Network Value at Risk

Briefing for Electricity Network Investors

Version 1

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MARCHMENT HILL CONSULTING

Executive Summary

For many years regulated utility assets have provided investors with a steady return, consistently above the cash rate. The security of these returns has been predicated on the stability and predictability of the industry, which hitherto has served a consistently growing demand from customers, relatively easy to predict and cater for. As such, the majority of financial investor groups have included some type of utility infrastructure asset investment as a part of their portfolio.

In the past five years, the stability of the industry has been shaken by an unprecedented decline in energy usage and peak demand. As a result, the electricity network, built to cater for this historically growing peak, is becoming less and less utilised, to a point where network businesses may not be able to justify the revenue they are allowed to collect from customers. At the same time, the Australian Energy Market Operator is now conducting independent demand forecasts challenging the accuracy of network service providers' (NSPs') own forecasts. If demand does not normalise and asset underutilisation persists, the current industry model will become unsustainable, necessitating change. One such change could be a systematic write down of assets within an NSP's regulatory asset base (RAB), if assets are seen to be significantly oversized relative to the energy they transport. Marchment Hill's preliminary analysis indicates that for a typical utility, up to 10% of the RAB can represent Network Value at Risk: a utility with a RAB of $10bn may have hundreds of millions of dollars in asset value currently at risk.

Investors should also note that any impact on the RAB will likely have a multiplicative effect on the value of their investment:

- The value of the network assets as recognised on the company's statutory balance sheet can be a positive multiple of the value assigned to those assets in the RAB
- The equity value of an investor's stake is often based on a positive price-to-book-value multiple as well.

Regardless of whether write downs occur in the short-term, or of their extent, risk now pervades the industry with the drivers behind the decline in demand likely to persist for the foreseeable future.

The crucial question remains: ***what actions should investors and networks take in response?***

Why is Energy Usage in Decline?

From the mid-20th century until 2007, per capita energy consumption has grown in a very predictable fashion, exceeding GDP growth since 1980 (see Figure 1). Because of this long history of predictability, forecasts of peak demand were able to be made 5 years into the future with reasonable confidence. This forecast peak demand dictated the capacity to which networks were planned to be built, and ultimately the revenue that would be collectable from the network's customers.

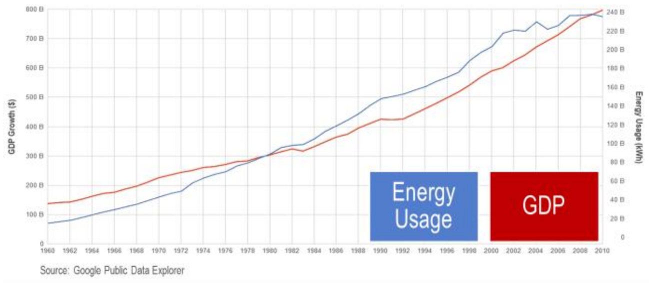

Figure 1: Energy Usage vs GDP, Australia, 1960-2010

Figure 2 and Figure 3 below show the recent divergence in actual demand from forecasts. In the most recent calendar year, the difference between the demand profile NSPs and the AER were expecting five years ago, and the eventual result, is almost 20%.[1] Actual energy usage has been slowing in its rate of growth for the past seven years, and falling for the last four.

[1] We should note that network businesses have already recognised this reality and very sensibly made downward adjustments to their capex plans to avoid exacerbating the problem.

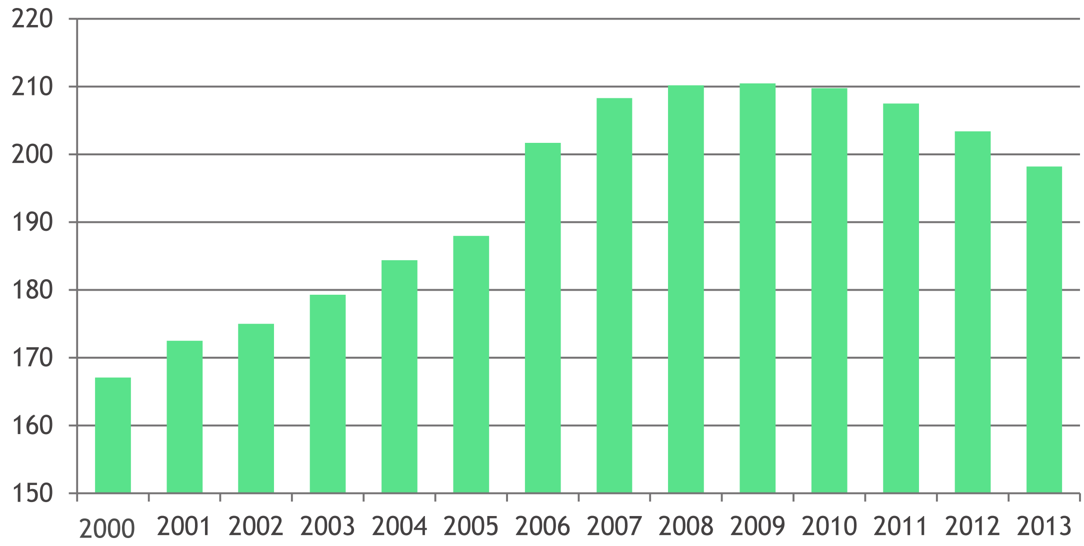

Figure 2: NEM Demand (TWH/a)

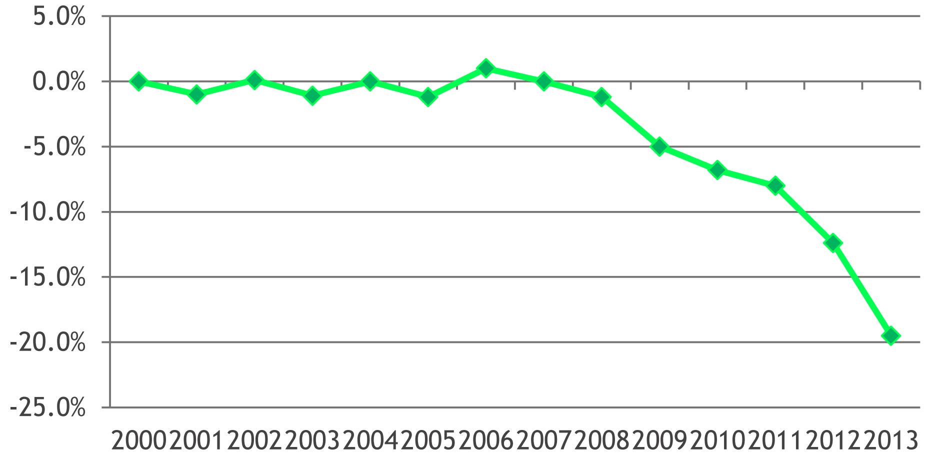

Figure 3: Gap between actual and predicted demand (5 years out)

We see four interrelated drivers that have significantly affected electricity industry demand:

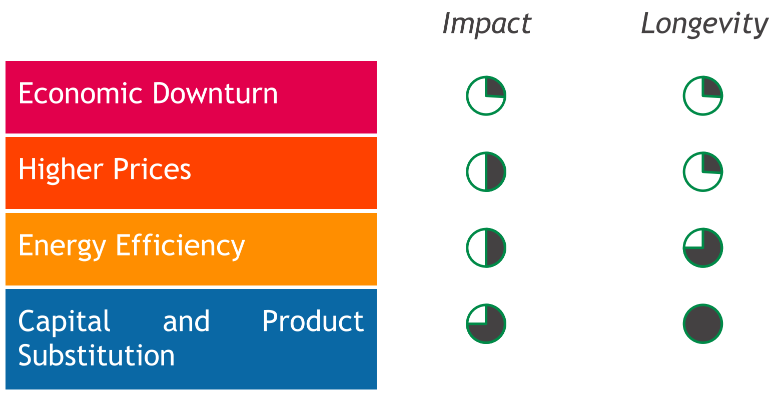

Figure 4: Causes of falling demand

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Economic Downturn

Electricity consumption is positively correlated with economic activity. Almost 73% of electricity use in Australia is for industrial purposes, as Figure 5 depicts. Since 2008, the combination of urbanisation of our significant trading partners, the financial crisis and the high Australian dollar has resulted in a decline in total industrial consumption. Significantly, these factors have forced an 11.7% decline in aluminium smelting activity; and 1.5% decline in structural metal manufacturing.

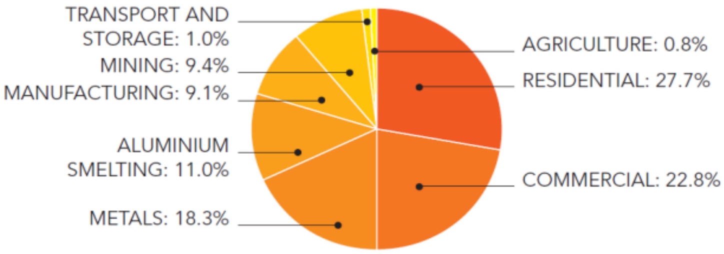

Figure 5: Breakdown of electricity use in Australia

Higher Prices

For the better part of the last century, Australia's natural advantage has been relatively cheap energy, particularly electricity. However, in the past five years this has changed dramatically: electricity price growth has rapidly outstripped measures of general inflation (as shown in Figure 6), in large part due to the contribution of network charges, and consumers have begun to react by looking for ways to cut their electricity consumption. Even if prices do not continue indefinitely on this sharp upward trajectory, we can expect a delayed elasticity effect, as more and more consumers gain the means (as well as the will) to reduce their consumption. Total network throughput is therefore unlikely to resume its growth in response to plateauing prices in future.

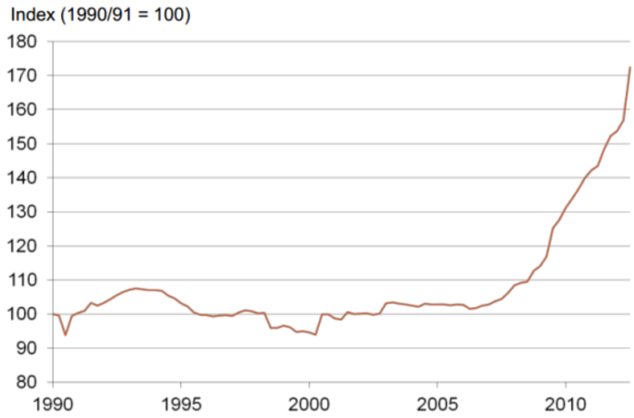

Figure 6: Australian electricity prices (inflation adjusted)

Energy Efficiency

Choosing more energy efficient devices is one means that consumers have to reduce their electricity use. Efficiency gains in Europe have contributed to a decrease in per-capita energy use of 24% since 1990 (1.4% p.a.), shown in Figure 7.

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Further advances in energy efficiency are likely in Australia, with buildings having minimum efficiency criteria and the Federal Government's commitment to reduce carbon emissions by 80% of 2000 levels by 2050. This too will put downward pressure on electricity network throughput.

Capital Substitution

Another means for consumers to reduce their electricity use has recently emerged as a powerful force. Technologies such as solar hot water and rooftop PV (especially when coupled with energy storage devices) directly reduce the amount of electricity drawn from the grid. The solar PV market in Australia has grown quickly – 115.2% since 2008 – and is expected to grow at 10% p.a. through to 2018[2].

At the same time as the price of manufactured PV panels has fallen dramatically, the price of grid-delivered electricity has risen to the point where PV installation is now an attractive investment for households in some locations based on financial payback alone. On current projections, this investment will become even more financially attractive for increasing numbers of households. The additional perceived benefits of being protected from future (grid based) price shocks, and the sense of being in control which alternative solutions provide, could see the rate of uptake rise steeply unless the industry responds. In addition, where they have the option, some customers have switched to using gas in place of electricity for some applications: an example of product substitution.

These customer decisions to substitute the electricity industry's capital investments with their own are becoming more and more common, and currently the industry has no effective way to combat this competitive threat. The net effect of these drivers in the industry is a forecast reduction in network utilisation, which continues a trend of recent years. The chart below shows this forecast reduction for a selection of distribution businesses we have analysed using publicly available data, assuming that:

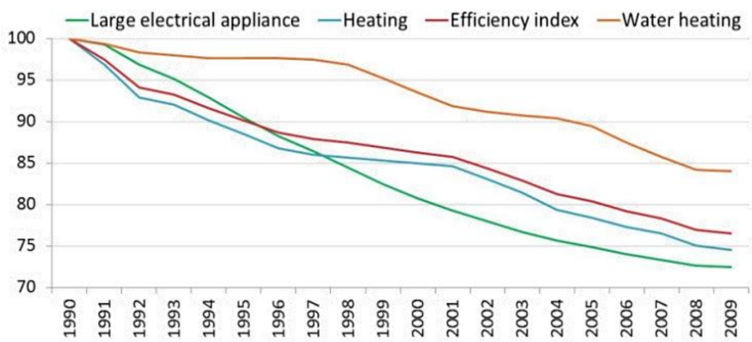


Figure 7: Household energy use decrease 1990-2009

- these businesses continue their capital augmentation plans as outlined in their latest available published regulatory submissions or statements of corporate intent
- the industry drivers discussed above persist, and the long term trend of demand declining across the NEM continues.

[2] IBIS World, Solar Panel Installations in Australia, 2013

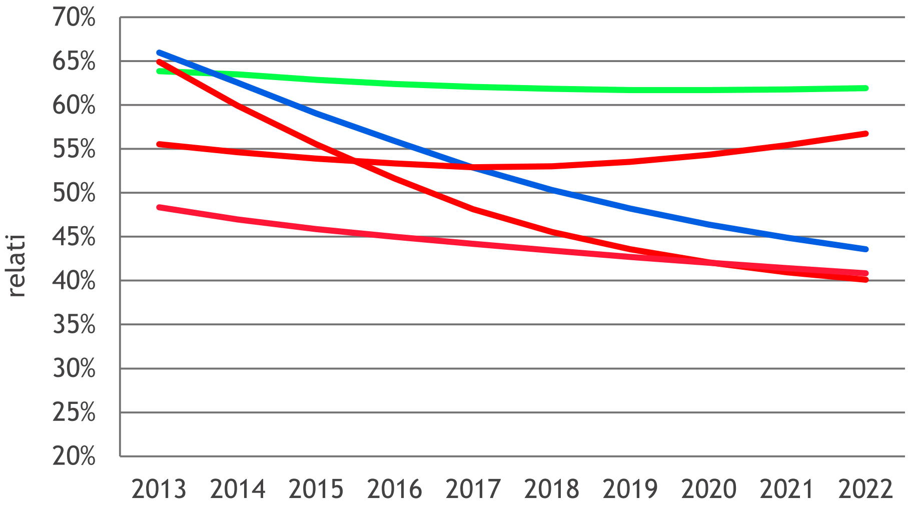


Figure 8: Forecast network utilisation over time (selection of distribution businesses)

This forecast should be read only as a guide. However, it serves to illustrate the variability across networks: some will experience increasing utilisation, at least in part due to management responses; some will see declines, arising from lower customer usage rather than continued network investment.

Underutilisation, Falling Utility and Spiralling Prices

The National Electricity Rules state that NSPs must provide adequate infrastructure such that electricity can be effectively delivered to meet peak periods of demand, regardless of their frequency. Crudely speaking, NSPs therefore build network assets to accommodate a forecast peak demand level, plus an allowance for spare capacity. Figure 9 shows how this affects network tariffs, which are the quotient of a regulated revenue allowance and energy throughput. When throughput falls, forecast tariffs therefore rise so that the regulated revenue allowance is met.

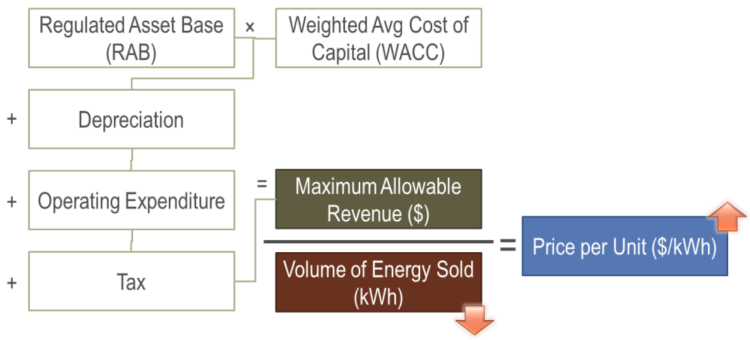


Figure 9: The effect of volume reduction on tariffs for a revenue-

This is a crucial aspect which perpetuates a vicious circle: lower energy consumption begets under-recovery against the forecast allowance, and feeds into lower forecast demand which requires higher forecast prices, which potentially lowers consumption further, and so on. This has been termed the “death spiral”. It can also be intuited from Figure 9 that a decrease in the volume of energy consumed has a far higher effect on the tariff that customers pay, compared to the effect of an increase in the network's capital expenditure for a given period, which will have only an infinitesimal bearing on the total size of the Regulated Asset Base. This can clearly be seen in **Error! Reference source not found.**, where a dramatic cut in future capital expenditure is shown to have almost no effect on the amount that the average customer of the network is required to pay.

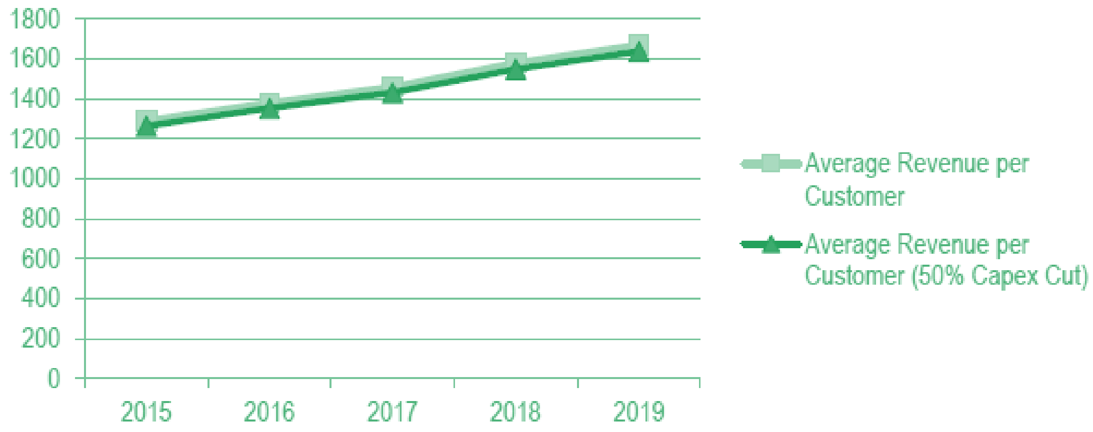


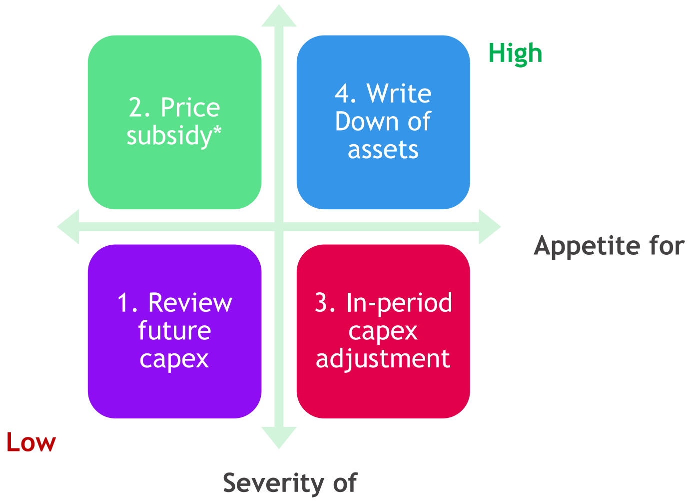
Figure 10: Projected Effect on Per-Customer Revenue of Cutting 50% from Future Capex

The AER's Likely Responses

The AER will almost certainly act in response to network assets that fall below a critical level of utilisation, and are delivering significantly less utility[3] than justifies their revenue. However, the nature and degree of this action remains unknown. The AER does not have the authority to unilaterally re-value the NSPs assets. Nonetheless, Economic Regulators are subject to the decisions of their political masters, who are in turn are influenced by the community they represent. Thus, at some point in time, Regulators will act to address any material disconnect between prices being paid by customers for the use of assets, and the quantum of utility (or services) those asset deliver.

The AER's *Better Regulation* issues paper (2012) has recognised many current issues with demand forecasting and proposed network expenditure programs, foreshadowing a much more aggressive and critical regulatory approach in future. With this in mind, Marchment Hill believes that there are four broad possible regulatory responses to the scenario we've outlined:

[3] In the sense of 'usefulness'



*This is a potential state government action in response to price rises, outside the

Figure 11: Possible regulatory responses

1. **Review of future capital expenditure** – the AER can allow utilisation and prices to correct over the long term with minimum regulatory intervention, simply by taking a stricter approach to reviewing capital expenditure proposals and approving actual capital expenditure from NSPs in future regulatory periods. In Victoria, the AER appears ready to move to the revenue cap form of regulation and away from the recent preferred weighted average price cap (WAPC or CPI-x regimes), which increases the likelihood of the use of P-nought adjustments, potentially increasing revenue volatility until demand normalises according to historical trends.

   This would only be a reasonable choice if the utilisation problem is mild enough to not require urgent correction, and if it is believed that electricity consumption will return to normal growth of its own accord.

2. **Price subsidy** – in the past, governments have used postage stamp price subsidies and targeted concessions as a mechanism to relieve stress on selected consumer groups. This may avoid the "vicious circle" effect of higher prices, while allowing pre-subsidy prices to correct over the long term as network capital expenditure reduces. However, the falling price of wholesale electricity price of recent times, the prospect of rising fuel costs in the immediate years ahead (driven by LNG exports), and policy interventions such as the renewable energy target have made forecasting the consequences of these subsidy approaches less reliable.

   Politically speaking, this approach has appeal, but history suggests that the fiscal load it imposes on government is unsustainable, and that a larger price shock is inevitable down the track. For example: in Western Australia and Queensland, announcements of increasing fixed costs in electricity tariffs (to address the implicit subsidy PV owners receive from other customers) were immediately overturned due to political pressures. Price subsidies are not a reliable alternative that the AER, NSPs or public can rely on to stabilise the market.

3. **In-period capital expenditure adjustment** – planned NSP expenditure may be interrupted mid-period (either voluntarily on the part of NSPs, or through intervention by the AER) to prevent the further divergence of network capacity and demand. This is the easiest option to give effect to, has already occurred in the last two years, and whilst future network

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investments might be jeopardised, the value of the current network infrastructure is maintained.

This approach's effectiveness would be limited if certain network expenditure (e.g. replacement and refurbishment) is unavoidable, and its effect on end-use prices would not be materially felt for some time. It may also increase the risk of networks being unable to meet peak demand.

4. **Directly write down network assets** – Finally, the AER may form a view that network capacity is significantly larger than the optimal level needed to serve future demand, seek a change to the prevailing rules allowing it to retroactively revalue a RAB (not a speedy or easy process), and thereafter "force an asset optimisation" for the purpose of determining revenues, which would need to be followed by an accounting write down of network assets to reflect their true value to customers. This decrease in the RAB, along with a corresponding reduction in the return on capital, depreciation and operational expenditure that NSPs would be able to recoup, would force down the regulated revenue requirement, prices, and profitability. The levels of write down of network assets may impact capital structures and subsequently change the relative share of returns to both debt and equity investors. The proportion of the RAB which we believe to in excess of the optimal network size, and therefore at risk of write down, is what we have termed the network's '**value at risk**'.

   Good for consumers in the short term; not so good for asset owners. In the long term, consumers may end up suffering too, as the ultimate effects of such a move on private investors' willingness to fund utility infrastructure are very difficult to predict. The increase in the industry's risk profile would also increase the cost of capital to NSPs, and should create a corresponding increase in the WACC risk premium calculated by the AER for these NSPs: a second-order effect which would partly offset any reduction in prices. The key question is whether the AER is willing to make NSPs bear the financial and political costs of external industry developments, and whether it has the appetite for the confrontation that will ensue if it optimises their asset bases. Or will the asset write downs be instead borne by governments or customers?

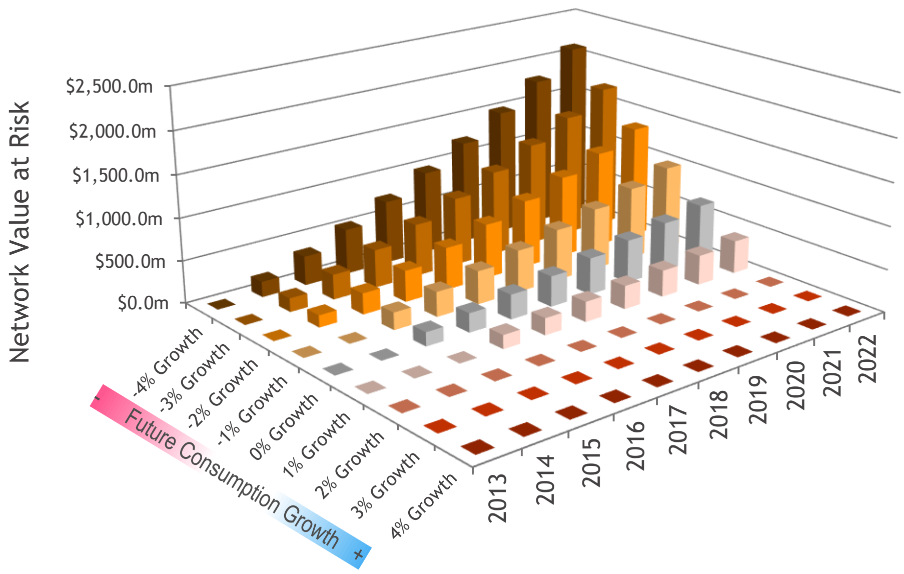

Figure 12: MHC analysis: Consumption growth level and network value at risk over time

Figure 12 shows a preliminary analysis undertaken by MHC, using actual data from a typical network business in Australia. It shows how the value at risk over time varies for given levels of consumption growth. Most notably, this NSP avoids write down risk for any level of consumption growth averaging above 2%, i.e. if growth returns to historical levels.

However, if growth persists below 1%, our analyses indicate that this example utility, with a RAB of $10 billion and asset utilisation of 57%, has more than $300m value at risk within the next five years. Under this scenario, it is more a matter of '*when*' and '*how much*' with regard to a potential write down as opposed to '*if*'.

It is important to note that this model assumes: 1) an utilisation threshold of 60% before the AER would have impetus to seek action; 2) NSPs themselves do not correct their current forecasts and capital expenditure plans in response to low consumption growth 3) NSPs continue to charge at their maximum allowed price / revenue cap.

Responses from Networks and their Investors

The electricity distribution industry seems to have peaked in output, and arguably in value, at least for now. NSPs may be unable to recover their maximum allowable revenue, and face an increasingly uncertain return on their long terms investments.

So far, we have seen them respond appropriately yet tactically by cutting capital expenditure, and looking for new revenue streams. We believe that a more strategic and viable response is to encourage customers to use *more* energy, rather than less, and thus make use of the plentiful spare capacity in their networks. The means to do this, in most jurisdictions, are already available: offering tariffs to customers that reflect the true (and very small) incremental cost of electricity distribution at off-peak times, creating the impression of abundance rather than scarcity.

How MHC can help

Our modelling of Network Value at Risk shown in this paper is a summary position. MHC has completed VAR modelling for all NEM NSPs, using publicly available date which is necessarily coarse (e.g. utilisation, demand growth, future capital expenditure) in order to illustrate the situation facing a typical network business.

For network businesses keen to understand their own situation with more accuracy, our analyst teams offer customised models built on far more granular private data, the capability to show how value at risk can change under various scenarios (e.g. energy efficiency, embedded generation uptake (PV), customer growth, product substitution), and the insight needed to build a credible regulatory argument against asset optimisation, in favour of better long-run solutions to the underutilisation problem.

Prospective and current investors in these networks should consider their risk tolerance, and what hedges may exist to protect against the possibility of losses in value as the utility of networks erodes. They may also recognise that not all NSPs are equally at risk, and are certainly not identical in their responses to the threats outlined in this paper.

MHC, through its accumulated industry knowledge, can offer investors:

- An assessment of the likely impact on energy flows associated with increasing penetration of alternative technologies
- Tailored research identifying the network businesses that have the most credible mitigation plans in place
- Advice on the nature of the risk within NSP assets and the scenarios which may trigger it
- Views on the emergence of new business models and how these might affect asset owners

For a confidential discussion of the issues raised in this paper, please contact:

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About MHC

MHC is a management consulting firm **determined to make a difference** by serving the needs of the energy and water sectors in Australia.

Our quarterly journal, QSI Online, shares our insights with the industries we serve and empowers businesses with high quality, content-rich and contemporary information relevant to their industry.

Read it at www.marchmenthill.com/qsi-online

Our Philosophy

The MHC philosophy, validated and reinforced by our work for clients around the world, holds that the value (V) of a consulting intervention rests on three cornerstones:

$$V = Q \times S \times I$$

Value of Engagement	*Quality of Insight*	*Support for Change*	*Implementation with Integrity*

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