

INVESTING IN SECURITY OF WATER SUPPLY: LESSONS FOR THE ELECTRICITY INDUSTRY

Conclusion

The recent history of the water industry demonstrates that planning and investing during times of crisis will most likely lead to inefficient and very costly outcomes for the community. This is generally due to factors such as a rushed decision-making process, lack of consideration for customer preferences (especially pricing impacts) and a higher risk of political intervention. In addition to the crisis-based investment in the water industry, there also did not appear to have been sufficient consideration of flexibility within these large-scale investment decisions. This lack of flexibility was amplified by the fact that there was significant uncertainty regarding some of the key factors that were underpinning the investments (such as supply and demand).

In a similar vein, the electricity industry is currently at a point whereby there is significant uncertainty regarding supply and demand balances - both in totality and in different jurisdictions. Factors such as the growth in embedded generation (solar PV), battery storage, new renewable technologies that can base load, electric vehicles, demand-response and cost-reflective pricing (among other things) have the ability to dramatically alter the viability of any large-scale interconnector project. Options analysis tells us that as levels of uncertainty increase, so does the value of adopting a more adaptable, flexible solution - with high upside efficiency and low down side risks. It is imperative that this use of options analysis is reflected in any investigations supporting the construction of large-scale, long-term supply or interconnection solutions and/or that the forecasting of supply and demand be dramatically improved.

Discussion

Security of supply has become a substantial issue for the electricity industry, consumers and policy makers following the recent loss of supply in both South Australia and Tasmania. These large-scale losses of supply have resulted in major concerns and robust discussions regarding the prevention of future black-outs. Some of the prevention solutions involve considerable upfront expenditure that could impose significant additional costs on the industry or investors.¹

The water industry was facing similar issues when dealing with the Millennium Drought and the potential for loss of water supply for several states. In response to the Millennium Drought, the water industry, collectively, invested more than \$11 billion on water security infrastructure. The majority of this spend was based on large desalination plants, however there were other investments such as large, interconnecting pipelines and recycled water schemes. Additionally, demand-based programs were introduced (such as water restrictions) to minimise the impact on the reduced supply. The introduction of these programs themselves was low-cost, however the broader economic impact through welfare losses was significant.²

¹ One major difference between water and the electricity supply industries is that large scale supply (generation) investments are made by investors, however transmission and distribution decisions are borne by the community through regulation

² The Productivity Commission estimated that the introduction of level 3a water restrictions in Melbourne would create a net welfare loss in that city of between \$400 million and \$1.5 billion over a 10-year period (Productivity Commission, 2011, *Australia's Urban Water Sector*, Report No. 55, Final Inquiry Report, Canberra, p. 192)

The following table provides a summary of some of the key water security infrastructure that was invested in during that time. It can be seen from this table that the significant investment in water security has essentially acted as insurance assets whereby they have rarely been called on since they were constructed.

	Victoria Desalination	South Australia Desalination	Gold Coast Desalination	Sydney Desalination	Western Corridor Recycling Plant (QLD)	Sugarloaf Pipeline (Vic)
Completed	2012	2011	2009	2010	2007	2010
Initial Cost (\$m)	3,500	1,830	1,200	1,890	2,500	750
Capacity (GL/Year) (Max Capacity)	150 (200)	100	49	90 (180)	85	Access to 38GL
Proportion of Annual Usage (current)	35 (46)	55-62	17	17 (34)	29	9
Supply since commissioning (GL)	0*	13	24.0	N/A**	50	0
Operating rules	Orders are placed annually by 1 April by the Minister for Water	SA Water is to use the least cost options. SA Water forecasts water availability from its reservoirs and River Murray water and, if needed, can supplement this from water from the ADP	33% operational when storages reach 60%; 100% operational when storages reach 40%	Will begin restarting plant when dam levels fall below 70% until storages reach 80%	100% operational when storages reach 40%	Critical water reserve (for when Melbourne storage levels are below 30% as at 30 Nov of any year)
Current Status	Standby*	Standby/Minimal Production Mode	Hot Standby Mode	Care and Maintenance	Care and Maintenance	Not currently operating

Notes: * The Minister for Water announced an order of 50GL of water for 2016/17 however it is not clear whether this order has been, or will be, supplied; ** Not available, however it should be noted that the plant ran continuously for the first two years following the completion of construction, it has been in care and maintenance mode since mid-2012.

Given the significant investments by the water industry to address security of supply issues, it raises the question of whether anything can be learnt by the electricity sector from this period of significant investment:

■ Planning

Crisis-based decision-making, which can be made hastily with limited consideration of long-term customer impacts, is best prevented through good planning. The issue for industry planners is that sometimes it is not known whether it is good planning until it is too late. For the water industry, most states had considerable water storages prior to the Millennium Drought and either did not predict the security of supply issues that they would soon face or did not have decision-making processes in place that would allow time for suitable decisions to be made. While the Millennium Drought itself was an extremely unlikely event, the lack of planning on how best to address any security of supply issue that arose unexpectedly (contingent planning) created a situation where several states were forced to consider the issue in a condensed period of time, while under considerable stress to resolve the problems quickly. They decided to pick the winners and naturally went with firm supply replacement options.

In reviewing the South-East Queensland bulk water infrastructure, the Queensland Audit Office concluded:³

“Better planning may have avoided the need for such drastic and costly action, but it is acknowledged the drought was unprecedented. That however, could and should have been done better, even in a time of emergency, was to have a thorough and rigorous assessment of all costs and of the social, economic and environmental benefits, in all likely modes of operation.”

■ Clearly defined objectives and processes

One of the downfalls of making decisions during these times of crises is that key aspects, such as defining objectives and business case processes, can sometimes not be given the full consideration they require. This is generally not deliberate by the decision-maker but rather a function of the size of the crisis and the perceived timeframes required to address the issue.

In reviewing several significant investment decisions for the Victorian Government (i.e., not just the desalination plant investment), it was found that:⁴

“In a number of instances, projects were announced and went to market before the need was substantiated, strategic options investigated and a full business case completed. Once an announcement is made, the government is committed to an un-tested solution and its attendant risks, and the legitimacy of the investment management framework is undermined”

³ Queensland Audit Office, *Maintenance of water infrastructure assets - Report to Parliament 14: 2012-13*, June 2013, p.2.

⁴ Evans and Peck, *Advice to Inquiry into Effective Decision-Making for the Successful Delivery of Significant Infrastructure Projects*, Dec 2012, p. 5.

■ Community perception and engagement

A common perception within the community is that governments must appear to be doing things to solve the issue, otherwise they are seen as not giving the issue sufficient priority (regardless of the amount of analysis and effort being undertaken in the background). In some cases, it can also be viewed that the more money being invested in the solution, the more effort and priority the government is placing on the issue. In these cases the level of political influence in identifying preferred solutions can be extremely high as they seek to respond to critical community concerns.

This influencing can also be seen between governments - as evidenced with the Adelaide Desalination Plant. The original decision for the capacity of the Adelaide Desalination Plant was 50GL, equivalent to 36 per cent of Adelaide's average annual water consumption. The Federal Government provided an additional \$328m in government grants to increase the capacity to 100GL. While the decision on the desalination plant was likely based on other factors in addition to cost, the Productivity Commission highlighted that opting to purchase 100GL water entitlements from the rural market instead of proceeding with the desalination plant would have generated capital savings of much as \$1.6b and produced substantial operating cost savings.⁵

In terms of water and electricity, one difference between the two industries is that the water supply issues related to the potential loss of some water utilisation (i.e., customers had not actually experienced a loss of water, just encouraged to use less); whereas some electricity customers have experienced actual loss of supply for a period of time (i.e., significant regional blackouts). It is unclear how this may change the community perceptions of electricity security of supply however it does assist in conveying the potential consequences to customers of not addressing the security of supply issues.

Engaging with the community is becoming increasingly important with major investment decisions (not just security of supply decisions) and therefore any preferred solution should ensure that it does not conflict with community views. Regardless of the outcome of any cost-benefit analysis, if the community is unwilling to accept the preferred option then the benefits are unlikely to be realised. The SEQ community response to recycled water being used as a potable water source provided a clear example of where the business case did not account for community perceptions (see Box 1).

Box: 1: Western Corridor Recycling Scheme

Over \$2b was spent on the Western Corridor Recycling Scheme to provide purified recycled water into the South-East Queensland Water Grid to then be used for potable water. However, due to community backlash regarding the consumption of recycled water (albeit indirectly), the Queensland Government reversed its policy position and decided that the water within the scheme would only be used by industry (rather than as a potable source). This significantly reduced the requirements of the scheme and resulted in the subsequent 'moth-balling' of the infrastructure.

Unfortunately for the SEQ water customers, this realisation of community concerns did not occur until after the Western Corridor Recycling Scheme was completed, therefore the full cost of the scheme is currently being recovered from customers.

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Productivity Commission 2014, *Public Infrastructure*, Inquiry Report No. 71, Canberra, p. 667

■ Flexibility of solution

One of the key findings from analysing the water security infrastructure investments made, was the significant upfront cost relative to the modest supply subsequently required. Within the period this expenditure was made to provide considerable water security insurance to the industry, however questions could be asked as to whether this insurance could have been achieved more efficiently, flexibly, or through other less costly options.

The water security solutions developed by each of the states had limited flexibility in their scope and operation. The primary solutions focused on large desalination plants and increased connectivity through greater pipe networks with limited capability for staging of these developments to cater for changes in forecasts or circumstances. In reviewing the industry's response to the water security challenges, the Productivity Commission found that:⁶

Although some of the recent investment in desalination plants ... might have been appropriate in the circumstances to maintain security of supply, there is sufficient evidence available to conclude that many projects could have been:

- *Deferred for a number of years*
- *Smaller in scale*
- *Replaced with investment in lower cost sources of water.*

These findings highlight the importance of having flexibility in the options through the use of real options analysis. This lack of real options analysis resulted in inflexible solutions that placed a considerable insurance cost on the industry and consumers for any future security of supply risks. By implementing a real options approach, it may well have given the industry much greater flexibility at a lower cost to serve (assuming it is implemented correctly). The preferred option under this approach could, for example, include opportunities to expand the facility in the future if the demand requires (e.g., constructing civil works supporting a desalination plant for 100GL, but only sizing other infrastructure for 50GL), or cease operations if the need for the investment dissipates at a much lower cost than simply building to a specific capacity (e.g., through demand response).

Investing a significant amount of money based on “perfect foresight” (i.e. the idea that the future will be what I predict it to be) is not compatible with the real world, however by adopting a real options approach to determining the preferred investment, it can limit the negative impacts of not having perfect foresight.

One of the key issues that faced the water industry was whether the changes in supply and demand were temporary or permanent. A key driver for the investments was the changes in supply (Millennium Drought), however the industry response was combined with other demand-response measures which resulted in significant reductions in demand. Some of the modelling supporting the construction of the desalination plants was based on the continuation of these abnormally low supplies, however as it has turned out the changes in supply were relatively temporary in nature (although shortages are likely to occur again in the future), while changes in demand have been more permanent in nature (i.e. changes in customer behaviour have remained even after the demand-response initiatives have ended).

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Productivity Commission, 2011, *Australia's Urban Water Sector*, Report No. 55, Final Inquiry Report, Canberra, p. XXIII.

This change in demand has also impacted pricing and cost recovery for bulk water assets that were invested to mitigate the supply risk. For example, bulk water prices in South-East Queensland were set based on a projected increase in water consumption following the end of the Millennium Drought, however as the reduced consumption has become permanent in nature it has resulted in the bulk water service provider under-recovering its costs.

If you would like to discuss any of this analysis, please contact Tim Ryan or Jim Snow directly on the details below.



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