

ELECTRICITY VS WATER SECTOR – LEGISLATED FRAMEWORKS, RISK MANAGEMENT AND INVESTMENT DECISION MAKING.

*Myles Lind, Manager Asset Planning, Queenstown Lakes District Council
Dr Stephen Batstone, Director, Whiteboard Energy*

ABSTRACT

Asset management in the New Zealand water industry is undergoing significant changes, most recently through the introduction of Section 101 of the Local Government Act. By comparison the electricity sector has undergone 20 years of liberalisation and maturing of regulation – this has seen a profound change in many aspects of the industry, not least asset management. These two industries have remarkable similarities in many respects across the supply chain. In this paper we compare and contrast the New Zealand electricity and water sectors in terms of asset management practices and infrastructure outcomes. Through case studies across the two sectors we identify and examine where sector specific learnings can provide advantages to the other. In particular we consider the sector approaches to the incorporation of risk management into asset life cycle and broader asset management, and the potential evolution of future technology and consumption behaviours.

KEYWORDS

Water, Electricity, Incentives, Customer Focus, Metering, Demand Management, Risk Management

1 INTRODUCTION

Local authorities are facing what appears to be a significant funding challenge. Demographic and economic change, combined with approaching an investment-intensive phase of asset life cycles are increasing concerns about the sector's financial sustainability. The World Bank describes it as a “mismatch between revenue means and expenditure needs” however in local government circles it has been described as the ‘funding gap’.

In trying to match costs with revenue, we instinctively assume costs and investments are “fact” and that funding needs to shift to match costs. But what if we are looking about this the wrong way? What if this isn't a funding gap and instead is an overstatement of what is actually required?

An objective to be efficient and sustainable is not necessarily commensurate with an approach of building assets and then seeking funding to match it. A more responsible framework is surely to consider the “elasticity” of the future needs of the community, in the same way we think about the alternative options for funding.

What are the confidence levels in our evidence base? How are we tracking and communicating our risk profile? What happens if we engage with our customers and better inform them of their consumption patterns and the true cost of those behaviours?

These are the sorts of questions that were debated at Queenstown Lakes District Council (QLDC), when their newly formed Infrastructure Asset Planning team employed a former risk and investment manager from the electricity sector in early 2015.

2 BACKGROUND

2.1 DEPRECIATION AND RENEWALS

Depreciation is an accounting function used as a rough financial measure of the value of assets that have “worn out” or been “used up” in a given year. Renewals expenditure is the money that has been spent on replacing these “used up” assets. If renewals expenditure is lower than depreciation, it may indicate that we are falling behind in our asset life cycle and there is a backlog of renewal work building up. An alternative argument is that we may have understated the economic life of the asset. Each explanation implies two different courses of action: one would recommend scaling up renewals expenditure (to mitigate the impending “bow wave”), while the other suggests we have the renewals expenditure about right, and it is depreciation that needs to adjust, and in this case scaling up expenditure would be an inefficient use of resources.

The reality is that the answer will be different for different situations. The challenge is, to be good at this, we must have reliable data on the condition of the assets, robust models predicting remaining life, and experienced people interpreting those results for the decision makers, and a considered, risk-based approach to balancing these competing requirements.

2.2 SIZING THE PIPES

A similar challenge applies to investing to meet growth; or equally, disinvesting to manage population decline. Is it reasonable to take our growth projections, the levels of service we have to provide, and the way we provide for growth through new investments as a given? Running the assets into the ground is seen by engineers as unacceptable, due to risks to the health, wellbeing and prosperity of a community. However, commercial sense needs to be considered here – not every asset failure will result in dire consequences. Some assets can, and should, be run closer to a higher risk of failure. A decision on which assets fall into this category can only be identified through an intelligent risk management approach, involving a broad range of parties, and giving due consideration to the operational context and stated levels of service set out by a particular entity. What is of greater importance is the requirement to know which assets are truly critical.

2.3 THE FUNDING GAP

There is an obvious question that occurs from this current “funding gap” situation. Namely, how far above (or below) the service level line are we as to what is acceptable? There is only limited data available to currently assist us in understanding this completely, but it is reasonable to assume that there are some levels of conservatism or ‘gold plating’ occurring.

The Office of the Auditor General confirmed in its November 2014 report that local authorities’ are not exploiting their data sets to inform decision-making. In addition, The Treasury identified that investment decisions need to be more evidence-based within structured business cases, rather than relying purely on engineering judgement. Moreover, the challenges that New Zealand’s infrastructure has ahead will not be sufficiently met by our “traditional systems”.

Of the 2015 QLDC long term plan the auditors observed that council’s:

“ . . . methodology for developing the investment programme has been based primarily on best engineering judgement. . . ” and “that as data quality improves, capital programmes are expected to reduce.”

As a sector, to truly establish that there is a funding gap, we need to provide robust evidence that forecast expenditure is grounded in reality, rather than an unreasonable degree of engineering conservatism, and that capital expenditure represents good value for money.

We wholeheartedly agree that solid business-cases based on verifiable evidence are a core component of good decision making. However, it is not the only component.

2.4 LOOKING OVER THE FENCE

“If you do what you’ve always done, you’ll get what you’ve always gotten.” Anthony Robbins

Other sectors with similar network and monopoly characteristics (e.g., telecommunications and electricity) have pursued more aggressive institutional structures to provide, in the words of the institutional economist Alfred E Kahn¹, “society’s surrogate for free competitive markets...[generating] results that conform to optimum economic results”. We believe that, rather than necessarily debate the optimal institutional arrangements, it is worthwhile considering what characteristics emerge from these industries that could be insightful for the water sector.

As it is important to make any insights relevant to water, in this paper we have chosen the electricity sector as a comparator, due to the fact that it has similar characteristics, namely:

- Both water and electricity are point-to-point, network based services, with network externalities.
- Both are fundamental to the social and economic wellbeing of communities and the nation.
- They both have two primary challenges – their never ending need to be reliable and a customer’s willingness (or ability) to pay.
- Both sectors have long-life assets and their asset managers today are effectively custodians of those assets for the next generation.

However, we reinforce that the two sectors are fundamentally different in their institutional and regulatory arrangements. The local government sector is a set of local (natural) monopolies which are predominantly self-regulated². The network monopoly part of the electricity sector is subject to economic regulation by the Commerce Commission (to varying degrees, depending on size, ownership structure and other factors), while the supply (generation) and demand (retail) sectors of the electricity sector are principally disciplined by a competitive market (under the governance of a Crown Entity). However, in keeping with our purpose, the evolution of these regulatory arrangements for electricity arose in part due to concerns about the financial sustainability of the sector.

The next section briefly revisits the reasons behind the liberalisation of electricity. However, we stress that this is not necessarily to advocate a similar path for water, but rather to contextualise electricity as a comparator.

3 THE LIBERALISATION OF ELECTRICITY

In the 1980s, the fourth Labour government commenced a plan to liberalise key sectors such as banking and financial services, telecommunications and electricity. For electricity, this process commenced in 1987, with the creation of a new corporate entity Electricity Corporation of New Zealand (ECNZ). It proceeded through numerous phases, directed by governments from both sides of the political spectrum, culminating recently in the partial listing of the last State-Owned Enterprise, Genesis Energy, in 2014.

The reasons behind deregulation have long been debated, and weren’t necessarily helped by Ministerial promises to consumers of lower electricity prices. However, as outlined in Treasury’s briefing to the Incoming Cabinet in 1984³, a core objective was to get the significant amount of capital accruing to the electricity sector out of direct government control (where incentives were warped by politics, and muted due to agency issues

¹ Kahn, Alfred E. (1988), *The Economics of Regulation: Principles and Institutions: Vol I*, MIT Press. Kahn goes on to broadly define what society’s definition of success looks like, i.e., that the customer desires industry:

1. To be efficient in the technical sense, that is, to keep the costs (social as well as private), to which price is to be equated, as low as possible.
2. To improve its efficiency as rapidly as is economical - perpetually to devote its efforts to improvements in efficiency so long as the incremental cost of those efforts are exceeded by the (discounted current) value of cost savings thus achieved.
3. To engage in product or service innovation with an intensity subject to the same economic test.

² Although not in the same coordinated way as the electricity generation and retail sector was between 1996 and 2004, which was via multilateral agreement between all participants

³ Incoming Cabinet briefing, 1984, NZ Treasury, stated for example “*In many cases, existing provisions regarding the accountability of State enterprise managements do not, in Treasury’s view, incorporate appropriate incentives for efficiency*”, Chapter 13.

and lack of accountability), and into the hands of entities who were correctly incentivised to manage it efficiently. The underlying belief was that:

- There were colossal cost overruns in the electricity sector under government control, that were assessed to cost the taxpayer \$300M per annum in perpetuity⁴ (nearly \$1B per annum in 2015 dollars)
- There was insufficient signalling of the cost of electricity to consumers. While deregulation had commenced by then, this was also a criticism of the Ministerial Inquiry into the 1992 Electricity Shortage⁵

The point is that deregulation was in no small part predicated on the belief that decision making incentives matter.

The period since deregulation gives us an opportunity to observe how market liberalisation – and, to some extent, phases of both light and tight regulatory oversight – have benefited the electricity customer. There are many perspectives that could be taken – the impact on investment and security of supply, political interloping, or transparency, to name a few. To briefly comment on these in turn:

- The 90 years of sole government investment in the electricity sector since the passage of the Electrical Motive Power Act of 1896 certainly evolved the industry into the modern economic era, but it did exhibit regular patterns of boom and bust, cost overruns, both wasteful investment and numerous periods of forced rationing through almost every decade until 1992
- Since deregulation, the market has largely delivered the right investment at the right time – under the market there has been no forced rationing, despite periods of record low hydro inflows, and investment has predominantly been in renewables despite no formal government support. In water, we expect to see the quality of investment decisions being brought into sharp relief with the increasing uptake of Treasury’s Better Business Case framework, and the bar being raised for evidence-based decision making.
- While deregulation ended an era of direct political control, the electricity sector has not been immune from Ministerial reviews, tinkering, and interventions. A fundamental re-design of the market framework was (unsuccessfully) proposed by opposition parties at the last election, partly motivated by an extended period of price rises over the last decade. However, the perception is that an effective regulator is a key part of preventing further intervention.
- There is little doubt that the market is significantly more transparent than under state control, in no small part due to ability to reconcile the electricity price faced by a customer to a wholesale price for electricity, which is traded every half hour of the year. The Electricity Authority has also raised the transparency of competition, network and retail tariffs. The Commerce Act’s Part 4A disclosure regime ensures that key parameters regarding the assets of electricity lines businesses are available to all consumers.

Each of these themes would require a paper in themselves to do justice. However, we have chosen here to focus on what we believe is one of the most important outcomes of deregulation: the engagement of the customer.

Below we outline the benefits that have arguably accrued to the electricity consumer, some as a result of deregulation, with others enabled by decisions that significantly pre-dated deregulation (e.g. metering). Before doing so, we make the following observations:

- In all fairness, the trajectory wasn’t purely towards liberalisation. In the early years of the 21st century, two key pieces of legislation were enacted to (re)regulate the electricity sector when the exposure to unregulated entities was recognised.

⁴ McLachlan, C. (1984) *Review of Electricity Planning and Generation Costs*

⁵ The Report of the Electricity Shortage Review Committee, 1993

- Firstly, Part 4A of the Commerce Act was introduced to regulate the monopoly behaviour of network companies (companies responsible for the transmission and distribution of electricity, not the generation or retail). Regulatory settings were both price and quality (including reliability).
- Secondly, Minister Pete Hodgson established a regulator for the electricity sector (including generation and retail) – then the Electricity Commission⁶, but now the Electricity Authority. The Electricity Authority’s statutory objective is to improve efficiency, competition and reliability.

The introduction of the State-Owned Enterprise model arguably achieved many of the benefits the customer now enjoys. While the capital technically remained on the government balance sheet, the commercial incentives (reward and risk) were concentrated in limited liability structures, many of whom competed in wholesale and retail markets, governed by independent boards of directors.

4 INCENTIVES MATTER

As outlined above, one of the key motivations for electricity sector deregulation was the agency problem that managers responsible for decision making faced no direct sanction from the owners/investors in the electricity system (ultimately voters)⁷. Accountability was enormously diluted through the political system. Ultimately, this agency problem was addressed by:

- Exposing the contestable parts of the electricity supply chain (generation and retail) to the discipline of competition with a level playing field designed partly to encourage the entry of private capital, and
- Non-contestable network businesses were subjected to the regulatory oversight of the Commerce Commission who in turn set prices and quality thresholds.

Neither regulatory oversight nor competition are present in the water sector. In fact, more pertinently, the relationship with the customer is even less sophisticated than the electricity sector was for most of the 20th century. At least the electricity customer received some price / behaviour signal via their electricity bill from a local Electricity Supply Authorities, even if the true marginal cost of electricity was partly picked up by the taxpayer.

Across local government water services, with the notable exceptions of Auckland Council and its neighbouring councils, the variable cost of water supply is not signalled directly to the customer. Rather, it has been preferred practice to bundle water costs as part of an overall rates demand. In fairness, rates demands are a very efficient, enforceable way for councils to cover their costs. It removes the requirement for service level agreements with consumers and revenue is guaranteed as a customer’s ability to challenge a payment to a council is very limited. However, in recovering water costs within a broader rates demand, transparency is lost to the customer, as is their ability to understand trade-offs between service and cost. This is a point not missed by LGNZ as set out in its October 2014 paper on water sector issues.

If a poor investment decision is made by an electricity company (generation, retail or network) now, they cannot simply pass the cost through to the customer – in a competitive market an increase in price will see them lose market share, or in the regulated network businesses the Commerce Commission will have little sympathy when setting price thresholds.

In the water sector, there is no regulator acting as the customer’s agent, ensuring that good decisions are being made, efficiency is being properly incentivised, the quality of supply is being maintained and that all of these

⁶ The Electricity Commission was enacted in response to the industry’s failing to achieve voluntary self-regulation in 2003. A parallel development since then has been the Gas Industry Company, which is a model of co-regulation, whereby the industry is regulated by an independent entity, but empowered by legislation with Central Government setting out overall objectives and performance requirements via a Government Policy Statement.

⁷ This is not to diminish the reality that the desire for managerial excellence was not present in the Ministry of Energy days. No senior official wanted to be in the “public eye” as a result of an investment failure. However, Treasury’s point was that, generally, the reward mechanism for managerial performance was in no way tied to how the customer assessed performance.

factors are transparent to the customer⁸. Hence the water customer, despite being the primary “investor”, has little sanction on the performance of their local council other than voting in the local body elections, which is only available every three years. In this way, the water sector currently is similar to the pre-liberalised electricity era in that poor investment decisions do not result in any negative financial consequence for the decision making body, but are ultimately charged directly through to the taxpayer.

We are not necessarily advocating that either competition or the economic regulation approaches applied in the electricity sector should be mimicked in the water sector. Rather, we are highlighting that there are few examples left in a modern economy where the quality of investment decision making is the customer’s risk alone, and is not subject to any independent oversight or competitive discipline.

Looking forward, water providers place themselves in a precarious position as an essential service provider if they can’t clearly demonstrate they understand the condition and performance of their assets, the future demands placed on these assets and the transparency of linking those investment decisions with an engaged (incentivised) customer base. This is not to suggest that water providers aren’t competent: rather that the lack of direct price signals in water dilute performance incentives enormously. Even the most diligent water investor will struggle to optimise capital allocation when their financial performance signals are muted by the bundling of numerous different service ‘revenues’ into a single rates bill.

4.1 CLEAR SIGNALLING

The Auditor General described QLDCs 2009 long term plan, which sought to increase debt from \$111M to \$393M over ten years, as “not financially prudent”. This was a bad look for the Council and the reputation of local government generally. How was it then that the engineers, the managers, the elected members and the public of the district thought this level of investment was a good idea but the Auditor General didn’t?

In part it goes to show that the role of good governance matters in local government as the breadth and complexity of decisions are in the millions of dollars annually. We need to embed change management processes to enable us to be continuously improving the performance of local government in the drive to make a “stronger, more efficient local government sector” writes Lawrence Yule, President of LGNZ. It should be the goal of local authorities that QLDC, back in 2009, be the last council to ever have their long term plan labelled “not financially prudent”.

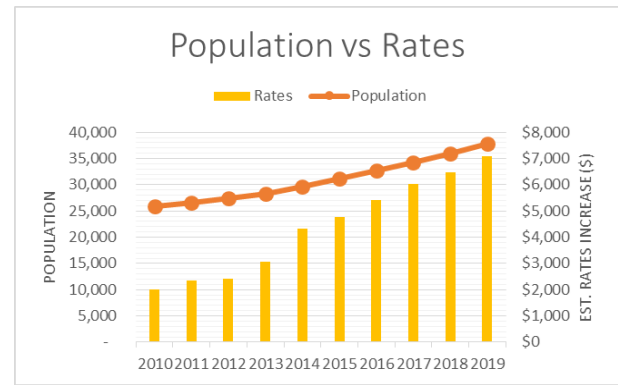
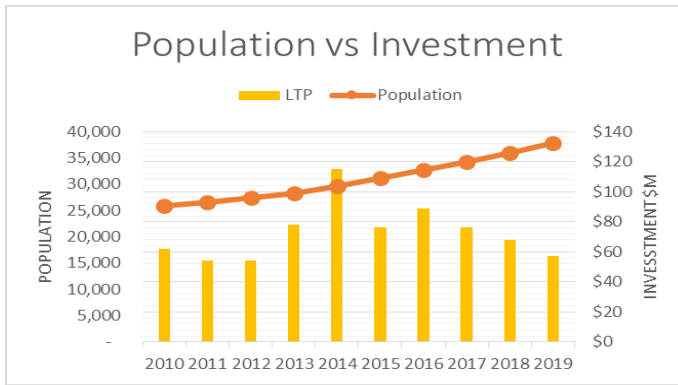
A key question here is “how did the paying-public miss this?” They are the ones footing the costs. The answer is simple – there was a lack of meaningful engagement.

The recent non-financial measures developed by the Department of Internal Affairs go part way to encouraging customer engagement. But as a sector we could go further. To close the loop, this paper proposes that as part of the improved customer engagement process brought about by metering, local authorities should also be providing the projected implied price of water as part of their long term plans. This will assist in engaging with customers to ensure that the best solution is being identified and delivered.

We are required to project our 10-year investment programmes and changes in debt. Both look very impressive but ultimately mean little to the average person in the street. However, a 10-year projection of a customer’s water price changes year on year - this would surely gain a customer’s attention and encourage them to engage (Figure 1).

Figure 1 – QLDC 2009 LTP – Telling a story to the community vs Tell the story to the customer

⁸ One of the main benefits of the Part 4A disclosure regime is that it allows all 29 electricity distribution companies to be directly compared in terms of investment performance, network reliability and pricing. The customer can get at least a rough idea whether they are getting a fair deal or not.



5 PRICING AND METERING

5.1 PRICE SIGNALLING

The economics literature is replete with arguments as to why price-based signals achieve higher levels of efficiency than other cost allocation approaches. We do not intend to replicate these arguments here, but instead will illustrate the practical effects of marginal pricing observed in the electricity sector.

There are two key advantages to marginal price signalling over tax based funding. Firstly, it allows consumers to make an informed decision about whether they want to buy, and how much they want to buy. Given a particular price point, a consumer will choose to purchase (or not purchase) a particular good or service. This gives the consumer a greater ability to manage their financial situation⁹, and gives the producer a clearer understanding of actual demand needs.

As Kahn (1988) notes in his seminal text on the regulation of public utilities:

“If consumers are to make the choices that will yield them the greatest possible satisfaction from society’s limited aggregate productive capacity, the prices that they pay for the various goods and services available to them must accurately reflect their respective opportunity costs; only then will buyers be judging, in deciding what to buy and what not, whether the satisfaction they get from the purchase of any particular product is worth the sacrifice of other goods and services that its production entails.”

Kahn goes on to explain the practical difficulties with equating price with marginal cost¹⁰; not to diminish the concept, but to present a realistic set of principles that should be adhered to in its pursuit. However, it is clear that - in spite of these difficulties - it is a superior situation to the present one where perverse customer behaviour arises simply because they have already paid a fixed amount for the water service in their rates. The customer is numb to the effect their consumption has on the service as a whole as there is no direct signal, economic or otherwise, that their consumption will cause incremental costs or – equally – that their non-consumption (through conservation or efficiency) will confer incremental benefits. The fact that these costs or benefits are (almost invisibly) socialised across all customers significantly diminishes any basic signalling which social responsibility would require as desirable. The fact that rates are generally only charged quarterly further dilutes any drivers for individual social responsibility as a customer’s changes in behaviour are not measured with sufficient time-based granularity to inform future behaviours. The incentives ‘feedback-loop’ is also too slow.

To reinforce the social benefits of price signalling, over the period 2003-2012, electricity consumers faced nominal price increases which averaged nearly 6% per annum¹¹. While the reasons behind these price increases

⁹ We acknowledge that the social dimensions of equity and hardship, in the face of pricing essential goods, need to be dealt with when considering the introduction of pricing mechanisms.

¹⁰ Kahn, *ibid*, pp 65-77

¹¹ Sales-based residential prices, June 2014, Ministry of Business, Innovation and Employment.

have been hotly contested, we find it as no surprise that the peak of these price rises coincided with a flattening of residential electricity consumption that was without precedent in the history of the industry. We acknowledge that the reasons behind declining household consumption are a complex interplay of technology, price and information¹², it would be hard to assert that increasing prices hadn't played a role in the uptake of energy efficient appliances such as heat pumps and energy efficient light bulbs¹³. Or – perhaps more importantly – electricity price rises have led to a more engaged customer (the size of our electricity bills are a common topic of social discourse), with commensurate behaviour changes often triggered. The customer has the power to conserve¹⁴. However, local authorities have generally been slow to adopt such an engaging approach for water services. Without volumetric charging, a water customer faces no consequence for leaving sprinklers on overnight, just the same as a neighbour gets no benefit for laying drip lines and a rain-sensitive watering system instead. In fact, the lack of a price (even in the presence of a tax or levy) drives perverse behaviour – if a customer is going to pay the same amount regardless of consumption, they might as well maximise their consumption, because their marginal cost is effectively zero. It also significantly dilutes positive initiatives such as water efficiency labelling of new appliances; why would a consumer purchase a highly water-efficient washing machine, if water is “free”?

While we acknowledge that the cost structure of network industries does not necessarily imply pure variabilised charges¹⁵, an industry with no signal to consumers reflecting the costs of expansion required to meet additional demand can in no way argue they are operating efficiently¹⁶.

Local authorities should seize the advantages of these direct consumer-engaging tools, and the Government should seriously consider removing any impediments to their effective use. Price rises are a political hotbed; but from a public policy perspective, in the case of electricity they may have done their job: they arguably reached a point where conservation and efficiency became more attractive to the customer than implicitly asking the industry to invest in additional electricity generation.

5.2 THE CASE FOR UNIVERSAL METERING

The place of water meters in local government is often a highly-charged debate, and is often seen as a precursor to privatisation. Technically the value of water meters will depend on the offset cost of investing to meet existing demands into the future. The water sector as a whole doesn't have a clear position on whether meters are good or bad. The electricity sector does – they are good.

According to Water New Zealand, water metering is common practice in non-residential properties however is not yet wide spread amongst residential properties. On average this year's review indicated 94% of non-residential properties are metered, but only 29% of residential properties. By way of comparison, effectively all electricity customers are metered.

Electricity metering (and volumetric charging) was introduced around the time of World War II. We have no documented evidence of the specific drivers for this change in approach; however, we speculate that it was driven by severe supply shortages being experienced at the time, due to the lack of investment relative to demand growth. However, we also note that, until that time, electricity demand had been primarily driven by

¹² See Batstone (2014), *Trends in Residential Electricity Consumption* for a discussion of these factors. Available at www.comcom.govt.nz/dmsdocument/12306

¹³ Indeed, solar power vendors often cite the rising price of grid-based electricity as a motivation for installing solar panels. Miller et al (2014) reports that this is a major motivation for those contemplating solar.

¹⁴ This behaviour was recently replicated by private vehicle users in 2005 when petrol prices hit all-time highs following Hurricane Katrina and carpooling became common practice.

¹⁵ The balance of fixed vs variable network charges in electricity is currently under consideration by the Electricity Authority. A commonly cited principle is that genuinely variable costs (over the short and long term) should be signalled to the customer. In the case of water, despite the largely fixed nature of the network in the short run, we find it hard to believe that the overall, long term cost of water could credibly be signalled as zero. And, to be clear, we are not convinced that replicating the fixed-variable structure of short-run network costs in pricing structures is, in the long-run, efficient.

¹⁶ In fact, it was primarily this observation that led then Minister of Energy Pete Hodgson in 2003 to introduce legislation that capped the fixed component of electricity bills. The Minister's motivation was seeing pensioners trying to save electricity, but not being rewarded by a commensurate reduction in their electricity bills.

lighting, and thus household consumption was probably quite homogenous. With the advent of larger electricity appliances (e.g. electric ovens and heaters etc.), household consumption became more diverse, and it became important to measure and understand where this was happening, as well as to tap into the power of the new discretionary consumption (via price signalling) to manage scarcity

Electricity metering and pricing was seen as two sides of the same coin (how can you price correctly without metering?). However, it was in no way introduced as a pre-cursor to privatisation. Metering and pricing were introduced nearly 100 years ago and was driven by a desire to manage the system more sustainably, and (we speculate) to enhance the understanding of what was happening at the customer's premises so that better asset investment could follow.

Just because New Zealand currently has an abundance of fresh water, that doesn't mean that we should take it for granted and use it inefficiently. The concept of water as simultaneously "essential" and "free" rival common sense. It defies common sense as "free" results in more cases of thoughtless or wasteful consumption. This runs completely counter to a vision of a sustainable and efficient sector. We note that water providers who have introduced metering and volumetric charging have observed that their customers are willing to adjust their water use in response to these price signals¹⁷. It was also noted that the three organisations with water consumption close to the International Benchmarking Network for Water and Sanitation Utilities of 158¹⁸ litres per person per day have volumetric charges. The average for the rest of the country was nearly 50% higher at 231 litres per person per day. As stated in the latest Water NZ performance review,

"There are opportunities to reduce water loss [wastage]. Median current annual real losses of 161 litres/service connection/day is twice as high as the urban Australian median of 79 litres/service connection/day (National Water Commission, 2014)."

There is an argument put forward by some that the cost of installing water meters doesn't align with the savings benefits. This may be true in some cases. But if we consider the counterfactual: what if we don't meter and charge volumetrically over the next 30-years? The electricity sector may have already shed some light on the answer. The desire to be a sustainable and efficient sector needs to be more than wishful thinking and leaving it for the next generation to solve.

The issue of an idea being good in the long-term but cost prohibitive in the short term was well discussed and debated by the many water providers of Auckland in the mid-2000s as part of the Watercare led Three Waters Strategic Project¹⁹. The answer was to enable and encourage. QLDC has picked up on this thinking with its new water metering policy. Water meters are required moving forward for all new developments. Installing meters at the time of development causes no meaningful financial burden on the developer or the homeowner and it progressively moves the council and the consumers to a place of improved data and knowledge. This is an important step forward for the district which currently estimates water consumption to be around 480 litres per person per day on average (compared to, for example, Tauranga at around 180 litres per person per day on average). QLDC may not be able to afford to roll out water meters in the short term the way Auckland did in the 1990s, but it is able to correct the course for the future. By making progressive, forward-looking policy change, future generations will have the robust data they need to inform, incentivise and optimise their investments in our water supplies.

6 UP-ENDING THE SUPPLY CHAIN

Creating a sustainable and efficient sector must involve asking the question – "do we really need this much infrastructure?" The ability to plan for future consumption is unequivocally a central part of good asset management. However, recent experience in electricity suggests this is more than just a statistical forecasting exercise.

6.1 DEMAND PROJECTIONS AND MANAGEMENT

¹⁷ Water New Zealand, 2013/14 Annual Survey

¹⁸ Danilenko, 2014

¹⁹ Three Waters Strategic Plan, Watercare Services Limited, December 2008

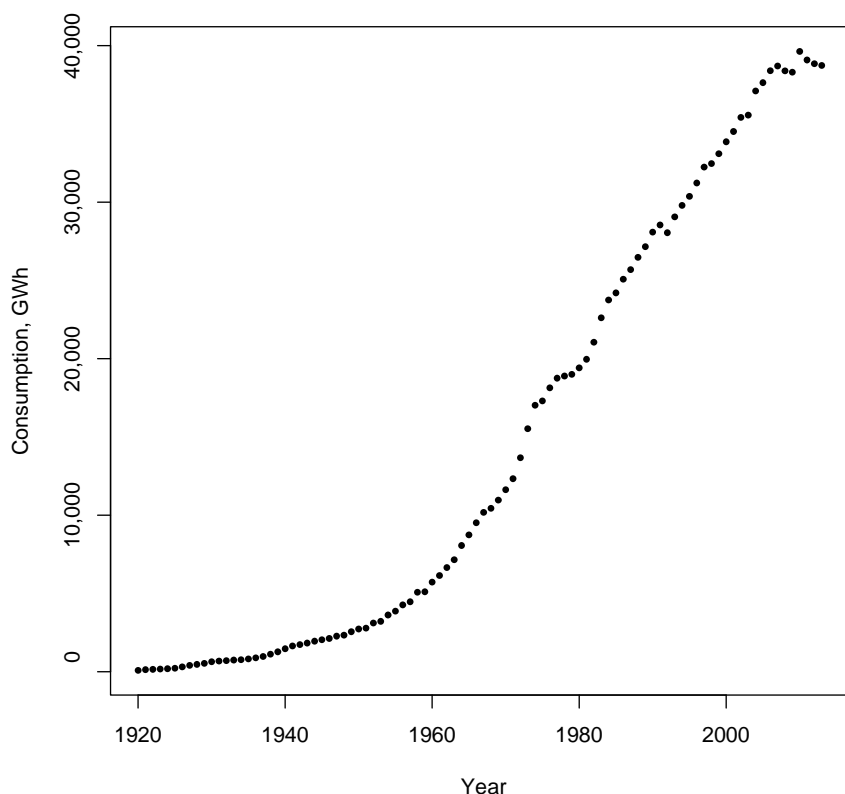
The ability of demand to respond is being increasingly seen as a productive part of the supply chain. The entire electricity system (like water) is built to meet a peak demand which may only last for a short period of time. In many parts of the world, customer involvement is being seen by regulators as an attractive alternative to building expensive peaking plant and low-utilised network capacity. New Zealand has one of the oldest and most comprehensive electricity demand-side response schemes in the world (i.e. ripple control of hot water systems), which is primarily used by network companies to manage network capacity and thus defer investment. More recently, the New Zealand wholesale market has enabled consumers (usually large industrials), who can respond to high electricity prices, to bid into its wholesale electricity market. In the United States, there are numerous state incentive schemes designed to grow consumer responsiveness to system congestion through the use of smart devices (e.g. intelligent central heating thermostats).

Rather than seeing customers as a demand which must be met, this transformation allows customers to elect to be rewarded for changing behaviour, rather than pay for additional system capacity to be built.

The simplest analogy in water is to take a flexible approach to levels of service; especially given the shape of the demand curve through time. This is reinforced through Treasury's Better Business Case approach. At each decision gate, the strategic need to invest is required to be reconfirmed before proceeding. In addition, options for addressing the problem need to consider both demand and supply-side measures. This gives water providers the opportunity to test, measure and reconfirm demand management and other non-infrastructure interventions over time, to what historically would have been a simple "build more capacity" solution. However, we reinforce that consumer driven demand management is made much more effective through metering (to measure response) and pricing (to signal need and reward response). It deals to the free-rider issue that results when the efficiency savings of a few fastidious consumers are effectively socialised (and likely reduced to near zero). While we accept that some will be driven by a conservation ideology irrespective of whether it gets measured and rewarded, financial incentives will drive a much broader cross-section of consumers.

Secondly, the ability to understand customer behaviour, and anticipate feedback loops, improves our ability to see changes in demand coming. Even though electricity has been metered and priced for over 80 years, it has maintained a remarkably static growth path (Figure 2). Accurate demand growth projections made investment planning easier (although a boom-bust cycle was still observed under government control, often as a result of macroeconomic objectives).

Figure 2 – NZ Electricity Consumption 1920 – 2013



However, in 2007 something changed. The industry has since experienced the longest period of flat demand since reliable records began in 1908. As discussed above, the reasons behind this are still being debated, but it has given rise to a much greater industry awareness of what’s driving the customer, given the obvious impact on revenues for the entire supply chain. Building more generators and electricity lines is no longer a guaranteed growth path – in fact, the industry’s response has (efficiently) included the decommissioning of power stations²⁰. The global industry (especially developed countries) are experiencing a similar demand dynamic and is thus rapidly considering alternative business models with revenue streams which aren’t as closely tied to consumption growth, focused more sharply on what the customer actually wants and needs.

Council’s infrastructure programmes have primarily been based on the ‘build our way out’ philosophy. However, it’s unreasonable for the water sector to expect its customers to just pay annual increases in charges. Eventually, there will be a tipping point where the ratepayer will say, “This is too expensive, what are my other options?” The experience of electricity is that, when part of the decision making is vested in the hands of customers, with appropriate signalling, consumers become more engaged (even if this takes some time). Engaging with the community in this way may actually be a more complex challenge to organisations that have historically had a dominant “supply side” focus, but – in our view – is more in keeping with a custodianship philosophy. This is especially important in water, where local government is the appointed custodian of the community’s assets, and has a corporate responsibility to protect our water resources.

7 CUSTOMER ENGAGEMENT – THE REAL THING

While the impact wasn’t immediate, the reforms in electricity have seen a progressive increase in engagement with the customer. It was only 15 years ago that a customer could buy their electricity from only one entity, at the posted tariff. Now, customers enjoy competition from numerous retailers, with a wide range of tariff structures, ranging from real-time wholesale pricing (varying by half hour) through to deals offering fixed prices for many years.

²⁰ Two of the four 250MW coal-fired units at the Huntly power station have been removed from continuous service.

These changes are gradually up-ending the electricity supply chain. The legacy supply-side dominated perspective saw consumers as a fixed demand which needed to be met (and couldn't be controlled); the complexity of the industry was managed on the supply side as a result. Now, the customer is becoming an integrated part of the value chain – partly driven by escalating prices, more choice and technology advances.

The point should not be lost that these changes, while manifesting post-deregulation, are fundamentally enabled through metering; a decision that was taken over 75 years ago. The more sophisticated arrangements seen now are enabled by the next generation of advanced meters (which, we note, have been rolled out at the election of market participants, rather than by government edict, which is often seen in other countries).

In water, we are far less advanced down this path of engagement maturity. The sector is convincing itself that there is a funding gap because we have an assumed level of (re)investment, and now we just need to pay for it. The bow-wave of renewals is subject to this same philosophical framework of assuming that cost is fixed, and revenue needs to be raised to meet it. The water sector does not actively see the customer as an integral part of solving the “investment challenge”; the closest it gets to customer engagement is through consultation on weighty planning documents.

There is evidence to suggest that our understanding of future demand – let alone asset condition data - are not up to a standard that is appropriate for the importance and value of the infrastructure we are currently the custodians of.

This is especially true when the consumer does not see, or is not exposed to, the cost of providing the service. Our current approaches for developing levels of service and signalling the cost of those levels of service are not appropriately aligned or linked.

Specifically we need to change our approach and improve our ability to effectively manage demand, primarily by signalling to consumers the value or cost of changing their consumption, in a timely manner. This will reduce wastage and engage with customers with a view to ultimately providing what they need, as opposed to what they are currently using.

The electricity sector tells us that there are a number of dimensions we could focus on – asset management, risk management, governance. The water sector is improving in these respects. But we believe an area not afforded sufficient attention is how we, as a sector, think about the customer. Incentives are the key driving force. We need to up-end our supply chain and make it a value chain, which starts with the customer. Informed and engaged customer demand drives the system, not supply. And we need to bear in mind that when demand grows predictably, the incentives to understand or involve the customer are limited. When that dynamic stops, understanding customer behaviour becomes paramount.

Water metering is an offensive concept to some people. Waste and inefficiency should be an equally offensive concept to all people, especially those who are paying for it, and especially to those who desire to lead an efficient and sustainable sector.

Water metering, progressively rolled out in the water sector is a fundamental need to ensure our water services are efficient and that waste and leaks are minimised.

Customer engagement through volumetric charges based on water metering is critical to ensure the water sector is financial sustainable and is best able to deliver efficient and effective services, that meet the current and foreseeable future needs of the communities we serve.

8 CONCLUSIONS

The funding gap needs to be re-thought from the customer's perspective.

The water sector can learn and improve its performance by taking lessons from the electricity sector, specifically through introducing:

1. **Incentives** – to ensure the pressure to make good decisions is felt by the agency decision makers, not just lumped onto the customers. Low quality services and poor investment decisions being foisted on the customer is not a sustainable business model.
2. **Metering**: – having got the agency sorted, things that get measured, get managed. Inefficiency and ineffectiveness in a business is bad business. Metering has wider benefits in that it identifies leaks and improves network effectiveness. New Zealand is trailing well behind Australia in water efficiency – as a nation we can't accept this as “good practice”, given the importance of sustainability to our national brand.
3. **Pricing** – having got the agency leaks (wastage) managed through metering, send a clear price-based signal to customers to improve engagement, equity and avoid perverse behaviour.
4. **Value chain** – up-end the supply chain by creating a value-chain which is focused on the customer and close the loop on demand and levels of service. Communicate in the language that everyone understands – price and service.

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