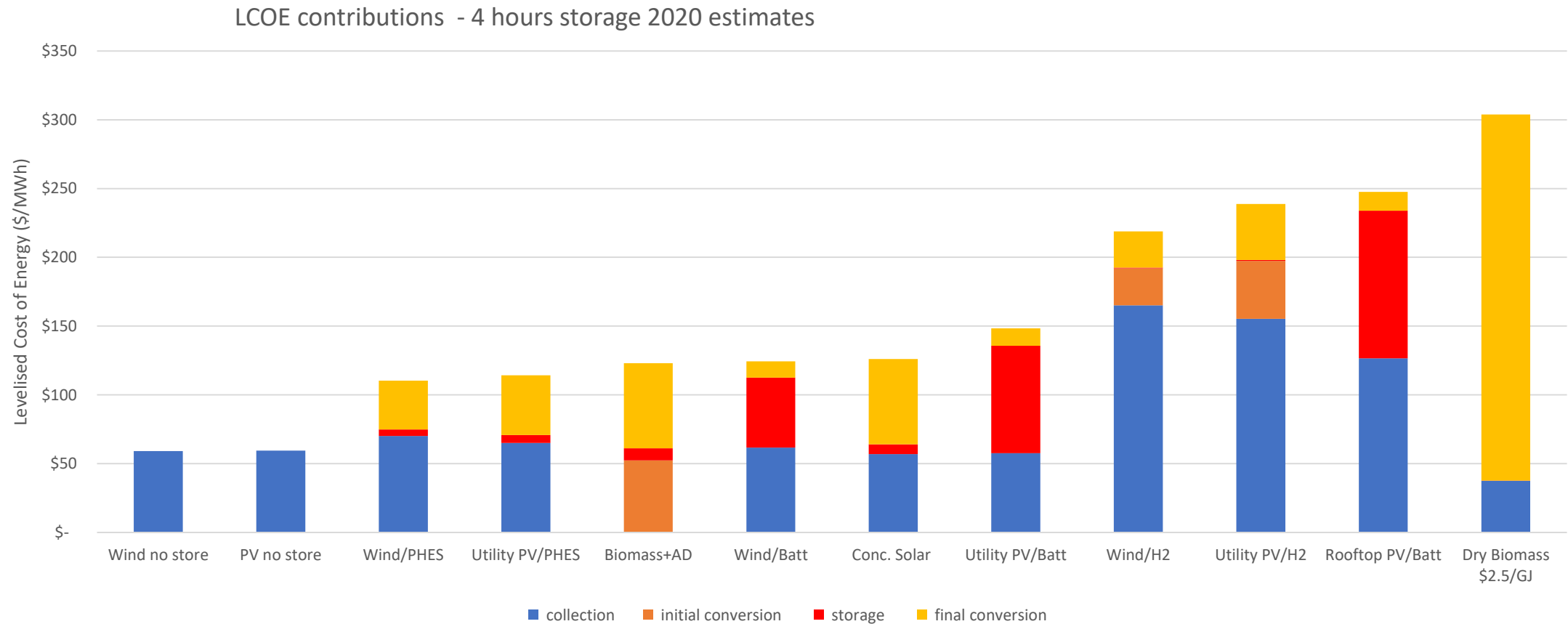


- Increased need for reserves, or inter region transmission
- Increase in ramp rate, ramp range and ramp uncertainty

Impact of VRE on VRE generators

- More chance of curtailment
 - Curtailment lowers value
 - The next unit of VRE is worth less to the system than the unit that came before
- Lower price expectations

Cost of individually firmed renewables



Source: ARENA study forthcoming

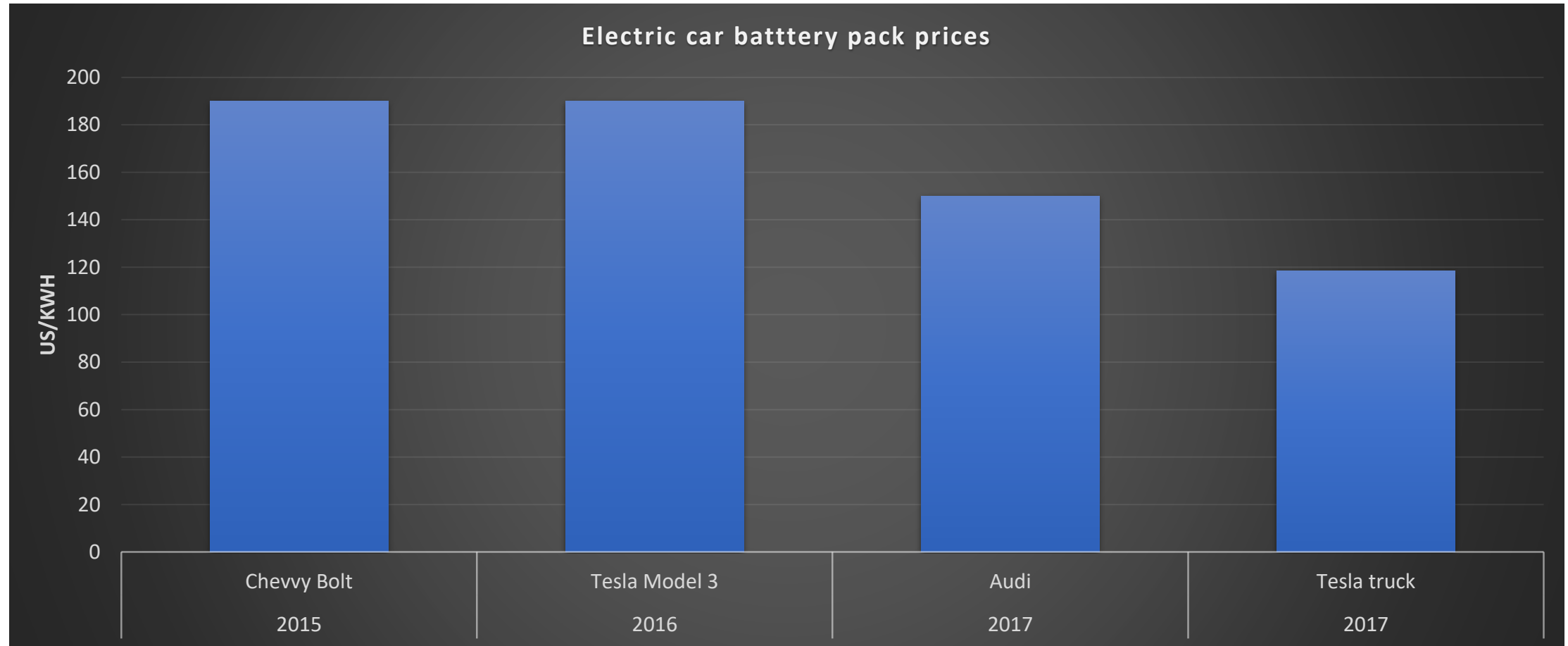
Lower costs when a system view is taken

- Firming investment may need central planning
 - Transmission
 - Environment
 - Location
 - Quantity
- Blakers study arguably already leads to Snowy 2.0

100% renewables			
	Power	Energy	LCOE
	GW	TWh	\$MWh
PV	30	49	
Wind	43	159	
Total	73	208	50
Spillage cost			6
		Hours	
Firming	17	26	13
Transmission			6
Total			75
Source Blakers Feb 2017			



Car battery prices are falling, but data is anecdotal





Residential batteries cost 3X-6X car batteries

