

UQ's Global Change Institute responds to Grattan Institute's solar power article

Have solar panel investors really been robbing Aussie battlers, or is it retailers and network companies that have been robbing customers?

Disruptive technology is exactly that. It is seldom predicted and almost never perfectly anticipated despite the fact that industries have been subjected to disruption for centuries. So, forecasting the adoption of disruptive technology is nigh on impossible. Horse traders didn't see the motor vehicle coming, the IT industry didn't see the networked PC coming in the 1990s, and the telecom industry didn't prepare for the mobile devices of the 2000s. Who could possibly have forecast that solar panels would rattle the cage of the Australian electricity industry in 2015?

But when state-based feed-in-tariff policies for residential roof-top solar were devised from around 2009, it was a widely held view that solar panels could never challenge legacy forms of electricity generation. Only 6 years later, the Grattan Institute suggests that the disruption caused by solar panels to the electricity industry was entirely predictable. In their view, state governments should have had the foresight to see Germany and China develop strategies that were diametrically at odds with the Australian industry view but which would cause costs to tumble and investment in solar panels to soar. The result of this lack of government foresight, in their view, is a \$9 billion subsidy paid by battling electricity users to well-off greenies.

Respected commentators, including [Giles Parkinson](#), [John Quiggin](#), [Bruce Mountain](#) and [Dylan McConnell](#), have disputed the Grattan Institute findings as biased with poorly formulated assumptions that have been constructed to support an aging industry view. The most surprising assumption in the report is that the potential for energy generated from solar panels to lower the wholesale cost of generation is unfair to generators and "not a benefit to society". This is so surprising that the remainder of this article will look only at the shortcomings of this assumption, rather than address the wider array of issues highlighted by other commentators.

Experience in South Australia indicates that electricity from solar panels has made a very significant reduction in wholesale costs. Between 2008 and 2011, demand for electricity on the hottest of days exceeded 2850MW for 131 hours (of a total of 35,040). This resulted in generators charging up to \$10,000/MWh to meet these peak demand events (that's \$10/kWh compared to the 15c/kWh generally paid by residential consumers). The bill for these 131 hours was just over a billion dollars, nearly 27% of the total cost of generation for the 4 years combined. From 2012 to 2013, cooler summers meant few extreme demand events but in 2014 four days of maximum temperatures in excess of 42° Celsius drove up demand. Spot prices increased to meet the surge in demand, but importantly, they increased for only a few hours rather than the extended periods that were evident before 2012.

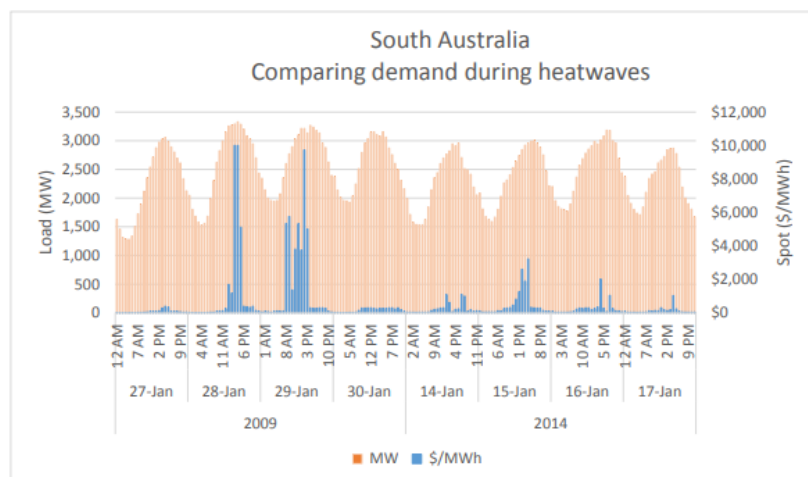


Figure 1: South Australian demand and spot prices during heatwaves

Figure 1 presents evidence of two very important benefits associated with solar panels. Firstly, generating electricity on the back of extreme heat events reduces the substantial cost of air-conditioning. The 500MW of solar panels installed by 2014 meant that under temperatures that were slightly higher in 2014 than in 2009, generation from the solar panels, at fixed prices, significantly reduced the concentration of excessive spot prices around peak demand events. The generating cost for the 4 day period from 27 to 30 January in 2009 was \$204 million whereas the generating cost for the 4 day period from 14-17 January 2014 was \$38 million. That's \$160 million saved wholesale costs by the generation from solar panels in just 4 days. The Grattan Institute's report concludes that these periods of high-priced electricity generation are an important source of revenue for all generators. Perhaps a good question to ask at this time is "Is a billion dollars a reasonable price to pay for extreme demand or is it just opportunism?"

The second observation is that in 2009 most of that peak demand was from the middle of the day to the middle afternoon. Of the 36 hours where load was above 2850MW, only 2.5 hours were after sunset and 4.5 hours after 6pm when generation from north-facing solar panels drops to zero. In 2014, only 2 hours were after sunset and 4 hours after 6pm. So, despite the refrain that solar panels are not addressing day-to-day early evening peak load, it is apparent from the data that solar panels are reducing the demand and costs of absolute peak demand when wholesale costs escalate dramatically and the network is pushed to its limits. This has implications for network investment. The South Australian distributor has invested \$0.5 billion in augmentation (bolstering the network for greater demand) since 2011. It is not clear how much of that \$0.5 billion was spent on preparing for increasing absolute peak demand, but whatever it was it may have been unnecessary because generation from solar panels has reduced absolute peak.

Data from Queensland also provides ready evidence of benefits from solar panels. On 5 March 2015, Queensland experienced a very hot spell. For the first time since 2011, demand exceeded 8800MW. Looking back over the last 7 years, there were 4 days prior to 2015 when demand exceeded 8800MW. Figure 2 provides a picture of the daily load and spot prices on these absolute peak demand days. Prior to 2015, peak demand was reached between 2pm and 4:30pm which was when prices surged to address absolute peak demand. In 2015, demand peaked at 5pm which, contrary to proving that 1.3GW of solar panels failed to address peak demand, shows that solar generation shaved absolute peak demand on the most extreme day for the past 4 years. If indicative generation from solar panels is added to the load, peak demand would have reached an all-time high of 8953MW at 4pm. It is estimated that the higher spot prices associated with the higher levels of demand would have resulted in an additional \$15million generation costs from just 12 hours of PV solar power generation.

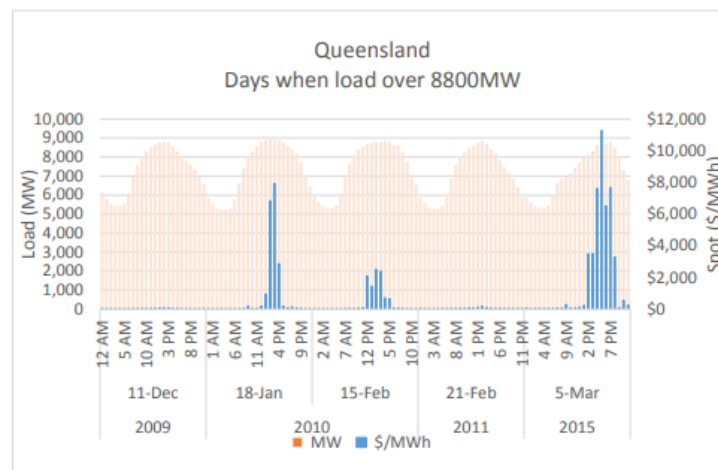


Figure 2: Queensland days when load exceeds 8800MW

Energex's 2014/15 Annual Planning Report calculates that on hot summer days, absolute peak load at 2pm has been reduced by 335MW. In addition extensive connection of solar PV systems have changed the load profiles in the low voltage grid, upgrading substation transformer and switchgear ratings, with a capacity increase of 458MVA. None of the costing benefits for improvements to the network brought about by solar PV are included in the Grattan Institute report.

If solar panels have reduced the wholesale costs of generation and reduced network infrastructure requirements, why then have battling electricity consumers not seen their electricity prices come down accordingly? The reality is, that network companies have not reduced their investment expenditure (Queensland spent \$2.7 billion in bolstering the network for greater demand from 2011- 15) because it was approved by the Australian Energy Regulator and there is no incentive for them to adjust their plans. As they are paid on the size of their asset base, their prices and profits have escalated. Retailers have been gifted a business model where they are allowed to charge extra to compete for customers, but there is no requirement for them to pass through wholesale cost savings. So, the benefits of investment in solar panels have flowed to the network companies and the retailers, not necessarily solar panel owners.

The Grattan Institute's findings that solar panels have been subsidised by battling electricity consumers is fundamentally flawed - especially in its clear omission of the findings presented here. Excluding the benefits that have come from wholesale cost reductions and reduced network investment requirements is too serious to disregard. Perhaps this omission is because their scope of research is too narrowly defined. A diversity of opinion within, and around, an organisation allows for robust debate and discussion to improve the quality of assumptions and analysis. The Grattan Institute may wish to widen its consultative group on areas of complex issues to avoid the pitfalls with its recent report on the cost-benefit associated with solar panels.