

SLOWING THE FLOW – DEMAND MANAGEMENT AND THE CURRENT STATE OF HOUSEHOLD WATER EFFICIENCY PROGRAMMES IN NEW ZEALAND

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ABSTRACT

The sustainable management and use of water resources will be a key element to any sustainable development strategy pursued in the 21st century. However despite a legislated and often stated goal of improving the overall sustainability of resource management in New Zealand, few councils have identified and implemented programmes to significantly reduce water consumption per capita at the household level.

Based on a recent Beacon Pathway research project that explored the breadth and scope of demand management water conservation/retrofit initiatives within New Zealand, this paper argues that reducing demand and water use at the household level is a viable, cost effective and proven method for lowering water infrastructure costs whilst improving social and environmental outcomes.

The paper also identifies some of the imperatives for change and provides two case studies, one from Kapiti District and the other from Sydney. The key components of the programmes being run in these two localities are arguably a template for what more comprehensive water management programmes might look like.

Conclusions for the New Zealand situation are drawn and the roles that both local and central government might play from both a regulatory and practical point of view are outlined.

KEYWORDS:

Demand management; water; retrofit programmes.

INTRODUCTION

Local governments in New Zealand are missing out on the significant financial and environmental benefits that come from the utilisation of well implemented demand management water programmes. A national and local policy setting that promotes the uptake and use of urban rainwater tanks, low flow showerheads and low flush toilets, greywater reuse systems, and water efficient appliances could significantly reduce the amount of reticulated water required by households. Such a reduction in water throughput reduces water supply treatment costs as well as the degrading of water pipes and associated maintenance costs. By deferring the capital expenditure required for new dams or related water infrastructure there is significant cost savings. Besides these financial savings there is an array of other associated benefits that come from a policy of emphasising water conservation over consumption.

OVERVIEW

Beacon Pathway is a research consortium, established in May 2004, with the aim of encouraging and improving New Zealand's sustainability in the residential built environment. In accordance with Beacon's goal of achieving a high standard of sustainability in 90% of New Zealand homes by 2012, the organisation has created the following water demand target:

- 90% of homes reduce demand for reticulated water by 40% per capita and council supply to domestic uses is reduced by 50% per capita by 2012;

The underlying premise of Beacon's water research work is that water supply and water resource management will become a major issue for New Zealand during the course of this century and that water use efficiency is a key element in any effort to improve the sustainability of New Zealand's housing stock.

IMPERATIVES FOR A DEMAND MANAGEMENT APPROACH IN NEW ZEALAND

There are a number of reasons for a growing imperative in New Zealand but some of the principle drivers include:

- A combination of increasing and competing demands for water resources at the same time as the resource is becoming increasingly scarce. This is especially so in some areas of the country where drought has been a continual and ongoing problem in recent years.
- A growing population and economy is driving demand for water
- Our water supply model is based on 19th and early 20th century human populations not the 21st century
- New Zealanders are presently washing clothes, showering and flushing toilets with drinking quality water that requires expensive treatment processes. At the same time the cost of providing and maintaining centralized water infrastructure is continually rising.
- The effects of climate change and the likelihood of more variable and extreme climatic events over the course of this century which are likely to have unknown and unprecedented repercussions. This in turn requires greater levels of resilience from our water delivery methods – by implication this means greater use of decentralized water storage capacity.

Collectively these and other trends will ensure that the days of profligate and free water use in the New Zealand context will, and indeed in many places already has, come to an end.

At present New Zealand still enjoys relatively abundant water resources and perhaps it is tempting to view water scarcity as being of little present concern and that our focus should be on more immediate issues. However, as our neighbours across the Tasman and many other countries are discovering, climatic conditions and their consequences can change quickly.

In New Zealand, only Waitakere City and Kapiti City Councils have what could be called relatively comprehensive and ongoing long-term programmes to reduce water consumption per capita with relatively significant resources allocated to ensuring the programme is successful. Waitakere Council's target is a 25% reduction in per capita water use by 2025. This compares very favourably against the regional target set by the Auckland water authorities which is presently only a 5% reduction per capita by 2024. Kapiti has established a target of reducing their present water consumption levels of 600l/c/pd down to 400l/c/pd over the medium term using a number of innovative and progressive water conservation methods (see the case study below).

Neither Waitakere nor Kapiti's targets are unrealistic or without precedent. In Sydney and Melbourne, for example, even more aggressive targets have been set. The Sydney Water Conservation and Recycling Implementation Report has a goal for the region of a 35% saving per capita against a 1991 baseline, a figure which if achieved will provide a saving of 145 billion litres of water per year by 2015 (this is close to 20 million litres more water than Auckland consumes in total annually). Significant Federal Government resources are provided to run the programme and ensure its success.

North Shore City Council and Tauranga City Council are other councils that have invested resources into water conservation programmes although North Shore City Council has been mostly focused on stormwater amelioration rather than supply demand management.

The key findings from the Beacon report TE106b include:

- Well implemented demand side water management programmes offer New Zealand local governments' significant financial, environmental, social and cultural benefits. That these benefits are not well understood is evidenced by their lack of use nationally.
- Most New Zealand councils lack clearly defined per capita water use targets and few have comprehensive and targeted long-term strategies to reduce water consumption per capita.
- There appears to be a lack of imperative with respect to water efficiency in New Zealand, perhaps due to a perception of the resource being relatively abundant.
- There is a lack of consensus or even discussion as to how much water is enough per capita in the New Zealand context and the establishment of national reduction targets would provide an important benchmarking tool for water resource managers.
- Demand side management programmes for water conservation are relatively new and still evolving locally. At present there is a lack of empirical local data documenting actual savings through before/after programmes. However, there are a number of easy to implement initiatives that are known to significantly reduce water consumption, even if it is as yet unclear by exactly how much.
- Australia has significantly more advanced water conservation programmes and there is an opportunity for New Zealand to leverage off their experience.
- The installation of water metering coupled with volumetric user charges which charge customers based on actual use as opposed to a fixed annual fee within annual rates, drives almost immediate and substantial savings in water consumption at a household level and appears to drive longer-term behavioural change.
- Direct user charging for water in areas where it has not yet been implemented remains contentious - due possibly to its status as a "necessity" as opposed to a "luxury" resource and New Zealanders' historic access to water as a free good. As such, political opposition to user pays pricing is a major obstacle for many councils wanting to meter and price the resource according to use. The passing of national legislation requiring mandatory water metering and charging might address this.
- In some cases councils have a disincentive to conserve water as profits generated from throughput are used to fund the significant capital investment made to provide water infrastructure such as treatment facilities.
- Further monitoring of end users' behaviour with respect to water use is required to be able to offer more cost effective and targeted demand management and supply side programmes.
- There are equity issues with respect to the pricing of water. Securing affordable supply to lower-economic socio groups without underpricing the resource needs to be carefully considered and is an important policy issue

- The decision to “semi-privatise” water supply operations, whether through Council Controlled Organisations (CCO’s) or Public Private Partnerships (PPP) as has happened in many places may be an impediment to achieving water efficiency savings targets. Nationally legislated targets for reducing water consumption per capita would be the most effective way to achieve a level that could be considered ambitious.

An Opportunity for Change

The opportunity currently exists for New Zealand to develop a more resilient and sustainable system for the delivery and use of water resources, but only if we address the issues now. The shift to such a system requires a wide range of strategic investment decisions made over time.

Priorities also need to be set. For example, if existing per capita water use trends in Auckland are not significantly reduced over the next 15 years, then in approximately 20 years the city is likely to require an additional piped supply from outside the regional catchment i.e. further supply from the Waikato River. If, however, investment in demand management programmes was made over that time there is a possibility that future investment in an additional pipeline could be significantly deferred if not made altogether unnecessary. Such demand management programmes would need to promote the wide spread installation of urban rainwater tanks and low flow water efficient fittings and appliances, coupled with an ongoing campaign to change people’s behaviours and attitudes regarding water use. This lower-cost/lower use approach has the potential to deliver a huge range of sustainability benefits across the triple bottom line – but requires a long-term planning approach to be most effective. It is too late to instigate these programmes a few years out from meeting capacity. This was aptly demonstrated in the early nineties when following the region-wide drought in Auckland, the decision to pursue a costly pipeline option had to be made.

Water is a finite resource and in many places around the country our existing water infrastructures are being stretched to meet the demands of a growing population and economy. This, coupled with significant under-investment in water infrastructure in recent decades, has seen local government water budgets coming under pressure. The need for significant capital expenditure across the country has also arguably driving a period of reflection as to how we can deliver water services more efficiently – at least in some regions.

According to the Ministry of Health, a total of 300 l/c/pd is required. However analysis of typical water use shows that only 5 litres of that water need be biologically and chemically safe and 105 litres of biologically safe water would provide a daily shower. In effect this means that New Zealanders in the year 2007 still flush their toilets and water the garden with high quality drinking water.

Around 85% of New Zealand’s population receives water, wastewater and stormwater services from local authorities. Local authority water and wastewater infrastructures are valued at approximately \$7.5 billion with around \$600 million spent on operational costs each year. It has been estimated that around \$5 billion of investment will be required over the next 20 years to upgrade water, wastewater and stormwater infrastructure. This figure could well be a low estimate.

Reducing water use also reduces the likelihood of non-point source pollution – an important issue with respect to the declining water quality in New Zealand both in residential and rural areas. The Environmental Protection Agency in the United States has identified that using less water can reduce:

- On-site disposal system failures
- Polluted run-off from irrigated agricultural and urban lands
- The need for additional reservoir capacity and associated habitat alterations
- Surface water withdrawals or diversions that result in degraded habitat and wetlands.

When taking all the above factors together, it isn't difficult to see why demand management should become a key component of any strategy to address water supply and scarcity issues. However in New Zealand efforts to date to restrain or reduce water use have largely been targeted at affecting small behavioural changes at the peak of summer when supply is most scarce.

Programmes to lower water consumption by reducing actual demand through the use of ubiquitous water metering and charging, retrofit programmes, promoting more efficient water use technologies, or targeting the water use behaviours of end-users, have in most cases been limited and piecemeal, and not a well integrated component of water use conservation strategies.

Internationally, Seattle in the United States can be seen as a leader in what a sustainable three waters approach can achieve. The graph below illustrates the city's population growth per capita and the level of water saved pc/pp over the same 30 year period.

The Seattle Public Utilities and partners' Ten Year Conservation Program Plan identifies:

“Conservation is an economically and environmentally responsible way to accommodate competing demands for drinking water to meet long-term population growth.... as a proven water resource, conservation has demonstrated reliable savings that are expected to continue over the next 20 years.”

In New Zealand, the legislative environment is such that social and cultural values must also play an integral part in any decisions relating to water system management issues that local governments make.

Beacon's research has found that while a number of councils face water scarcity and supply issues, there has generally been little attempt to use strategic programmes and well-implemented conservation methods at a residential scale to work as a means for addressing longer-term water scarcity issues.

Many New Zealanders have a perception that, at least in New Zealand, water is an abundant resource. Internationally over the course of this century water is going to become an increasingly valuable resource which, if properly managed, could provide the country with a significant economic advantage. However, continuing with a business as usual model will not enable the full value of our water resources to be realised.

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

CASE STUDIES

Kapiti District Council

Kapiti District Council faces some particular water-use challenges. The combination of an elderly population, sandy soil types, and a thriving gardening culture, has led to high daily water use per capita of around 600l/c. The council has set a target of reducing the demand on articulated supply down to 400l/c/pd. This figure allows for 250l/c for “essential” uses – ordinary household water activities and drinking water - and 150l/pd for “non-essential” uses such as gardening.

For residents in rural or lifestyle situations, a total water use limit of 1000 litres per household per day has been set with the use of an outdoor rainwater tank mandatory. The use of grey water is also encouraged and rebates are offered on water tanks where they are plumbed to at least two indoor uses such as for washing machines or flushing toilets.

This target and other water use targets and strategies are outlined in the Council’s long-term sustainable water use strategy, a document that takes a 50 year view and which identifies and works with a principal assumption that water is a finite resource requiring a significant change in mindset if a reasonable standard of sustainable management is to be achieved.

The strategy identifies demand management as being the key component to its long-term water management strategy:

“In effect, the key long term issue is that of demand management. The strategy takes the view that the community’s role, via the Council, is to support basic water needs and some lifestyle use – within the capacity of natural systems. This strategy therefore is built on the principle that a key role for community investment in water management, is to reduce demand levels in high consumption catchments.... Supply will be secured within this framework of demand reduction. This is very different from an approach that sees demand management and water conservation as an addition to the normal focus on securing supply. The level of demand for which the community will take direct responsibility, provides for basic needs and some lifestyle activities that have been a traditional focus for some communities on the coast.”

The Council also intends to introduce household water meters by 2008/09 along with water use charges – however there are the associated political tensions and pressures related to instigating such a policy that could as yet derail the proposal, especially in an election year.

Kapiti also allocates an annual budget of approximately \$70,000 to water conservation measures. The principle expenditure item is the annual outdoor garden show, an event sponsored by the council. The show demonstrates garden plantings and techniques for reducing water use in dry weather with a focus on water efficient plants, irrigation systems, and more economical garden design that takes better account of climate factors such as dry periods.

Other initiatives include the provision of a council funded “green plumber”. The plumber visits houses on request and will fix and replace leaky washers while providing water conservation advice to households (the programme has seen approximately 5,000 homes visited to date). The initiative has also seen roughly 3,500 flush reducing gizmos fitted to toilet systems to date.

The Council is also on the verge of becoming the first in the country to undertake a district plan change that will require the installation of a 10,000l rainwater tank or a combined 6000l rain tank and greywater system in new build residences.

The Sydney Water Experience

Australia is much further along the path than New Zealand in terms of implementing water use reduction programmes. The experience there has shown that Federal Government intervention in the form of regulation as well as adequate funding provides a stronger basis for reducing water consumption levels across the full spectrum of consumers and users.

There is nothing like an imperative to drive behavioural change with respect to resource use. In Australia, where increasing levels of water scarcity are fast becoming an everyday reality, regarding saved water as being as beneficial as an actual water resource is becoming prevalent. Sydney Water's Demand Management Strategy is widely recognised as one of the most comprehensive of its type anywhere in the world. Since 1999 Sydney Water has invested more than \$140 million in operating and capital expenditure in demand management initiatives. The water and financial savings of such investment are impressive.

The city first started developing a Demand Management Strategy in 1995 and the programmes have only grown in scale since then. However, Sydney Water says the key components have consistently been a focus on improving pricing signals, influencing stakeholders and customer behaviour, providing customer incentives (as well as education) and an active leak detection and repair programme.

The 2005-06 Water Conservation and Recycling Implementation Report summarises some of the key residential achievements for the latest financial year as being:

- Sydney's water leakage reduction initiatives inspected 18,011 kilometres of mains in 2005-06 achieving savings of more than 18 billion litres of water per year
- Almost 320,000 homes have now been fitted with water saving devices under the WaterFix programme, achieving savings of more than six billion litres per year
- Almost 25,000 rainwater tank rebates have now been paid saving almost 1 billion litres of water per year
- Almost 30,000 Department of Housing homes have been fitted with WaterFix devices, saving more than 600 million litres per year
- More than 37,000 'Do-It-Yourself' Water Saving Kits have been distributed to residents throughout Sydney, the Illawarra and the Blue Mountains, saving more than 250 million litres per year
- More than 7,000 washing machine rebates have now been paid, saving more than 140 million litres per year
- Almost 1900 properties have participated in a programme to determine the irrigation needs of gardens – and a web-based plant selector has been developed to identify low-water using plants for the garden.

As a result of these and other initiatives, Sydney Water's Water Conservation and Recycling activities are now saving over 40 billion litres of water per year.

The focus of programmes being run by Sydney Water can be grouped into three main areas:

- reduction of leakage from Sydney Water's distribution system
- incentive and education programmes targeting residential and business customers
- regulatory programmes targeting water efficiency in new homes and water efficient appliances and fittings (for example the New South Wales BASIX programme and appliance labeling and standards initiatives).

Independent experts engaged by the New South Wales Government estimate that these measures will save 145 billion litres of water per year by 2015 – more water than Aucklanders consume from a reticulated water supply in total in any given year.

Sydney Water's Operating Licence requires the Corporation to implement initiatives to reduce per capita demand by 35% from a 1991 baseline of 506 litres per capita per day. This target is to be met by June 2011 and is equivalent to a demand of 329 litres per capita per day.

The principal residential programmes include:

- Sydney Water's WaterFix, DIY water saving kits, rainwater tank and washing machine rebates, landscape assessment, outdoor education and water saving measures.
- A range of new pilot programmes are being trialed including a toilet retrofit programme, retrofits and DIY retrofits for business amenities and trailing of a leak detection system for large mains

The organisation says it has analysed more than 150 demand and supply options in the development of its strategy to date. Sydney Water has also implemented mandatory restrictions during summer periods which have seen significant reductions in peak demand.

CONCLUSION

Imagination is lacking in the field of water management in New Zealand and both central and local government could be doing a lot more to reduce water consumption in households in New Zealand. Perhaps the imperative to save is still not seen as critical, but as our neighbors across the Tasman have found, there is no space for apathy or a business as usual approach to managing such a vital life-giving resource.

To that end demand management programmes as a means to achieve more efficient water use and significant cost savings appear to be a poorly understood and under-utilised tool. Australian researchers believe that demand management programmes are “amongst the cheapest, least resource intensive, long lasting and beneficial options to society and the environment that can be chosen by any regional water planner.” All major cities in Australia are now utilising a wide array of demand management programmes to gain the dramatic water savings required for Australian cities to remain viable settlements into the future. So why are they not more widely used in New Zealand?

Beacon's research found that where demand management is being used, the programmes are largely ad hoc and not implemented as part of a comprehensive strategic water plan by councils that should have sustainable resource management as a core value. There is a definite lack of focus in terms of councils' prioritising reductions in water use at a household level.

In New Zealand, current water conservation through the use of demand management tools at local government level is still largely targeted at small-scale publicity and “tips” – information usually buried away on council websites. Despite the reality that water is becoming an increasingly valuable resource, water charging remains a political issue in many parts of the country including major cities such as Christchurch and Wellington. The experience in both New Zealand and abroad is that a shift to water metering and user pays charging effects an almost immediate leap in water savings – especially at peak times. On top of the water savings it also gives water planners access to water use data that can be used to target a range of other demand management programmes and much more effective water supply management.

At present there are also few or no disincentives for high volume users. Nationally there are no set

water targets and there is a wide variation in pc/d usage across the country so that what constitutes a “water conservation” target in one region may in fact be quite a high daily use when compared to other regions. Some form of national water act might provide such information and also empower councils to require metering defusing the potential for political fallout around the issue.

International experience suggests that significant and stable reductions in water consumption can be effected through the use of relatively simple water conservation methods targeted towards the residential sector. By implementing well-constructed and adequately resourced water retrofit programmes important steps can be taken toward achieving considerably greater levels of sustainable water use across the country.

REFERENCES

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N.b. A more comprehensive reference list can be found inside the above report TE106b. Available from: www.beaconpathway.co.nz.