

# Behind-the-Meter PV and batteries: life raft on a sinking ship?

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# Outline

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- PV economics
- Battery economics
- Case study of representative household in Victoria
- Policy issues arising

## Behind-the-Meter (BtM) PV v Grid for households

	cents per kWh*			
	VIC	NSW	SA	QLD
Lowest grid variable price	15	17	34	20
Typical grid variable price	27	29	41	27
Highest grid variable price	45	44	55	34
Average solar price	6.3	6.0	5.5	5.5

BtM PV 2.5 - 7x cheaper than grid variable price in VIC

BtM PV 6 - 10x cheaper than grid variable price in SA

- Installed price of PV dropped ~80% over last 7 years. Nationally 1/5 detached/semi-detached households now with PV (1/3 in SA and QLD).
- PV clearly much cheaper than grid, but PV typically only displaces ~ 30% of grid consumption for typical house. Surplus PV production exported to the grid, currently receives around 10 cents per kWh (~doubled in last year).
- Rooftop PV pays for itself in almost all cases with north or west facing roof. Rapid growth also in commercial sector
- Monthly installation rate at all-time high in August 2017 (100 MW, costing ~ \$150m).

# Behind-the-meter battery economics for households

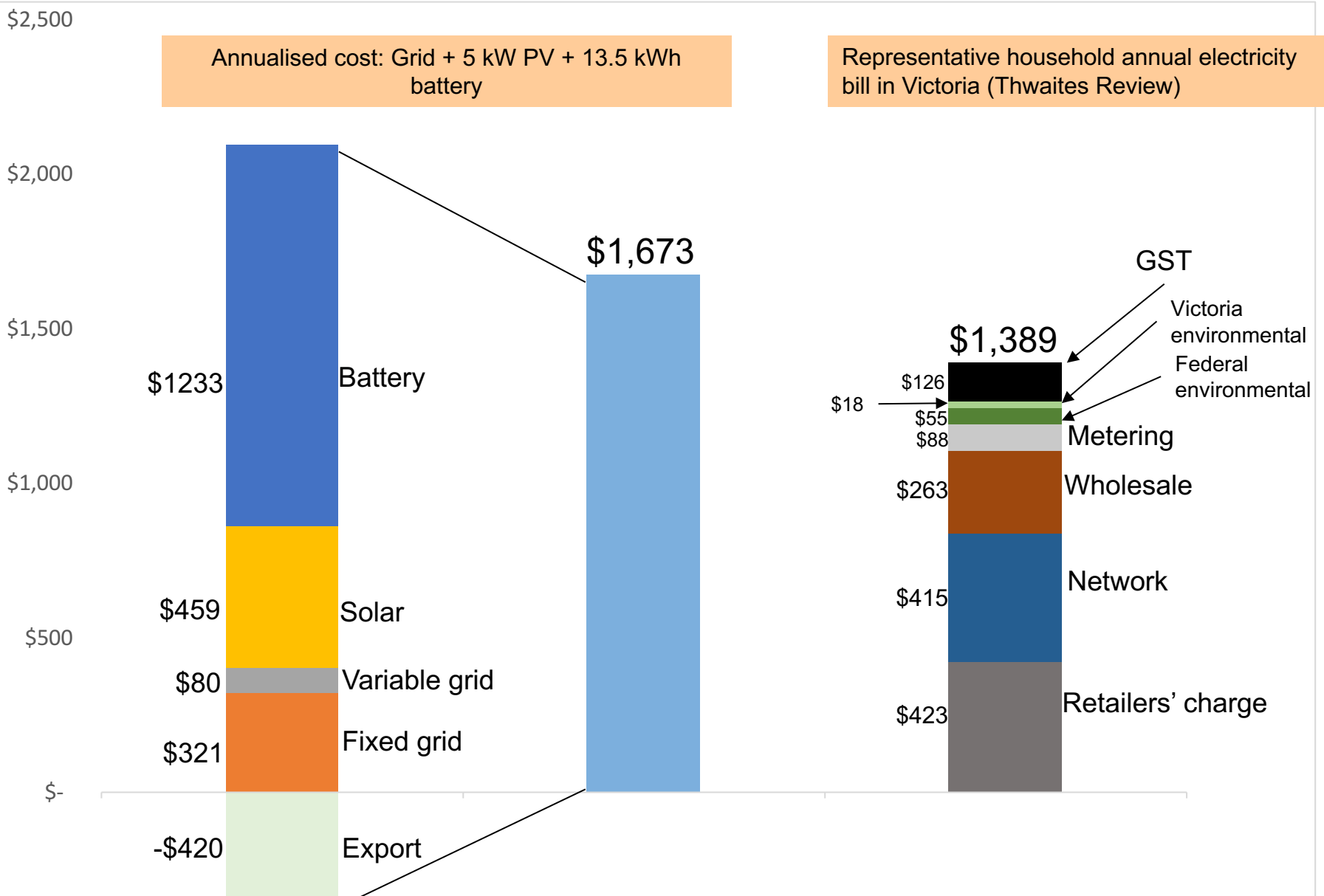
	cents per kWh				
	VIC	NSW	SA	QLD	
Grid-only arbitrage (median peak minus off-peak prices)	17	24	40	18	The benefit
Solar/grid arbitrage (lowest grid price minus avg. solar)	8	11	28	14	
Solar/grid arbitrage (median grid price minus avg. solar)	21	23	35	21	
Solar/grid arbitrage (highest grid price minus avg. solar)	39	38	50	28	

	Cents per kWh stored and reproduced per day	The cost
Tesla PW2**	28	
Bloomberg capex estimate	25	

\* Grid prices from MarkIntell on 13 September 2017

\*\* \$11k annualised at 2% (real) over 10 years, zero residual, 90% round-trip efficiency

- For households in SA, benefits from grid-only arbitrage or grid/PV arbitrage comfortably exceed costs. Elsewhere, benefits exceed costs for expensive retail offers.
- PV + Battery allows grid-independence for 70-100% of consumption. Optimal battery/PV sizing for households depend on many factors.



**Grid+PV+Battery dearer than grid-only for representative household in Victoria, but the gap is narrowing**

# Policy issues arising

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- Distributed energy technology development, and price/quality failure in the shared system are driving decentralisation. Continued decentralised technology development is certain but resolution of price failures in the shared system remains unclear.
- Governments that are concerned about electricity prices should focus on ensuring households and businesses can take advantage of BtM PV, and increasingly also of batteries.
- Grid still valuable as back-up, for decentralised trading and to diversify risk. But continued decline in dependency on the shared grid is assured. In particular locations, incentives for grid by-pass are very strong.
- Network asset values, particularly of government-owned distributors reflect historic write-ups, indexation at the consumer price index and gold-plating. Asset write-down to bring regulatory values back towards economic value is essential to ensure those dependent on the grid do not disproportionately bear the burden of past policy failure, and to avoid wasteful grid by-pass. For government distributors this is a fiscal and political issue. For private distributors, legitimate concerns about political appropriation will need to be addressed. The sooner policy makers grapple with this, the better.