Introducing water meters:

Lessons and perspectives

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New Zealand Infrastructure commission / Te Waihanga

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Introduction

Many of our cities and regions face challenges delivering safe and sustainable water services. These challenges include ageing assets, more stringent water quality standards, environmental compliance, and climate change (which is expected to impact water security in many regions). Significant investment will be required to address these challenges, with affordability a pressing concern given recent rates increases and cost of living challenges.

Metering water and charging for its use (volumetric charging) has helped many communities get more value from their existing infrastructure. While volumetric charging can reduce the burden on ratepayers, the costs and benefits need to be assessed on a case-by-case basis. The New Zealand Infrastructure Commission, Te Waihanga, examined the benefits of metering in our recent research: Valuing water: sustainable water services and the role of volumetric charging.

The prospect of introducing water meters evokes public opposition in some quarters. But sentiment may be changing. Councils up and down the country, including Ashburton, Horowhenua, Hutt City, Marlborough, Queenstown Lakes, Stratford, Tararua, Wellington City and more, have water meter implementation plans, trials, or investigations underway or in their long-term plans.

Practical lessons can be drawn from communities that have successfully navigated the process of introducing water meters. To that end, we commissioned the attached report, providing insights from the experiences of Kāpiti Coast District Council and Nelson City Council when they introduced water meters.

Everyone pays for water services

All New Zealanders pay for water and wastewater services, even if they do not realise it. The way in which New Zealanders pay varies depending on where they live.

Over 57% of residential properties and 72% of non-residential properties in New Zealand are metered with users paying for the water they use.

While the use of volumetric charging is on the rise, residential properties in most communities pay for water services through council rates. Depending on the transparency of the rates bill, homeowners may or may not have visibility of how much they pay for their services.

Although everyone pays for water services in one way or another, the way we pay influences the amount that we use. The way we pay can also affect investment decisions, service efficiency and the benefits that consumers receive.

A case for change

There are significant opportunities for improved pricing practices to lift outcomes in the water sector. Charging for water, based on usage, can form part of the solution.

Volumetric charging can help defer expensive community investments

Where water metering was introduced in Tauranga, it allowed the Waiāri Water Supply Scheme to be deferred by more than 10 years, despite high population growth – saving an estimated $53.3m. The current water meter rollout In New Plymouth, has already allowed the indefinite deferral of an

anticipated $4m pump station and pipeline upgrade. Significant cost savings were also achieved in Kāpiti Coast as highlighted in the attached report.

Improved leak detection

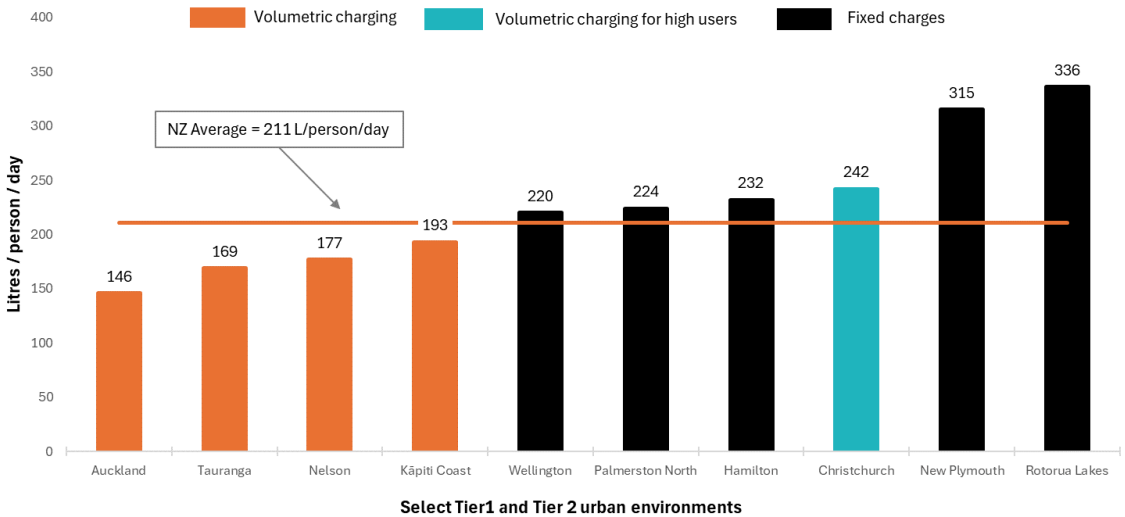
Abstracting, treating and distributing water to consumers is expensive and yet on average, 22% of total drinking water that is produced nationally, is lost due to leaks. Many communities across the country suffer leakage rates well above this average, in some cases approaching 50%.

The introduction of water meters to communities in Marlborough District Council in 2019 identified leaks within 25 properties responsible for hundreds of thousands of litres lost each day. In New Plymouth, improved leak detection enabled by water meters had saved 68 Olympic swimming pools of treated water a year half-way through their installation programme. The installation of water meters in Kāpiti Coast enabled even greater benefits through leak detection. See the attached report for more detail.

Reduced consumption

New Zealanders are one of the world's highest per capita users of water. This high consumption increases the cost of service, as more infrastructure needs to be provided to abstract, treat, and distribute a larger volume of water. Volumetric charging can be effective at discouraging excessive use of drinking water (see Figure 1).

Figure 1 - Residential water consumption for a selection of tier 1 and 2 towns and cities (L/person/day)



Source: Benison, T., & Talbot-Jones, J. (2023). Urban water security: Assessing the impacts of metering and pricing in Aotearoa New Zealand (Motu Working Paper)
Note that water consumption data for New Plymouth pre-dates introduction of volumetric charging there. In Rotorua Lakes, seven of their ten water treatment schemes serve rural-residential and farming supplies, contributing to higher consumption per capita data.

Of course, volumetric charging is not the only way to incentivise water conservation. Councils often rely on outdoor water-use restrictions, such as sprinkler bans, during dry summer months. While restrictions can be effective, an exclusive reliance on rationing provides no incentive to invest in water-efficient appliances and fixtures or more water-efficient gardens. The effect of volumetric charging also endures longer than a time-limited water restrictions.

Additional cost savings and wider benefits

Volumetric charging can also provide a range of other benefits including reduced operation and maintenance costs, improved investment choices, greater accountability and reduced pressure on fresh-water sources.

In the case of Kāpiti Coast District Council, 75% of its ratepayers paid less with water metering than they would have under the previous fixed-charge system. While in Tauranga, volumetric charging decreased the average cost of water by 40%, compared to what the community would otherwise have had to pay. While potential savings are attractive, the distribution of costs matters too.

Volumetric charging can be more equitable than fixed prices

Modelling we commissioned shows that volumetric charging can reduce costs for many low-income ratepayers. These results are based on the finding that low-income households tend to have fewer people than high-income households and use less water as a result. Research also shows that low-income households tend to be more responsive to price than high-income households. Volumetric charges allow households to reduce their costs by managing water use, whereas fixed charges limit opportunities to save money.

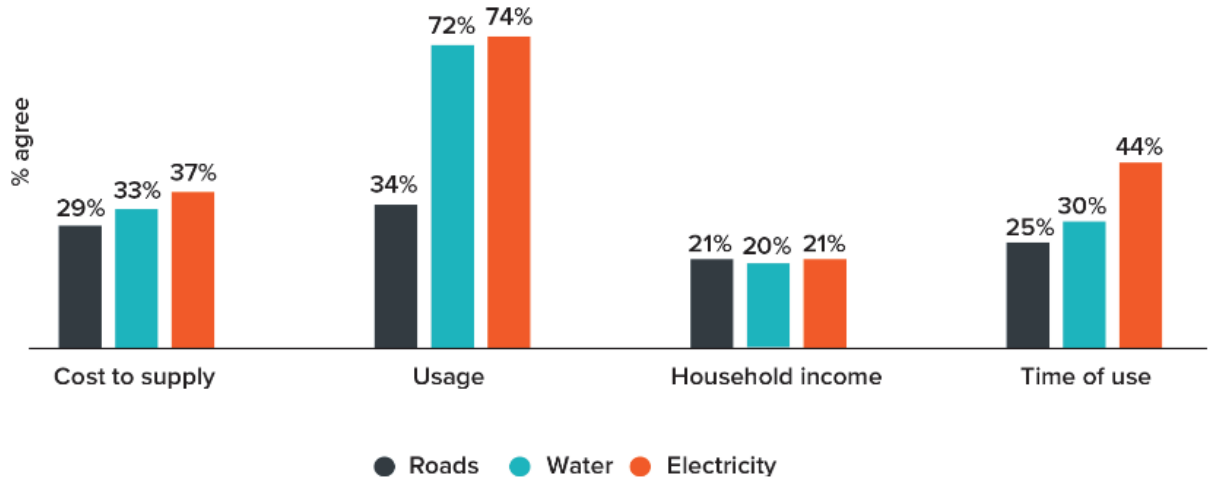
But socio-economic traits differ between communities. As a result, many councils have established working groups with broad community representation to tailor billing structures to address equity issues. The impact of volumetric charges on renters requires specific consideration as savings from reduced council rates may not necessarily be passed on by landlords.

Most New Zealanders' see volumetric charging as fair

We commissioned a demographically representative survey of over 3,000 New Zealanders asking what they thought about the fairness of different approaches to paying for road, water, and electricity services *(Public perceptions of fairness in how households pay for key infrastructure services in New Zealand*, New Zealand Infrastructure Commission, 2023).

Almost three in four New Zealanders (72%) felt that usage-based charges for mains water are fair. This result is very similar to the share of New Zealanders (74%) that felt that usage-based charges for electricity, are fair – see Figure 2. While the concept of 'fairness' means different things to different people, this data suggests that the fairness and distributional issues associated with volumetric charging may be smaller than commonly assumed.

Figure 2 - Survey responses on the fairness of different approaches to paying for road, water, and electricity services



Source: Adapted from (New Zealand Infrastructure Commission, 2023)

Adopting volumetric charging

The challenges facing the water sector will necessitate significant investment. As a result, communities must find ways to reduce costs, defer investment demand and improve equity outcomes for users. We see significant opportunity for volumetric charging to contribute to each of these goals. That said, investment decisions require consideration on a case-by-case basis to identify where volumetric charging can offer net benefits.

We know that introducing water meters is not necessarily easy. The process can present political, commercial, and technical challenges. We commissioned the enclosed report from Pat Doherty to help us better understand these challenges. Pat was the Technical Director at Nelson City Council and the Chief Executive at Kāpiti Coast District Council when water meters were introduced to each community. We hope the following report will be a useful resource for councils considering the role that volumetric charging can play in supporting their financially sustainable Water Service Delivery Plans.

THE PRACTICAL REALITIES OF IMPLEMENTING WATER METERING AND VOLUMETRIC CHARGING

A report commissioned by the New Zealand Infrastructure Commission, Te Waihanga

February 2024

Abstract

This report was commissioned to support considerations on upcoming water reform. The report discusses the practical realities of water meter implementation based on the author's experience, knowledge, and opinions.

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Contents

1. Introduction

The introduction of water meters and volumetric charging in New Zealand has had a positive effect on peak water usage. These results are well documented in several papers, which can easily be found.

The New Zealand Infrastructure Commission, Te Waihanga, commissioned this report to discuss the practical realities of water meter implementation based on the authors experience, knowledge and opinions. Hopefully it will assist others to take on the challenge for the good of their communities and the environment.

The report provides a summary of the author's experience introducing water metering and volumetric charging in Nelson City and the Kapiti Coast. It includes:

- Advice on addressing public perceptions.
- Insights into the potential political implications.
- Advice on operational challenges.
- Discussion on the commercial drivers.

Both Nelson City Council (NCC) and Kapiti Coast District Council (KCDC) introduced water metering together with volumetric charging. For the purposes of this report (and ease of reading) the term water metering implies volumetric charging.

2. The author's experience with water metering

Between 1986 and 2001, I held the positions of Services Engineer and Manager Technical Services with NCC. During that time (1995 to 1999) I was responsible for leading the project to establish universal water metering in Nelson City. The project included obtaining Council approval, developing a strategy to minimise public resistance, letting contracts for the installation of 16,000 meters and manifolds, assisting the Council to select a pricing structure, running a public education campaign and establishing efficient meter reading and invoicing systems.

In 2008 I was appointed Chief Executive of the Kapiti Coast District Council (KCDC), a position I held until the end of 2017. Work on resolving Kapiti's long standing water supply issues started in 2009. After investigating the options available to address capacity and quality issues a preferred option was identified which included the implementation of universal water metering. Despite strong resistance from sections of the community, work on this part of the project was successfully completed in 2014.

In both cases, peak water usage reduced by 25%.

I suspect that I am one of the few people that has twice played a lead role in the successful implementation of water metering within NZ.

In late 2017 I returned to NCC as Chief Executive. Over the next three years NCC progressively replaced the meters that had been originally installed between 1996 and 1999.

3. Background to council decision making

3.1. Nelson City

When NCC made the decision to implement universal metering in 1996, there were two drivers:

- A new storage dam had been completed about 10 years earlier and there was now sufficient storage to meet demand during a 60-year drought for the next 50 years. This had seen the end to rigorously enforced, summer water restrictions, but peak household usage had increased dramatically. The city was at the point of having to increase the size of its trunk main systems or risk hill suburbs running out of water on summer evenings. The alternative was to reintroduce tough water restrictions which would have been unacceptable to many in the community, given the scale of expenditure on the storage dam.
- The city had two sources of supply and abstraction consents were due for renewal within the next 5 -10 years. The volumes of water being used for watering of lawns, gardens, and grass berms meant that it was going to be challenging to make the case that that water was being used efficiently and that the city's water resources were being sustainably managed.

  It is worth noting that the introduction of the National Policy Statement on Freshwater Management in 2011, and more recent guidance on the concept of Te Mana o Te Wai, means that the efficient use of water takes on even more significance now, than it did then.

The implementation of water meters offered the most economical solution to these problems. After consultation through the Annual Plan process the council decided to proceed with universal water metering.

The process took approximately eight months to reach this point. It then took three years to install 16,000 meters and start charging (including six months for sample invoices to be sent out).

3.2. Kapiti Coast

When KCDC made the decision in 2011 to include water meters in its Long-Term Plan (LTP) it was the result of an extensive water augmentation study. The council was at the point where nearly fifteen years of effort had seen no progress made in addressing the limited capacity of the water supply system serving the district's two major townships. The problem was made worse by the very high growth rates being experienced in the district.

Household demand was high. Most of Kapiti is built on sandy soils that dry out very quickly in the summer months. Leaks on the private network would rarely show on the surface.

Restrictions on sprinkler usage were of limited effect. With a large, retired population, some residents were prepared to hold a hose for an hour or two a day to keep their lawns and gardens healthy.

The point had been reached where a solution needed to be identified within the next eighteen months or consents for new subdivisions would have to be declined.

The study deliberately cast a wide net with 42 options being considered at the outset. The numbers were slowly and publicly reduced with the assistance of a community based Technical Advisory Group.

Eventually two options were left:

- Installation of water meters (at a cost of $8M) and a staged upgrade of of the Council's existing aquifer and run of river supply systems.
- Construction of a storage dam in one of the side valleys discharging to the Waikanae River upstream of the abstraction point (at a cost of $30M).

Both options offered a minimum 50-year water supply horizon. Consultation through the LTP process revealed fierce opposition to water meters from some sections of the community with over 1500 submissions received on the topic. There was also a protest march on the council building and a 9,500-signature petition delivered.

The majority decision of the council was to proceed with the water metering option.

The process took approximately two years to reach this point. It then took three years to install 23,000 meters and start charging (including three months for sample invoices to be sent out).

4. Issues raised in opposition

4.1. Nelson City

It helped that the neighbouring council, Tasman District Council (TDC), had successfully implemented water metering about three years earlier. TDC staff were a great source of advice and support.

There was opposition to the proposal, with some concerns consistently raised:

- The introduction of water meters would be a revenue gathering exercise. Specifically, there were two concerns:
    - Council could double dip by introducing a water by meter invoice and not reducing the rates.

      Fortunately, water supply was a separate line item on the rates invoice, so council could point to it being removed.
    - Council would arbitrarily increase the price of water with the surplus used to subsidise other activities.

      Assurances were provided that water supply was a closed account, dedicated to water expenditure. There would be no transferral of funds into or out of the water supply account for other purposes.

      Councils who choose to establish a Council Controlled Organisation (CCO) to own and manage their water assets could address this concern by drafting the CCO Constitution to require reinvestment of any surplus back into the company.

- Residents would be too slow adjusting their usage habits and receive crippling bills.

  Council made a commitment that once the meters were installed, the meters would be read in advance and sample invoices sent out, based on those readings. Staff made direct contact with anyone that had high readings to help them understand where the water was going and reduce their consumption before the real invoicing started.

  A "know your water meter" campaign was run to educate residents on how to read their water meter and understand their usage habits.

- Residents might not notice a leak and receive a huge bill that they couldn't afford.

  A policy was adopted that guaranteed that if a leak was found and promptly repaired, the Council would waive the portion of the invoice caused by the leak. A campaign was run advising people on how to quickly check if they had a leak in their system.

- The introduction of water metering would see the price of water increase.

  It was explained there was more capital improvement work planned (eg water treatment, renewals, etc) that would see the price of water rise, but the increases would be less with water meters than without.

4.2. Kapiti Coast

The reaction was much more passionate in Kapiti. This was a surprise as KCDC had for some time, positioned itself as an environmentally friendly council and its environmental initiatives seemed to enjoy community support.

The same issues that were raised in Nelson were raised again, but steps were already being taken to address these concerns. Other issues were raised much more vigorously:

- Water meters were being introduced to facilitate the privatisation of the district's water supplies – "the thin edge of the wedge". This potential loss of control and the risk of massive profit taking were the big issues that stirred the most emotion – the example of privatising water supplies in England was frequently raised.

  Pointing out that privatisation of water supplies was specifically forbidden by the Local Government Act made little difference.

  To acknowledge this concern, the council amended its standing orders so that a 75% majority of councillors (and a 50% majority in a referendum) would be required in support, before there could be any disposal of water supply assets. This was the best council could offer, as a 75% majority of councillors could amend standing orders.

- Those with large families would struggle with massive water bills and be forced to move out of the district.

  A hardship fund was set up for those who had difficulty paying their water charges but there were very few applications for assistance. There was an additional fund established to provide up to $300 assistance with repairing leaks.

- Water was a basic necessity of life and should not be charged for.

  It was explained that council's charges were to cover the cost of abstracting, treating and pumping water, maintaining the pipe networks that delivered it to each household and repaying loans. There was no charge for the water itself. Residents were also reminded that they were already paying for water supply through their rates invoice.

- Superannuitants on fixed incomes were concerned that they may be unable to pay the water bills and be forced to leave the district.

  It was explained that currently every household pays the same amount for water – a one person household on a small section pays the same as a five-person household on a large section. Most superannuitants could expect to see their water bill reduce. This was a critical point as nearly 70% of households in Kapiti were 1 - 2 person households.

- Water meters wouldn't produce extra water – just build a dam.

  Despite running a long, very public selection process where these options were thoroughly canvassed, some residents refused to accept that universal metering would reduce peak usage by 25% (which had the same result as developing another water source). Modelling was run to demonstrate what the average price of water would look like with $8M of water meters versus a $30M dam.

- Why not stay with fixed charges and use the water meter readings as an advisory tool?

  To explain why this would not be as effective, a comparison was made with electricity used to run a heater in the winter. If you were offered a fixed annual price to run the heater and provided with a monthly summary of how much power you had used – would you run the heater more, or less? Most people grudgingly agreed they would run the heater more than they do now.

Tauranga City Council had recently installed water meters and successfully reduced peak usage. They were a great source of information and advice. Their staff travelled to Kapiti at least twice to talk to the councillors about their experiences.

5. Political pressure during meter installation

5.1. Kapiti Coast

By the time the LTP was adopted, the council was 21 months into its term of office - there were only fifteen months remaining before the next election. It was not possible to have universal metering up and running within that time frame.

The decision to implement universal metering was far from the end of the issue – for some, it simply signalled the start of a long intense election campaign. The risk was not that a new council may be able to stop the installation of water meters, but they could decide not to implement volumetric charging and simply use the meter readings as an education tool. All the research had shown that volumetric charging is what produces the 25% reduction in peak usage.

"Fake news" started appearing, quoting second hand, anonymous sources with horror stories about water metering. These stories were spread through letters to the editor and neighbourhood web sites / Facebook sites. If the council didn't quickly respond, then residents would assume the story was true.

It was important that the council did actively engage – otherwise the councillors that voted for water metering would be left unsupported at a critical time. One councillor stated in a council meeting that she did not support privatisation of water supplies. The recording was edited to take out the word "not" and posted on a Facebook site. A cease-and-desist letter from the council solicitors was required to get that taken down.

Dedicated Comms resources were allocated to promoting the benefits of water meters. However, every piece of information the council put out was rigorously fact checked by the opposition (usually through an Official Information Act request) meaning that senior staff and technical staff had to commit a lot of time, sometimes at short notice, to writing and editing information pieces on water metering.

Time was also spent searching for reputably sourced, up-to-date information on consistent water use reductions achieved by other councils and average household water usage broken down by major usage category (eg shower, washing machine, etc).

Another challenge the council faced was that the fake news would take a paragraph and the factual response would take a couple of A4 pages or more. The average resident wouldn't read that far.

Newspaper opinion pieces, fact sheets, website articles and printed flyers were all tried as means of getting the story across – all with limited success. The problem was that the topic is complex, and everybody had different concerns they wanted answers for.

The communication method that proved the most effective (but very time consuming) was face to face meetings with groups of people that could act as opinion leaders within the community (eg Rotary, Probus, Greypower, Older Persons Council, Youth Council, and Chamber of Commerce). A 20 min presentation followed by 20 min of questions and answers could turn a room full of doubters into 95% supporters.

The hope was that once these people were well informed, they would talk to ten others. Unfortunately, there were only 3 - 4 staff within the organisation with the skills, knowledge and experience to deliver these talks, so the workload was intense, but the results made it worthwhile.

Some of the points discussed in those meetings are worth repeating:

- It was important to explain that council was concerned about peak usage – all the treatment and delivery systems must be sized for that one day in the summer when demand peaks and the rivers are at their lowest. Reducing that peak usage saves a fortune in finding new supplies and increasing the size of pipes and pumps.

- Most people don't understand what volumes of water look like. Providing some comparisons was useful:
  - A plastic bucket holds 10 litres.
  - 1 m^3 of water is 1000 litres and weighs 1 tonne.
  - The local swimming pool holds (say) 1,000 m^3.
- Council was mostly focussing on reducing the amount of water used on gardens and lawns. For example, a family of 4 - 5 might use about 1000 litres of water per day during the winter months. A rotating or oscillating sprinkler can use 1000 litres of water in an hour. This was usually the point where the penny dropped.
- While being careful with water use inside the house was great, it was not where the big savings would be made – except for teenagers with long showers. Do not take a bucket into the shower to try and catch some of the water for use in the garden – the chance of injury is high, and you will only save 2 – 3 cents.

Having the relevant trades on-side was also important:

- Meetings were held with the local plumbers to explain what was being proposed and why. It was pointed out that workloads were likely to increase as householders were soon going to be more motivated to find and fix leaks and that council would not be doing that work on private property. Some investment in leak detection equipment might pay off.
- Meetings were held with the operators of DIY/hardware stores to explain that demand for rotating and oscillating sprinklers would likely decrease but there would be opportunities to promote micro-irrigation and dripper irrigation systems and to provide advice on their installation.
- Meetings were also held with the operators of garden centres to explain that customers would be looking for information on drought resistant plants, and the use of compost and bark to boost soil moisture retention. There would be opportunities to promote their services as expert advisers.

Despite the best efforts of the organisation, approximately half the council, including the mayor, changed at the election. While there were other issues at play, water metering was a big factor in this result.

6. Smart meters or mechanical meters

A variety of metering technologies, both smart and mechanical, are now available to enable volumetric charging.

Back in 1996, smart meters weren't considered as a viable option. Mechanical meters were installed in Nelson.

In 2011 smart meters were still considered as an evolving technology and price was definitely a factor. Mechanical meters were installed in Kapiti.

When the mechanical meters in Nelson reached the end of their useful life in 2017, smart meters were seriously considered:

6.1. Benefits of Smart Meters

- Smart meters don't require manual reading. Manual reading of mechanical meters can result in errors.
- Depending on the reading frequency, smart meters can detect a leak on a private connection very quickly. With manual readings of mechanical meters, it can take some time for a private leak to be detected.

  While water is a low-cost product and the cost of the water lost (and rebated) is relatively low, customers can still be unhappy at the length of time required to confirm the presence of a leak.
- Automated reading of smart meters avoids the costs of manual meter reading and compresses the time required to complete a reading round and get the invoices out. There would be a reduction in the staff time required to load the readings and produce the invoices.
- Automated smart meter readings can be used to help identify faults in the network.
- It is easier to detect an attempt to tamper with a smart meter.

6.2. Disadvantages of Smart Meters

- With the manifolds already in the ground, screw in smart meters could be easily installed (and replaced in the event of a failure). In-line electronic meters would require considerably more work to install and replace. Given the existing configuration of Nelson's water network, in-line electronic meters were quickly ruled out as too expensive.
- As of 2017, there still hadn't been a large-scale implementation of smart meters in NZ. There would be a risk in going first.
- Readings are taken using a fixed radio network or drive-by technology. There would be an initial investment required to set this up.
- Provided there was only one reading of the meter each week, the battery was expected to last up to 15 years. The batteries cannot be replaced – the meter must be replaced. More frequent interrogation of the units shortens the battery life. In Europe smart meters are typically replaced every 12 – 13 years.

  Most of the current mechanical meters lasted 20 years and the replacements are expected to last 15 years.
- The supply cost of a smart meter (in 2017) was approximately $220 while a mechanical meter was nearer $75. For 20,000 meters this was a difference of $2.9 million.

- The additional depreciation costs on smart meters would offset the operational savings.

In Nelson, the decision was made to continue with mechanical meters.

While conditions in Nelson and Kapiti favoured the use of mechanical meters, changes in technology, battery life and pricing make it important to assess the business case for all current metering options.

7. Operational challenges during meter installation

7.1. Metering properties with a shared connection

Relaying individual pipes up a right of way (ROW) was out of the question in terms of cost and administrative effort. Assuming responsibility for the shared pipe would add many kilometres of pipe to the network increasing depreciation and maintenance costs.

In both Nelson and Kapiti, the preferred solution was to amend the Water Supply Bylaw to separately define the point of supply and the point of metering. On a ROW the point of supply was at the road boundary (where a check meter was installed) and the point of supply was where the property supply pipe entered each individual property.

This meant the metering software had to have the ability to compare the results from the check meter and the total of the individual household meters and flag if there was a leak on the ROW pipe. The ROW owners were then jointly responsible for finding and repairing that leak.

The formal consultation and decision-making process to amend the bylaw provided another focal point for opponents. Care had to be taken to rigorously follow a good process and not provide the opportunity for a successful judicial review.

In Nelson one block of motels had been converted into cross-lease units, with one pipe running through the floor slab between the units. It was impossible to provide separate connection points. Staff had to negotiate with the owners to agree on a percentage allocation of the total water used. This is reviewed each time a property changes hands. The metering software (and the bylaw) had to be able to cope with this arrangement.

7.2. Finding the point of supply

In most cases the point of supply was readily locatable but there were some that required considerable effort. A team needed to be established to deal with these challenging connections so that the contractors could maximise efficiencies by dealing with the straightforward connections.

One house in Kapiti needed a trench to be excavated around all four sides before the water connection could be found (illegally connected to the property behind, decades earlier). In such cases the pragmatic solution was for the council to provide another connection to the boundary and pay for a plumber to carry out the changeover work on the private property.

The council could not afford to shoot itself in the foot and create its own bad news. Funding provision for this work needs to be included in the metering budgets.

7.3. Resistance from property owners

Although the meters were generally being placed on road reserve, some householders considered this part of their property and would physically obstruct access to the point of supply or abuse the contractors as they attempted to set up on site. This was generally managed through discussions between the property owner and council staff. In extreme cases, it was a matter of waiting until the owner was away before lawfully carrying out work on the road reserve.

At one stage in Kapiti, an individual was following behind the installation crews delivering pamphlets that provided step by step instructions on how to destroy a water meter. While staff had strong suspicions on who was doing this, there was never enough proof to deliver a cease-and-desist letter.

7.4. Liaison with property owners

Installing the meters was a big job that saw a work site established at every property in the district, with the water supply briefly disrupted. Some people had extended their landscaping and high-quality driveways onto the road berm. For ROWs the work was being carried out on private property.

Letter drops were carried out in advance of the contractors moving into a street, but regardless of their attitude towards water metering, many householders wanted to discuss their specific concerns (eg location of the meter, reinstatement standards, and timing of the work). Almost invariably they wanted to talk to a council staff member and not a contractor.

Additional staff had to be taken on board for the duration of the project to act as clerks of work for the project and to provide timely liaison with property owners.

7.5. The use of manifold assemblies

In both Nelson and Kapiti, public feedback had made it very clear that volumetric charging could not be introduced progressively across the district as meters were installed. This was considered highly unfair. This was one of the reasons the meters were installed in two stages:

- A manifold assembly was cut into the household supply line and positioned within a plastic water meter box. The manifold assembly included a toby, a non-return valve and a blank plate that could be unscrewed to allow the meter to be fitted.
- Once all the manifolds were in place the meters were screwed in. This avoided some of the meters working for a year or two (and shortening their useful lives) before readings started.

Using the manifold assembly also makes it easier in the future to carry out repairs on the toby and to replace the meters at the end of their working life – no more excavation required.

In Nelson, failure rates of tobies had been getting very high. About five years before meters were installed, the decision was made to change to a manifold assembly in a meter box as the standard for all new and replacement tobies. When the decision was made to install meters, this reduced the number of sites where excavation was required by about 20%. This is

something other councils could consider once they start signalling water meter installation in their LTPs.

7.6. Charging regime advisory group

While water meters were being installed in Nelson, advice was received that a large NZ local authority had encountered strong resistance as they tried to establish a charging regime for their newly installed meters. That local authority eventually decided to only use the readings as an advisory tool to encourage residents to be more careful with water usage.

The staff advice to install water meters in Nelson was based on implementing volumetric charging and achieving a 25% reduction in peak demand. Only using water meters as an advisory tool can identify leaks, but misses an opportunity to influence consumption practices, making it far from optimal.

To help address potential risks around adopting a charging regime and to improve the understanding of the effects of water metering on different elements of the community, a Charging Regime Advisory Group (GRAG) was established with representation from all water users (eg major water using industries, landlords, tenants, Greypower and the Chamber of Commerce).

This was deliberately a slow, detailed process where members of the CRAG were brought up to speed on a range of issues:

- The council faced a predominance of fixed costs in the water supply budgets (ie costs not directly related to the volume of water supplied).
- The charging regime should preferably include a fixed charge (ie a line charge) to minimise fluctuations in council income as annual water usage varied from year to year. It was also a way of reducing the potential impact on large families.
- The charging regime needed to include a significant volumetric charge or there would not be sufficient incentive for households to reduce water usage.

Different regimes were modelled over a range of household and commercial usages. Inevitably high-volume users favoured a heavy weighting on the line charge while low-volume users favoured a heavy weighting on the variable charge.

Eventually the CRAG recommended an arrangement where 50% of the revenue was sourced from the line charge and 50% from the variable charge and that payment of the line charge provide each consumer with a set volume of “entitlement water”. The group also recommended that the volumetric charges be lower for very high-volume users (to recognise the economies of scale provided by delivering large volumes of water to one site) and that the arrangements be reviewed after 3 years.

It was acknowledged that if the 50/50 split between fixed and variable charges didn’t achieve the required reductions in peak water usage there would be opportunities to review the split and increase the variable portion.

The entitlement water was not a success. Despite it being made very clear that it was non-transferable and non-refundable, council regularly received requests from households who hadn't used all their entitlement water, asking for a refund or a carryover. At the first review, the entitlement water was removed, the fixed charge portion reduced, and the volumetric portion increased.

Establishing the CRAG was a real success. There was some public criticism of the charging regime and most times a member of the CRAG responded without the council being drawn in.

A CRAG was also used in Kapiti, with membership expanded to include representatives from iwi, the Older Persons Council, low-income households and elected members. It was just as successful and provided similar recommendations – except there was no "entitlement water". There were no major water using industries in Kapiti, so there was no discount recommended for very high-volume users.

The Nelson and Kapiti experiences showed that recovering 50% of costs by volumetric charging was sufficient to achieve the change in behaviours required.

7.7. Invoicing and budget setting

An important part of the process of addressing community concerns was having the meters operating several months before volumetric charging was implemented at the start of the new financial year. The meters were read, and sample invoices sent out to each household so that they could see how much water they were using and make changes/get leaks fixed. Ideally this should happen over a 6-month period (to include both summer and winter conditions) so that residents had an opportunity to see both ends of the usage scale. In Kapiti the meter installation took longer than planned so this was compressed to a 3-month period.

The knowledge that this was part of the council plan was a very useful tool in calming those who were worried that they were using more water than they could afford. It also helped to detect system errors before the real invoices were sent out.

The invoices were sent out in batches but still the councils (both Nelson and Kapiti) were inundated with questions and complaints. Ironically, for some customers, it was the first time they realised that water metering had been introduced.

The customer services teams were provided with extra resources to cope with these phone calls and emails. A field team was established to go out and meet people, discuss their concerns and ensure answers were provided with minimal delay and errors corrected. This was a critical time, as water metering was far from embedded in the culture of the district and unanswered customers would very quickly call a councillor. It took nearly 18 months before this pressure had eased to an ongoing baseline level.

Another challenge was setting the water by meter charges for that first year. This was a real challenge as staff couldn't be sure how dry the summer would be and didn't know exactly how much metering would reduce peak water use. Setting the charges too high would risk over-collecting, paving the way for accusations of revenue gathering to resume. Setting the charges

too low risked under-collecting - leaving a deficit for the following year and a dramatic increase in charges.

In Kapiti, the reduction in water use was underestimated, the charges set too low, and the water account accrued a considerable deficit by the end of the first financial year. To prevent water charges bouncing around as water usage changed, a policy was introduced that provided for any deficit or surplus to be recovered/distributed over the following five years.

8. Timing of the investment in water metering

Installing water meters is a reasonably expensive capital project that also sees operational costs increase. A business case for implementing water meters should demonstrate some of the following benefits to ensure it stacks up:

- The cost of installing water meters (and decreasing peak demand) is offset by not having to establish and operate an additional source of supply.
- The cost of installing water meters (and decreasing peak demand) is offset by the deferral of costs to increase the capacity of treatment facilities and trunk reticulation.
- Reducing peak demand reduces pumping costs and treatment costs.
- Reducing peak demand demonstrates that fresh water is being used efficiently and the case for renewal of abstraction consents is strengthened.
- There is an improved ability to identify and address sources of leaks.
- Improved equity outcomes are achieved (where low volume users stop cross-subsidising high-volume users).

Unless a sound business case, based on the above factors is presented, a council (or a board of directors) would be unlikely to make the decision to proceed. Eventually the genuine business opportunity will present itself and volumetric charging can be introduced – it will be critical that these opportunities are not missed.

9. Conclusions.

Implementing water metering is a significant change management exercise for the community and the organisation. Detailed preparation, planning and resourcing is required. In particular, vulnerable elements of the community (eg superannuitants and large families) will want to know their situation is understood and that there will be safeguards in place.

The perceptions regarding the privatisation of water supply companies in England still flavour the thinking about water metering in NZ. It will be important to be aware of the challenges that will come along these lines and front foot the issues from the start.

The communication method that proved most effective (but very time consuming) was face-to-face meetings with groups of people that could act as opinion leaders within the community. The delivery of these presentations should start as soon as the discussions about water metering begin – most of the target organisations are always looking for interesting speakers.

It can be hard for councils to make tough decisions about water metering. If the decision is part of the LTP process, it can provide a significant issue for a 15-month long election campaign.

If the timing of the investment is right, the introduction of water meters does offer material benefits for both communities and the environment. The next round of water reforms may offer a range of delivery models - some of which could make water metering implementation easier.