BRINGING DOWN DEMAND THROUGH WATER EFFICIENCY IN THE NON-RESIDENTIAL SECTOR

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BACKGROUND

Improving customer water efficiency is a highly cost-effective means of managing imbalances between supply and demand. When done well, it can both reduce operational costs and defer or downsize investment in supply side infrastructure (MfE 2009; Turner et al. 2008). In addition, it helps customers save costs on water and electricity bills, often with minimal investment and rapid return.

Commercial, industrial and institutional (non-residential) customers are prime targets for water efficiency as they are typically subject to volumetric water charges and have a strong imperative to keep utility costs down. In addition, the true cost of water goes beyond just that of the water itself. Heating, pumping, treatment and other energy and resource inputs all add to the total cost of water use, which can amount to several times the volumetric price of water. Many will also have sustainability and/or carbon reduction objectives that encourage reducing their footprint.

Auckland's water service provider Watercare has been onto the case of non-residential water efficiency since the 2020 drought, when they first started engaging commercial customers about water supply resilience. Wellington Water, the water service provider (WSP) for Wellington, Porirua, Hutt and Upper Hutt City Councils[1], formulated a Non-Residential Customer Water Efficiency Strategy in 2023, which laid the platform for piloting and then expanding a robust customer engagement programme.

This paper outlines the approach taken by each WSP to non-residential water efficiency, together with the benefits that have accrued from their activities, the themes observed, and the lessons learned along the way.

WATERCARE

In response to the drought, Watercare started collaborating with their key large non-residential customers (now preferentially referred to as simply 'commercial' customers) to reduce water consumption while minimising impact on Aucklanders and businesses during the drought. Through convening customer forums they went about sharing their challenges and conveying their commitment to investing in a more resilient water supply. Customers provided invaluable feedback

[1] Wellington Water also services South Wairarapa District Council however the customer efficiency strategy focused on the Wellington metropolitan area.

and stated their commitment to finding water savings and progressing innovation in water use and efficiency.

The partnerships fostered through the forums led to the establishment of the annual He Taonga te Wai Water Efficiency Expo (Figure 1), which connects suppliers of water-efficient technologies with key commercial sectors to promote responsible water use. Most importantly it enabled Watercare to show case water saving innovations and create a network to share best practice operations.

Watercare's commercial sector engagement efforts produced voluntary savings of 15% among their largest users during the drought.

Figure 1 Commercial customer representatives at the 2023 He Taonga te Wai Water Efficiency Expo

PARTNERING WITH INDUSTRY BODIES

Over the course of their engagement with the commercial sector, Watercare formed partnerships with a number of industry bodies, most notably the Exterior Cleaning Industry Association (ECIA). ECIA launched a "Water Efficient Operator" training programme in 2020. This involved establishing best practices for water management, which culminated in the formalisation of standards in the 2022 ECIA Code of Practice.

Watercare also collaborated with Fire and Emergency New Zealand to save water during training exercises. By introducing modified skip bins for pump training, firefighters can now recirculate water when simulating hydrant use. Watercare funded five recirculation units strategically placed across Auckland, starting with the Māngere station and Mt Wellington Regional Training Centre. Each training session now saves the equivalent of water consumed by 17,000 people in a day.

WELLINGTON WATER

Wellington Water initiated their pilot non-residential customer water efficiency programme in early 2023. This involved visiting thirteen customer sites in target sectors as per the strategy, namely high water users, schools and council facilities, to perform 'water efficiency opportunity assessments (WEOAs). The pilot allowed the team to test the approach to recruiting customers and systematise the WEOA process.

In June of the same year, a second batch of customers were recruited to the programme, with WEOAs being conducted for another thirteen customers. WEOA reports were then drafted and issued to customers over the following nine months with the assistance of consulting firm Awa Environmental. Awa Environmental (herein Awa) has been engaged to undertake follow-up engagement with the previously assessed customers and to continue delivery the programme.

OBJECTIVES AND SCOPE

The objectives of the Wellington Water programme are to:

- commence dialogue with the non-residential sector,
- partner with selected customers to capture data about their activities and assets and provide advice about how to become more efficient and save money,
- Build capability and capacity internally and amongst consultant and contractor partners in demand management disciplines and on-site surveys and assessments, and
- Reduce demand in the non-residential sector.

The programme is now fully up and running, with delivery being led by Awa Environmental whose scope encompasses:

- Prioritising and targeting non-residential customers and sectors in line with the strategy;
- Establishing relationships with selected customers;
- Undertaking water efficiency opportunity assessments (WEOAs) of selected customers;
- Devising incentives to encourage customers to implement of economic water efficiency measures;
- Following up with customers after WEOAs have been issued, again to encourage implementation.

THE APPROACH

As Watercare has demonstrated through their work, customer water efficiency is founded upon engagement – working with customers to launch and support their water efficiency journey. In the case of working with individual customers, Wellington Water and Awa have devised an approach that centres around building a positive relationship with the customer, providing context for the programme and focusing on the benefits (cost savings) that they can gain from implementing water efficiency measures. The key stages include:

- Prioritising and selecting candidate customers;
- Recruitment of candidate customers and arranging meetings and site visits;
- Capturing water consumption data to inform a subsequent assessment of customer water efficiency;

- Undertaking the assessment through one or more site visits;
- Preparing an easy-to-read report for the customer that summarises the opportunities and economics of water efficiency, and offers financial incentives for implementation in the form of rebates;
- Following up with the customer to go through the report findings and encourage adoption of the recommendations with incentives.
- Ongoing customer engagement and broader communications

PRIORITISATION, BENCHMARKING AND RECRUITMENT

In the Wellington region there are over 10,000 non-residential customers. Careful prioritisation of customers was carried out to achieve the best return on investment. Hence, criteria that consider water savings potential in conjunction with the likelihood of implementation were applied. In other words, the customers chosen for assessment were those that can make the greatest savings and are most likely to make the investments/changes to do so. Users and sectors within the service area that consume the most water were first identified to generate a pool of candidates to recruit potential participants from. The customers in the pool were then benchmarked against good practice for their respective industry to determine where the best water savings opportunities lie.

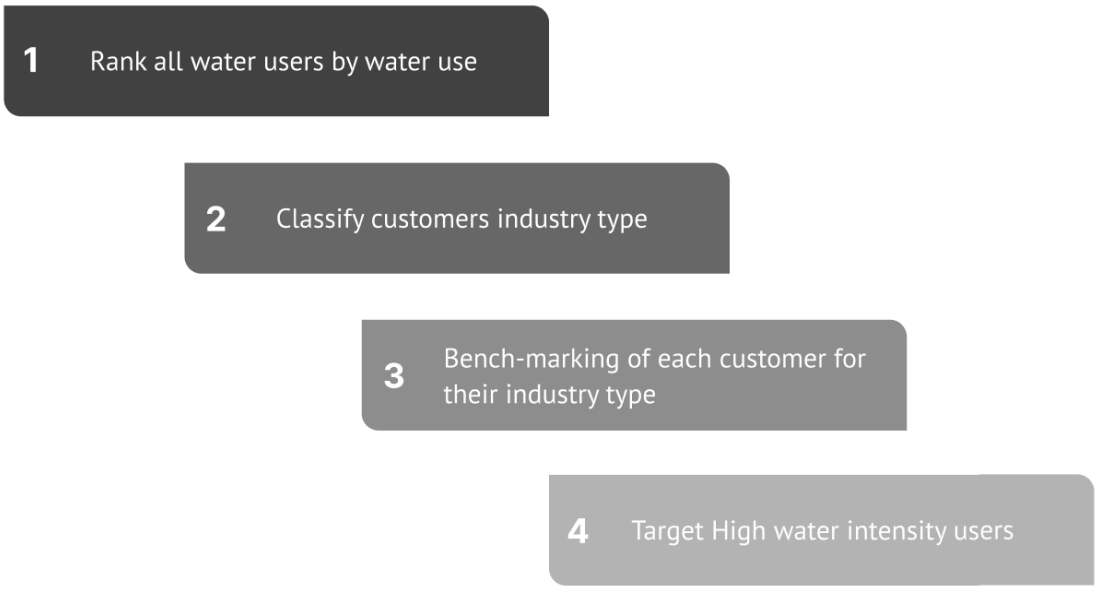

Figure 2 Targeting non-residential customers for water efficiency assessments

Once preferred candidates have been selected, contact is initiated by email and telephone to recruit them into the programme. The responses to the initial inquiries give an indication of the customers' buy-in and their preparedness to engage meaningfully, which informs the approach to the next stages.

SMART METERING

Smart metering is a key part of the success of the water efficiency drive. It provides three orders magnitude more data than conventional manual meter reads, providing granularity that radically improves the characterisation of water use at the site by helping to target specific end uses, as well as recognise potential leakage or wastage. Smart metering has also granted the customers more

transparency of their own water consumption through an online data storage and visualisation platform.

In most cases, the meter smarts are provided by fitting a pulse reader and transmitting datalogger to existing mechanical meters as show in Figure 3. Where meters are 50-mm or smaller and are near or beyond their asset life, the recommendation is to upgrade to an ultrasonic integrated smart meter.

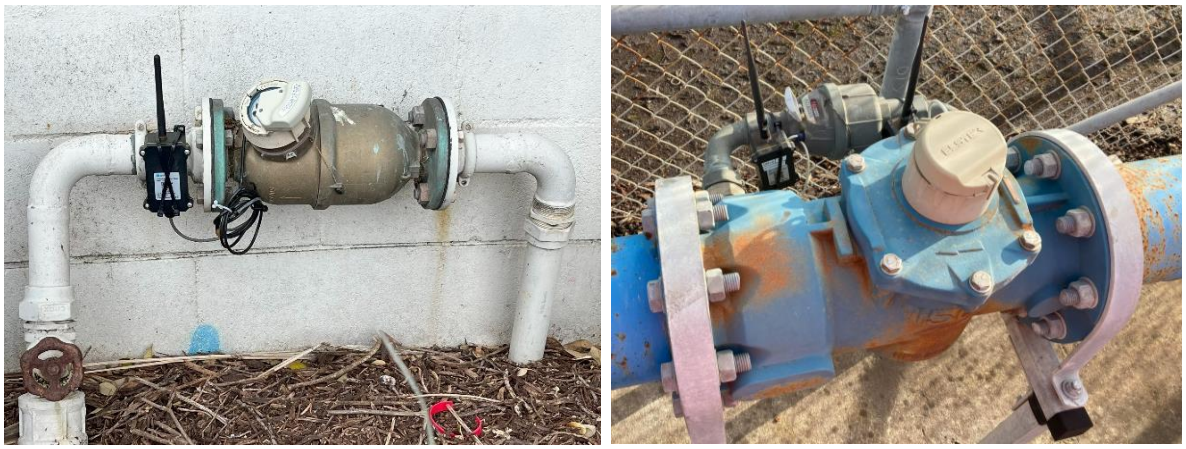

Figure 3 Customer meters fitted with pulse counters and IoT dataloggers

COLLABORATIVE ASSESSMENTS

The centrepiece of the process is the water efficiency opportunity assessment (WEOA). This involves meeting with the customer and conducting a site visit to observe water end uses and identify options for reducing consumption through changing practices and/or hardware.

Collaboration is a key aspect of the WEOAs. Throughout the engagement with each customer Awa seeks to understand the intricacies of their site, tailoring the assessment to provide realistic, tangible recommendations. Connecting with the right personnel within the organisation is critical to this, as it ensures that throughout the process, the assessors can provide the right answers to the right questions. Awa has received extremely positive responses when the staff being engaged are closely involved with water management and are well-informed. It certainly helps when the customer is excited by the project from the outset, but those less interested customers are often won over by the end of the process. After a thorough site visit and a subsequent desktop analysis, Awa provides the organisation with a report that is digestible, curated, and presents water efficiency as attractive and achievable.

The focal point of the report is the water efficiency savings opportunities table. The table lays out all the suggested water efficiency actions, and quantifies the costs, the potential water savings and the economic feasibility of these recommendations. To incentivise the organisation to implement the recommendations, rebates on up to 50% of the costs are offered to the customer. However, experience to date has shown that when organisations become aware of the savings they can make through relatively small changes, they follow the recommendations without claiming the rebates.

CUSTOMER HANDOVER

Once Awa have completed the assessment and follow-up phase, Wellington Water's customer engagement team takes over the relationship with the customer. The team's focus is on building

relationships with customers, providing customised advice and resources, and encouraging long-term commitment to water conservation. Specifically, the team:

- **Ensures customer understanding**: They meet with customers to further discuss the reports, answer questions, and handle administrative tasks like rebates.
- **Provides customised support**: They tailor their approach to each customer's unique needs and circumstances, offering ongoing support and advice.
- **Encourages long-term commitment**: They foster a sense of partnership with customers, motivating them to prioritize water conservation and make lasting changes.
- **Facilitates industry-wide guidance**: They gather feedback and insights from individual customers to create effective industry guidance and share best practices.

The customer engagement team's efforts contribute significantly to the program's success by ensuring that water efficiency measures are not only implemented but also sustained over the long term.

COMMUNICATIONS

To broaden the reach and impact of the programme beyond the customers selected for assessments, a series of factsheets that provide guidance specific customer groups and end uses has been developed. Figure 4 presents the first page of a urinal factsheet that has been developed with schools and council facilities (e.g. public toilets, sports field amenities) in mind.

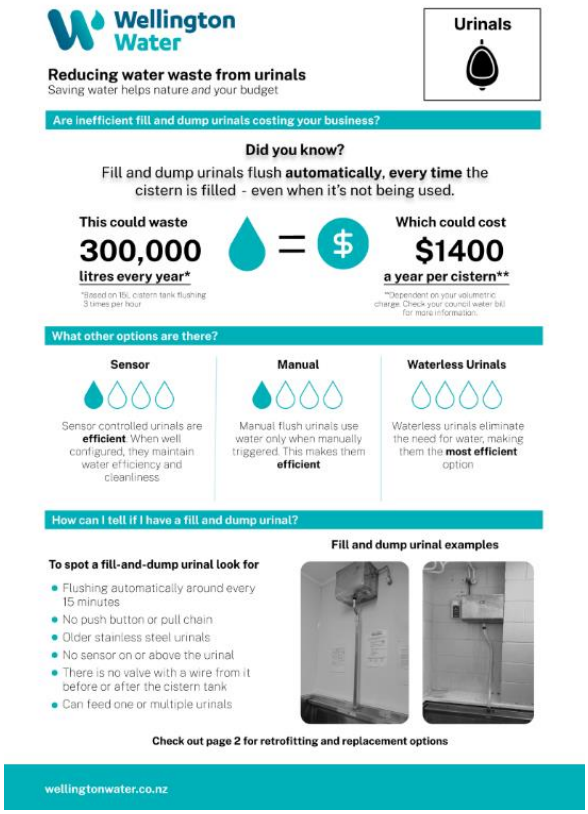

Figure 4 First page of a fact sheet on urinals developed for broad distribution to non-residential customers.

CONTINUOUS IMPROVEMENT AND EVALUATION

As the program progresses, Wellington Water and Awa continuously refine their approach based on customer feedback and observed outcomes. Evaluating water savings will be a key part of this process, providing verification of the program's effectiveness and informing future efforts.

LEARNINGS AND THEMES

While each customer has a unique water usage profile, a number of water efficiency themes have emerged across the various assessments, including:

1. The true cost of water to the business is often overlooked;
2. A lot of water is consumed unconsciously;
3. Many water savings opportunities are simple and low-cost;
4. Leakage and unintentional wastage often make up a large portion of customer consumption;
5. Follow-up engagement and communications are key; and
6. Working with industry bodies provides leverage to influence entire non-residential groups

THE TRUE COST OF WATER

The price of water has risen substantially over recent years, helping to bring water consumption into sharper focus for many customers. And in many cases, this alone makes water efficiency measures economical. However, it is when the other costs associated with water use including water heating, pumping and treatment that the economics of water efficiency really stack up for the business. As depicted in Figure 5, the true cost of water can be more than double the volumetric water price. Hence the WEOA reports place a strong emphasis on these 'hidden' costs of water to help the customer make the business case for improving efficiency.

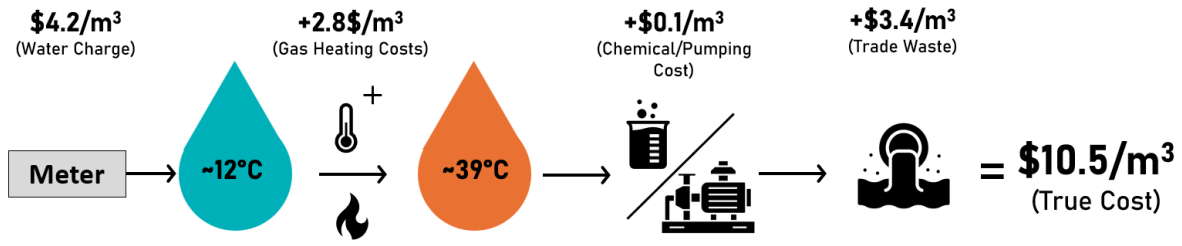

Figure 5 The true cost of water

UNCONSCIOUS CONSUMPTION AND EASY SAVINGS

Many customers have low awareness of water efficiency and the scope of opportunity available to them and are often surprised by the prospective cost savings that can be achieved with minimal effort and cost.

The measures recommended in the WEOA reports generally fall into two main categories - active and passive. Active measures relate to behavioural changes which can deliver quick savings but are sometimes difficult to sustain. Passive measures relate to reducing the water intensity of the base infrastructure/hardware of water use. These tend to be the focus of the assessments as they deliver effective and permanent savings, without the need for developing new operating protocols and

ongoing vigilance. It's about making facilities, fittings and fixtures more efficient so that when they are put to use, they consume less water. This can be anything from replacing tap aerators with more efficient models to optimising cooling tower control settings. An example of a passive measure is retrofitting efficient aerators to taps. For basin taps this can see reduce tap use by 80% while costing just $5-10 per tap, producing very short payback periods.

Another common theme observed in Te Whanganui-a-tara (Wellington) has been the presence of highly inefficient fill-and-dump urinals. The flush mechanism comprises a cistern (tank) that is filled in a similar manner to toilet cisterns, but once filled they automatically flush (dump) through an auto-siphon valve. This cycle repeats roughly every 15 minutes; hence the term 'fill-and-dump'. They can take the form of individual stalls or, more commonly, tray urinals. They cost around $2,000 annually to operate in water costs alone. Retrofitting options have payback periods of around one year and can reduce water use by around 75%. Ultimately, however replacement with more efficient urinal systems (individual stalls with sensors, or waterless) is preferable.

Figure 6 Examples of fill-and-dump urinal tank (left) and tray (right)

LEAKAGE AND WASTAGE

Diurnal profiling of water consumption using smart meter data has shown that for many customers, a large portion of their water demand comes from base flow which typically indicates leakage or some form of continual consumption/waste. Figure 7 givens an example of how consumption was reduced by 60% in one day following the repair of a previously undetected hidden leak that was identified through the installation of a datalogger on the water meter.

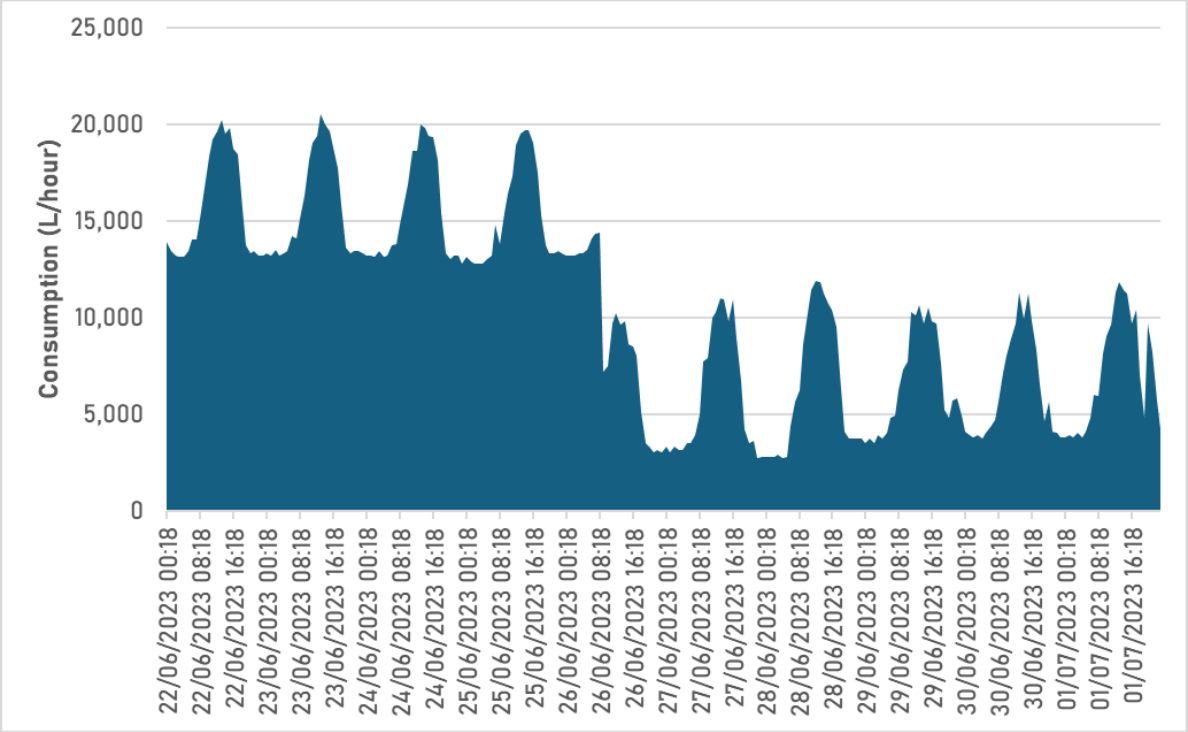

Figure 7 Change in consumption following the repair of a leak at an institutional customer site.

Urinals have been a common culprit for unnecessary water use, even when fitted with flush sensors. At one site, a urinal had been retrofitted with an infrared sensor to improve efficiency. However, due to the positioning of the motion sensor, the unit was being triggered by the flushing of the urinal itself, resulting in virtually constant water usage, even when no patrons were present. This was found to be consuming 9,600 litres each day and costing around $16,000 annually in volumetric water charges. Once notified of this issue the customer acted quickly to verify the source of the night flow and then rectify the urinal. Before and after water consumption is shown in Figure 8.

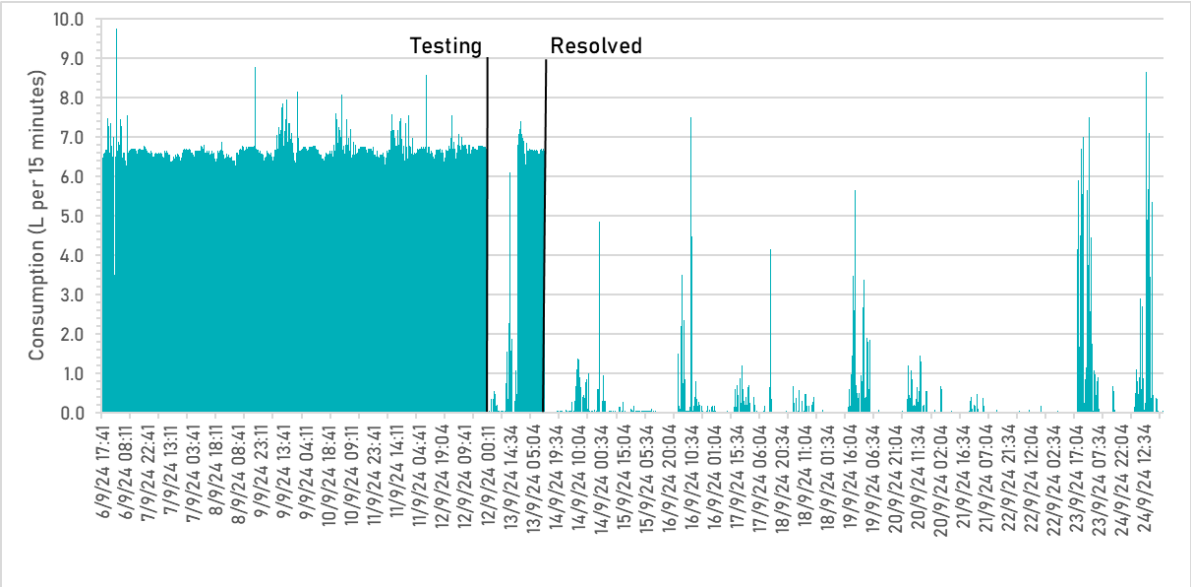

Figure 8 Water consumption before and after verifying and rectifying a mis-configured urinal.

FOLLOW-UP ENGAGEMENT

Even the most engaged customers can miss the email containing their WEOA report, let alone find the time to digest and act on the recommendations. Hence it has been an important feature of the Wellington Water programme to follow up with customers shortly after their report has been issued. This provides the opportunity to go through the observations and recommendations, to emphasise the benefits on offer, and answer any questions the customers may have.

PEAK BODY CONSULTATION

Watercare has found that partnering with industry bodies significantly extends the reach of engagement. As a large WSP with over 35,000 non-residential connections, Watercare can't engage with each commercial customer directly. Collaborating with industry bodies amplifies Watercare's message by leveraging the networks and the reputation of those industry bodies. Figure 9 contains some example advertisements that show how the commercial sector pitched in to the 2020 drought response. The benefit of this has even now spread beyond Watercare's service area, with the ECIA reaching out to Wellington Water regarding incorporating their best practice code into the Wellington non-residential water restrictions guidelines.

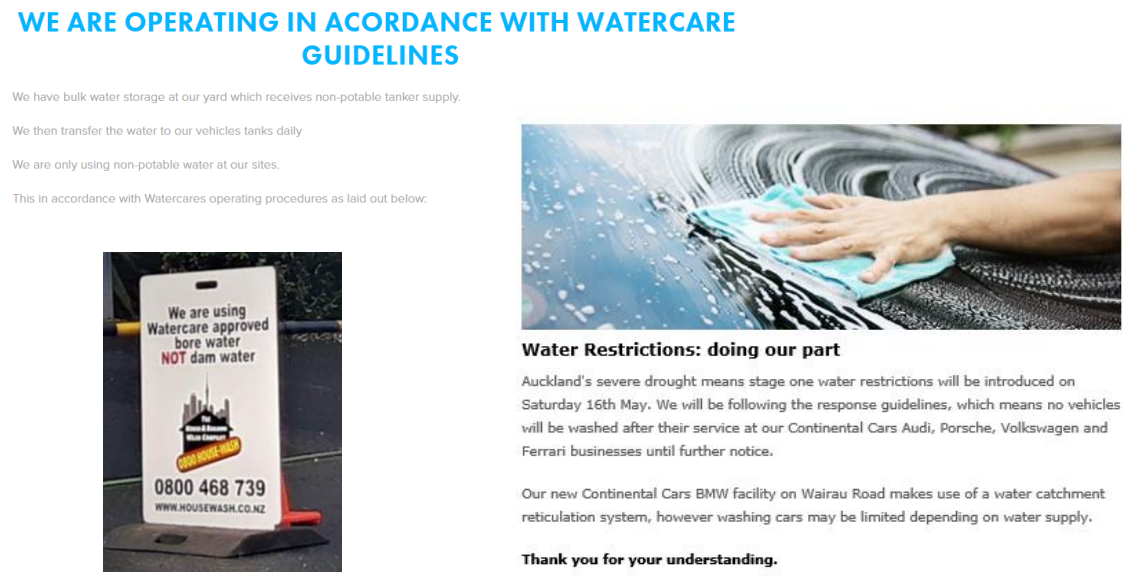

Figure 9 Advertising water restrictions-compliant water using services in Auckland during the 2020 drought

CONCLUSIONS

Promoting water efficiency in the non-residential sector can produce considerable reductions in network demand, providing both short- and long-term benefits to the supply-demand balance and network operational and capital investment needs.

In taking a broad, well-conceived and delivered engagement approach that involved both large individual customers and industry bodies, Watercare managed to reduce non-residential water demand by 15% in response to the 2020 drought.

Wellington Water has taken a more direct approach in performing water efficiency assessments on individual customers. To date, 20 customers have been through the full engagement, which amounts to just 0.2% of the non-residential customer base. But in targeting the highest users and groups that constitute 25% of total non-residential demand, the programme has already produced savings of 1.9 ML/d (~6% non-residential demand). In addition to bolstering water security for the region, this amounts to over $3 million per year in customer water bill savings alone, which highlights the mutual benefits of the programme to the environment, the water service provider and customers.

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