

Disruptive Technologies and Network Value

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Queensland Energy Forum, EUAA, Brisbane
8 May 2015

Alternative Titles - Price Elasticity at Work - or Welcome to Networked Electricity Supply Competition



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SAVINGS

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Demand Side Renewables – Not Supply Side

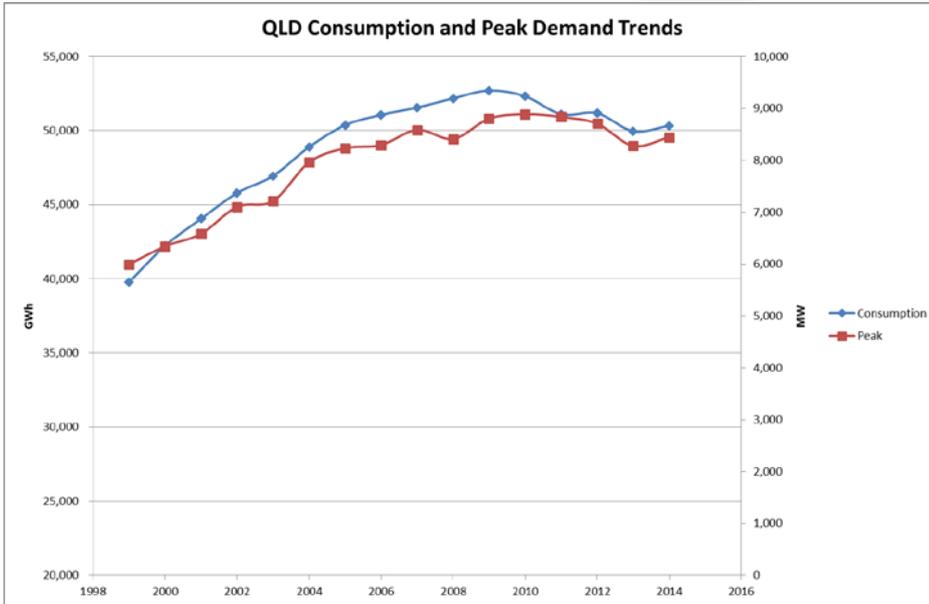
**Tesla 3 Year
Share Price
US\$30b**



3 Key Messages for Today related to “Network Value”

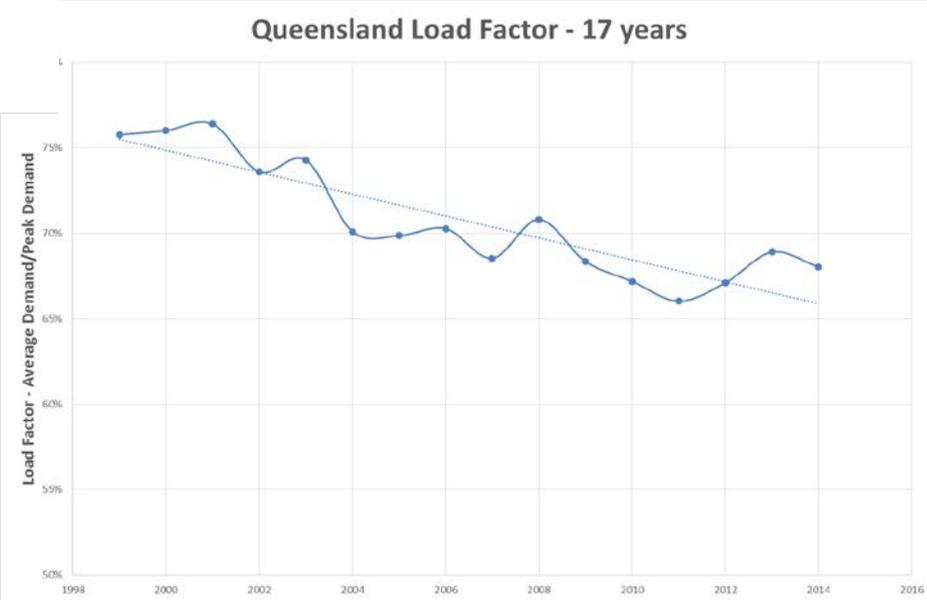
- The decrease in sales volumes (kWh) reflect the price elasticity of demand for power (like bananas) - and load factors are lower now - this is driving
 - The growing availability and competitiveness of demand side alternatives/competition to large power station generation delivered by wires (e.g. solar PV and battery storage), and
 - Consumers to seek lower energy consuming products and cheaper alternatives
- This will and is forcing pricing reform in networks to reflect the lower load factors on networks (ten years late...)
 - Energy (kWh) only biased tariffs progressively replaced at the network level by demand based tariffs (kVA) and higher fixed charges - Tariff Structure Statements *must* be based on LRMC - has impacts on renewables up-take but buffers networks from volume decline year-on-year
- Regulator is also seeking to “benchmark out” overcapacity costs and redefine “efficient” costs in this new environment
 - Revenue caps were seen as more of a safe haven for networks than WAPC but the regulator has focused more on benchmarks to reach efficient costs than those revealed through actual year-on-year revenue and cost results

Qld Electricity Demand History



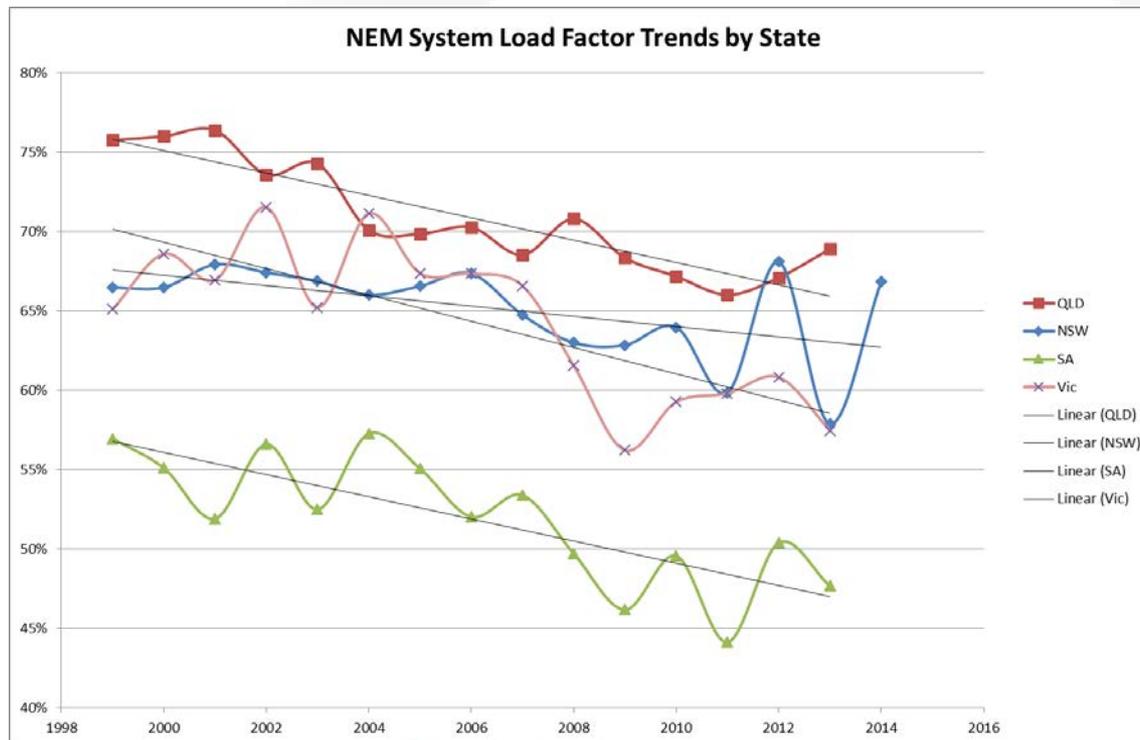
Qld consumption has been falling since 2009 in reality – but seems to have plateaued – unlike other states – but still a softening consumption trend

The system load factors have been declining – worse in hotter areas than close to the coast – this is the nominal “under utilised capacity” – although this can vary by location – and may be bottoming out as well In Qld?



Volumes and Load Factors are falling

- We presented a paper back in April 2009 (6 years ago - still on website) that highlighted this issue - coined the term then “a death spiral” - which came from my experience in the gas industry with the old “towns gas” - but unlike gas there will be no “death” - some one pays in one way or another for this slump in the use of fixed (and financially sunk) assets - this is a big part of potential lost “value”
- Issue here has been - is it the owners or the customers paying - or actually both?



Yes this is happening across all NEM jurisdictions – Qld is not alone

Customer respond to higher bills (prices)

The real and effectual discipline which is exercised over a workman is that of his customers. It is the fear of losing their employment which restrains his frauds and corrects his negligence. [Adam Smith](#)

- Economics tells us that when prices go up volumes come down - people
 - Economise - save energy by reducing waste - turning lights off, higher air conditioning temperature set points, etc.
 - Find alternative fuels for the same amenity - like gas, wood, solar, battery storage, etc.
 - Find other ways to do what they want without using any or as much power - LED lighting, skylights, etc.
- The most dramatic and visible outcome has been a switch to Solar PV (and hot water) through subsidised schemes
 - In the last decade rooftop solar PV has gone from some 2,000 units to over 1.2 million (June 2014), with
 - Name plate capacity of 3,420 MW and estimated to have generated 3,950 GWh in 2013-2014 (13.2% utilisation/efficiency)
 - And this “investment” in end use power generation (bypassing networks and NEM) has been fully funded by the community - through shared subsidies and individual capital investments - based largely on shorting the electricity supply industry

And they are making a huge dent

- This trend is expected to continue and AEMO forecast energy production from PV will climb to 14,114 GWh (or 7.5% of electricity) by 2023-24 (AEMO NEFR 2014) - over 12,000 MW name plate at the current average efficiency/utilisation
- Much faster growth than the last decade as it is a far more mature market and we will see highly attractive leasing and PPA products give this market a boost

In terms of Value - at say an average retail marginal cost of 2015 \$0.26/kWh this would = \$3.7 billion/year of displaced full retail revenue nationally - wholesale and network and retail costs – we often forget about the NEM but it has been hit hard as well – new generation market has collapsed

In network terms alone at a marginal rate of 2015 \$0.165/kWh = \$2.3 billion (>60%) – already north of \$650 million per year on this basis

- And now we have new alternatives arriving such as the use of battery storage - **if it can compete**

More load reductions and load shifting coming

- Cost effective energy storage has long been the holy grail for the power industry - storage has numerous advantages (look at hydro for example) but with one potential draw back for networks if consumers install it with their solar PV
 - Customers can generate more from solar and wind and store any excess and use it later - they can optimise the use of the renewables and probably put in bigger systems
 - But they will also reduce load at the critical peak times - reducing need for new network and peaking generation capacity
- This may well become another game changer for networks (and the NEM) - the potential to alleviate peak demand - or more likely, in the short term, to flatten load profiles by shifting generation from periods of low demand to peak demand
 - This peak shaving was always considered a great idea as it would save the LRMC of network investments and allow greater network utilisation - which was touted as good business for network investors as well
- But in the short term this could increase the level of under utilisation (over capacity would become more marked) and raise serious questions about benchmarking out the costs of this capacity and causing effective (investor) value right downs

Over capacity - who pays?

- This is after all how businesses operate and we see major right downs all the time from investments that do not meet their holding costs due to a lack of cash flow (ask Santos right now for example), and
- Regulation seeks to mimic competitive markets so this has and will become more deeply a **regulatory question** about what level of costs customers should pay for from an “efficient” supplier of network services - and one that has overcapacity?
 - Ask ourselves the question of how a network would act if there were 5 services in your street to choose from - remembering that they are bundled within a retailers offer - so retailers could do some major negotiating I would think for competitive offers across residential end use segments - and this is their competitive incentive
 - How would networks act if there was a decreasing level of sales available and competition wire-upon-wire - economics tells us they could not maintain any “economic rents” - with any forecast of falling cash flow they would certainly be faced with writing down assets for example - and capital investment would be miserly
 - I have seen this first hand in the generation market for example - yet just over a decade ago these had monopoly rents coming out their ears...
- Cue the discussion on pricing and benchmarks

Cost reflective pricing

- The underlying problem for Australian networks is they continue(d) to price their services based primarily on kWh volume in the residential market - even as volumes were falling - yet a lot of their costs relate to capacity kW - and they have not embraced peak pricing methods for a wide range of reasons which I do not have time here to cover
- But this has been done elsewhere for decades - I was for example involved in setting it up Critical Peak Pricing in the South Island of NZ in 1994 – where it has been highly effective - in fact great case study based on LRAIC (which interestingly has not changed that much in 20 years)
- Now seeing moves to introduce more peak demand based pricing principles and tariffs (not TOU as such) - SPAusnet, Ergon, Energex
- This push for demand based pricing is being driven by a need (and yes a regulator/productivity push) to have network pricing more reflective of the underlying costs - in particular the marginal costs of new capacity - and is a competitive response in many ways to the assault by PV and Storage

Cost reflective pricing

- Demand based pricing has its implementation issues but this is a very good development in our view as it brings an underlying principle of equality, and
 - In essence you should be able to price in this way - more based on the Use of Assets than customer class - this also reduces cross subsidies - and networks essentially price to retailers for how their customers use their network - they don't send bills to residential customers
- But it does devalue renewables a bit because the cost benefit equation has relied on the relative energy costs displaced (kWh) as much as subsidies, but
- Cost effective storage may well rectify this for customers - and may well be even more attractive/have higher benefits as it could lessen LRMC and energy charges, and
- Provide some benefits to network investors - depending on the regulatory approach - and may even provide new business opportunities across the market
- Is actually a lot more rational in terms of avoided costs - although subsidies can still change the economics - so cost to consumer of storage will be critical and may also attract subsidies

Value of the grid - to customers?

- All this brings up the real “value of the grid” to customers (not investors)
- OGW was asked to look at this issue for the Energy Network Association
- And we delivered a view on this “value” in a lot of detail (November 2014)
- The short version though is networks will continue to provide value in this new energy paradigm - being off grid comes with supply and power quality risks that must be managed - and limits options and consumer surplus
- Services by the network include:
 - Continuous supply, market access, start up power, power balancing, power quality, and
- For those that invest in PV and storage and remain connected they will effectively pay less for these services than those that don't (under demand based pricing) - but they have the added costs of the alternate generation and storage - so total package has to balance out
- Lot of talk about going “Off Grid” but this needs to be a sensibly costed choice

Case Study: Annual Value of Grid Connection - Endeavour Energy Residential Customer with Rooftop PV



Compared to the “off-grid” options as this is the counterfactual

Solar PV does not provide all the energy needed for a household (its dark at night) – storage may well rectify that but only if less than the “energy not served” costs

In-rush energy is the response to starting loads, clouds, etc. – has to be accounted for in choice

Power quality is also a major factor – islanded power systems have significant problems with this that need expensive rectification gear

Regulators - what discipline to impart on these monopolies?

- Networks under a Weighted Average Price Cap (WAPC) form of regulation effectively had this kWh volume risk passed fully to them
 - It was a slow acting train wreck in progress in many ways
 - Lots of cross subsidies to mitigate effects and respond to incentives
- Then the Australian Energy Regulator decided they were doing too well under this regime (actually some were responding to embedded incentives very well - again a paper for another day), and
- Moved them to a Revenue Cap - where they argue every 5 years about how much money they need but are “guaranteed” to be able to recover that money as a cap on its revenue - sounded good at the time (especially to networks)
- But to many this looked like a very odd decision as it now passes volume risk back to the customers just as it was becoming a major issue - but I guess they are the most proficient at managing that risk - but the question remained who would pay for diminishing capacity utilisation?

Regulators - what discipline to impart on these monopolies?

- The bit that was added though (by the AER) was a critical application of benchmarks
- The 5 year revenue determination process has effectively in my view turned into one about “value” in terms of what revenue customers should pay for the service(s) from an efficient operator, and
- The AER has moved to using benchmarks to determine what that means - amongst many other tools but this has been a significant change
 - This has seen some 30% reductions in opex, and major downgrades of capex of similar magnitudes, etc.
- Clearly the fight is on and this could see an effective “devaluation” of networks - you can not cut this deep into forward cash flows without an impact on value
- And benchmarks are a very blunt instrument in the regulatory arsenal that can be way off mark if poorly applied - care is warranted - networks are a critical piece of infrastructure that define our standard of living and underpin our economy
- And regulators have vacillated in the past - if you have major network failures in places like Brisbane someone's head is demanded....common issue

Regulators - what discipline to impart on these monopolies?

- The problem is that the actual “network valuation” will be set by
 - The market in a sale (or leasing) arrangement (e.g. NSW) - the market will determine the real value and it may well be very different to the Regulated Asset Base for example, and
 - It will be heavily related to forward cash flow assumptions - like any asset
 - So forecasts of sales and the management of operating costs (and need for capital investment) are critical
- The current owners, i.e. Government, need to do their own economics on this
 - Is it more viable to hold the assets and reap annual dividends, tax equivalents, etc. sufficient to give them a reasonable return on their calculation of their investment as such major industry change unfolds - so they can use these returns to offset Government expenditures in the long run, or
 - Is it better to liberate this money/investment (by the community effectively) and use it for other purposes where greater value can be created for the community, etc.?

Conclusion

- I can not answer that question for Government Owners and as we have seen in Queensland the community has the last say anyway....
- But there is no doubt that the recent past trends and current regulatory reviews are indicating an issue with defining an efficient operator/owner and what they should charge and how they should charge over the near term
- This may well be the inevitable correction to a network services pricing bubble - demand has responded to higher cost supply (and alternatives found) and in many markets this initiates a major (value) correction
 - Just look at the oil and LNG markets right now - and gas prices in various areas as the blow back occurs
- It appears that networks may well not be immune to actual economic principals in the end - so maybe you just can't claim value created by such inflation anyway (economic rents?) nor ignore real threats to network revenues - it may well have been illusory "value" - the NSW sales will be instructive
- Maybe their WACC should be higher.....but that's a paper for another day.

Jim has over 35 years of experience in the energy industry. He spent 12 years in the Natural Gas Industry (AGL) holding senior executive positions involved with the technical end use of energy, regulations and tariffs, contract pricing, analysis of energy projects investment, strategy, mergers and acquisitions and the promotion and marketing of energy.

He has consulted for 20+ years to water and energy companies in Australia, South East Asia, the Middle East and the US. He has extensive expertise in regulatory matters (particularly networks), modelling and pricing; business restructuring and improvement; greenhouse emissions matters and demand side management; government policy; business development, market entry, and business case development; and project development and implementation; and training.

Prior to being one of the founding members of OGW he was a Vice President with CRA international (Boston), the CEO of Energetics, Executive GM Development for Energy Developments Ltd and CEO Hunter Electricity.



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