

DEMAND MANAGEMENT - HOW LOW CAN YOU GO AND AT WHAT COST?

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ABSTRACT

The National Infrastructure Plan was published in 2011 and identified the water sector as the poorest performer. A three-year Action Plan has been developed and includes the action to “Increase understanding of and encourage debate on the use of demand management and pricing in infrastructure sectors”.

The Land and Water forum have been tasked with developing a common direction for water management in New Zealand. The forum believes the development of a set of principles, including efficiency of water use could address the current issues faced in over-allocated catchments.

New standard performance measures are likely to be introduced as a result of the Local Government Act in 2010 – water efficiency is likely to be a measure.

Demand management and water efficiency best practice is well established globally through a toolbox of options. For water service providers to manage water efficiently and wisely, an understanding of the drivers for efficiency, community perceptions and misconceptions and the funding challenges when implementing programmes will help inform the debate as to how far we can go and at what cost.

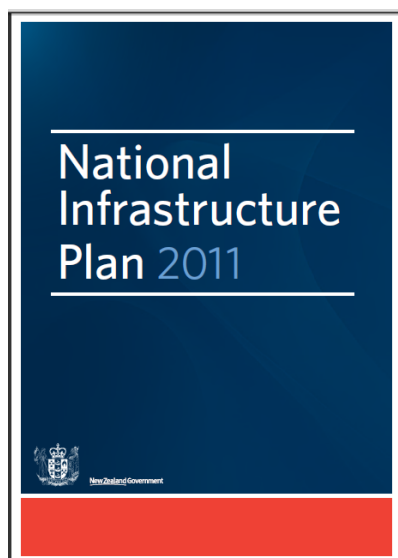
KEYWORDS

Demand management, water efficiency, universal metering, water losses, policy, plans and performance measures

1 INTRODUCTION

Demand management is a journey and every water provider and community will be at a different stage in their journey. When considering a demand management strategy there are a number of considerations. Where are we now? Why are we doing this - what are our drivers? Is this the right time? What are the risks of not being water efficient? How do we fund programmes and understand the cost benefits? Are the community with us? This paper doesn't aim to give the answers only encourage our thinking, inform understanding of water allocation policy and water industry reform and the opportunities for demand management ahead.

2 REGULATION, POLICY & GOVERNMENT DIRECTION



2.1 NATIONAL INFRASTRUCTURE PLAN

The National Infrastructure Plan (NIP) was released in July 2011. The NIP is a strategic, future focused document that places infrastructure in the context of economic and population growth. It seeks to provide common direction for how New Zealand plans, funds, builds and uses all economic and social infrastructure. Each of the five key infrastructure providers (Transport, Telecommunications, Energy, Social and Water) were assessed against six guiding principles:

- Investment Analysis - is well analyzed and takes sufficient account of potential changes in demand.
- Resilience - National infrastructure networks are able to deal with significant disruption and changing circumstances.
- Funding Mechanisms - Maintain a consistent and long term commitment to infrastructure funding and utilize a broad range of funding tools.
- Accountability & Performance - It is clear who is making decisions, and on what basis, and what outcomes are being sought.
- Regulation - enables investment in infrastructure that is consistent with other principles, and reduces lead times and uncertainty.
- Co-ordination - Infrastructure decisions are well coordinated across different providers and are sufficiently integrated with decisions about land use.

Table 1 shows the outcomes of the assessment for each of the providers: occurs effectively (green), occurs but could be further developed (orange) and does not occur or is ineffective (red).

| SECTOR | TRANSPORT | TELCO | ENERGY | SOCIAL | WATER |
|--------------------------------|-----------|--------|--------|--------|--------|
| Investment Analysis | Orange | Orange | Orange | Orange | Red |
| Resilience | Green | Green | Green | Orange | Orange |
| Funding Mechanisms | Green | Green | Green | Orange | Red |
| Accountability and Performance | Green | Green | Green | Orange | Orange |
| Regulation | Green | Green | Green | Orange | Red |
| Coordination | Green | Orange | Orange | Orange | Orange |

Table 1: National Infrastructure Plan – Water Performance

Water was clearly the poorest performer, particularly with regard to regulation, investment and funding mechanisms. The water sector includes all parties that use water e.g. local municipal water suppliers, irrigation, horticulture, hydro generators etc

The strategic opportunities identified for water included:

- Better demand management practices and consistent performance criteria for water infrastructure.
- Promote partnerships and activities within the sector.
- Ensure that management of water assets contributes to improved social, economic, environmental and cultural wellbeing of communities.

Water New Zealand (WNZ), along with the New Zealand Council for Infrastructure Development (NZCID) published its national review into these results in July 2012. The results for the Water sector differed slightly to the findings of the NIP – see Table 2 below. This was likely in part due to the high-level nature of the NIP assessment, relative to the more in-depth assessment undertaken by WNZ, which covered small, medium and large water providers throughout the country.

| ASSESSOR | NIP | | Water NZ |
|--------------------------------|-----|--|----------|
| Investment Analysis | | | |
| Resilience | | | |
| Funding Mechanisms | | | |
| Accountability and Performance | | | |
| Regulation | | | |
| Coordination | | | |

Table 2: Water NZ & NZCID – Water Performance

In summary, the study enhanced the 2011 National Infrastructure Plan industry picture of the urban water and wastewater sector through implementation of individual operator assessments based on a detailed performance framework endorsed by stakeholders. This has facilitated the identification of improvement opportunities at both the industry and individual operator level. These include:

- Facilitating increased scale and improved strategic focus on the provision of water and wastewater services through measures such as amalgamation, integration, shared service arrangements, and/or single-purpose entities
- Building community understanding of the potential benefits of adoption of volumetric pricing of water as an alternative funding mechanism, a **demand management tool**, and a tool to improve equity across water users
- developing aligned national, regional and local standards in the provision of water and wastewater services
- **Benchmarking and reporting of performance** across the industry
- Reforming the regulatory environment to remove complexity and provide the means to monitor and enforce service standards and delivery
- Developing and adopting best practice in investment appraisal and procurement decision making frameworks
- Implementing risk mitigation strategies to ensure long-term resilience of the water sector.

Resolution would require a combination of both local and national responses. All the operators currently suffer from a disparate regulatory environment, with regulations spread across a range of central and regional agencies, often with conflicting priorities.

The on-going requirement for operators to upgrade water and wastewater systems continues to create affordability challenges in small districts which cannot spread costs across wider networks. This is partly the result of quality standards being set nationally without consideration of the cost of achieving them.

Community resistance to change is inhibiting many operators from implementing changes to governance arrangements and funding mechanisms. Demand management initiatives are influenced by the views and responses of a community to the Operator's water use efficiency and the value they place on water and wastewater services.

Slow progress is being made in considering alternative funding tools to alleviate affordability issues. Opportunities for the adoption of volumetric pricing has been identified as a key focus for the industry moving forward and is discussed later in this paper (Section 3.3).

2.2 LAND AND WATER FORUM (LAWF)



Water infrastructure in New Zealand can be divided between two groups (as defined by NIP):

- Urban water infrastructure, providing safe and potable water, managing wastewater and stormwater, providing services to meet business and residential water needs and treating trade and industrial waste.
- Productive water infrastructure, for example, irrigation, hydro-generation, agro-processing, rural domestic supply and stock water.

Both groups require certainty around security in relation to water allocation to enable long-term investment in large water infrastructure projects. Although facing different issues, there are interlinked policy issues and regulatory settings relating to water quality and allocation, ownership, and regulation.

The Fresh Start for Fresh Water programme, including the work of the Land and Water Forum, aims to provide better clarity around water quality and allocation. The Forum's second major report, released in May 2012, provides a national framework within which Regional Councils will work with their communities and iwi to set freshwater objectives and develop limits for its use. The intention is to provide a consistent and transparent process for setting objectives and limits, including greater certainty for investment and development.

The efficient use of water as defined by the LAWF is:

- Technical efficiency – The amount (say, %) of water beneficially used in relation to that taken. It relates to the performance of a water use system, including avoiding water wastage.
- Allocative efficiency/Economic efficiency – Relates to water uses resulting in the optimum outcome for both the environment and community. Water is allocated to the use which has the highest value to society.
- Dynamic efficiency – Relates to the use of water adjusting over time, in order to maintain or achieve allocative efficiency.

Demand management is an integral part of the efficient use of water and for the water municipal supply authority the greatest impact can be achieved through improvements in technical efficiency. The challenges return to those identified in the NIP in that funding and community acceptance play a pivotal role in achieving this efficiency.

2.3 PERFORMANCE MEASURES

2.3.1 BACKGROUND AND CONTEXT

Amendments in 2010 to the Local Government Act 2002 require the development of rules specifying standard performance measures for five groups of activities commonly undertaken by local government.

Groups of activities to which the rules will apply to are:

- Water supply
- Sewerage and the treatment and disposal of sewage
- Stormwater drainage

- Flood protection and control works
- The provision of roads and footpaths.

The measures are part of a suite of reforms intended to ensure communities have access to better information about their local authority, enabling them to compare the costs, funding arrangements and service performance standards of these five groups of activities. The reforms aim to encourage greater and more effective participation by ratepayers and consumers of local government services in their local authorities' decision making about those services.

2.3.2 PURPOSE OF THE PERFORMANCE MEASURES RULES

The purpose of the rules is to provide standard performance measures that are applicable to local authorities so that the public may compare the level of service provided in relation to a group of activities by different local authorities.

What the performance measures are not intended to do

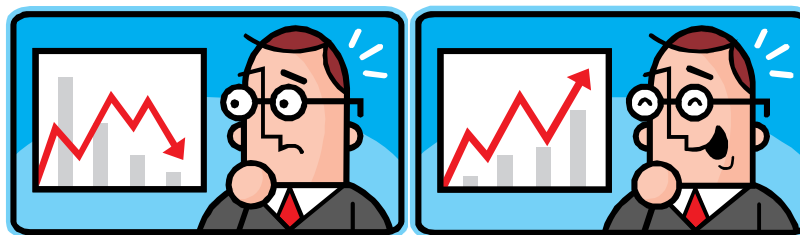
It is important to recognise that these measures are not intended as a means towards a 'league table' of local authorities. And as such there will be likely no single composite measure of how well each council delivers a service.

Equally, the measures are not expected to be a means for central government to impose service delivery standards on local government. Therefore, the measures would not set targets to be achieved: it would be for each local authority to set the targets it aims to achieve and to decide how it would achieve them, in consultation with its community.

2.3.3 APPLICATION OF THE PERFORMANCE MEASURES RULES

The rules would apply to all local authorities and any council-controlled organisations providing one or more of the activities. The measures would likely be included in long-term plans, annual plans and annual reports or, in the case of council-controlled organisations, statements of intent and annual reports.

Looking specifically at Water Supply, what could we expect in terms of performance metrics?



It is likely there will be metrics addressing quality and quantity (frequency of restrictions) as this is the primary function of water supply in ensuring the public health needs are met.

A demand management / water efficiency measure is also likely and typically these are based on water losses (leakage) or per capita consumption.

- Per capita consumption – In Australia and the UK a domestic per capita water use is a key measure. This removes the commercial/industrial/agricultural/horticultural component, which can vary between towns and cities. For example, a community where there is a large agricultural or industrial demand may have an unusually large gross (total) water use per person which can be misleading. Measures will likely need to be aware of these differences.
- Water losses - are considered of importance in both developed and developing countries. For councils to minimise wastage through lost water there needs to be some level of understanding of leakage in the networks, so will there be a leakage metric?

If the metrics are aimed at the community it may make sense to measure some level of customer satisfaction?

National water quality standards were set without consideration of the cost of achieving them by local authorities and water providers. Should performance measures be developed independent of the costs of achieving best practice, allowing an MSA, working with its community, to determine an acceptable level of service?

It is understood consultation with local authorities is planned for some time in the next 6 months and it is important as water and wastewater service providers to be involved in this discussion.

3 OPPORTUNITIES FOR DEMAND MANAGEMENT

3.1 DEMAND MANAGEMENT DRIVERS

When talking about demand management we often look to Australia as leaders in this area. A key point of difference is that their water efficiency has been driven by necessity and a long term drought. Investment in demand management and alternate solutions was not a barrier when faced with running out of water. Many of these initiatives have stopped since the rains arrived, although an on-going benefit of changed water use behaviour is likely to be observed in future.

It is important to understand the NZ context e.g. political, legislative, regulatory drivers, climate change and adjust demand management programmes accordingly to suit the local community.

Demand management initiatives are often most appropriate when major capital investment in a new water source is imminent and reduced water use could significantly delay that investment. If water resources are abundant, the price of water is low then it might not be the right time to implement extensive water efficiency programmes e.g. the case presented by Rotorua District Council.

3.2 WATER LOSSES



Water loss (WL) is treated water lost from water supply networks. Apart from saving money in operational costs in water treatment and distribution, successfully addressing losses can enable a council to provide water supply to meet growth through deferring further investment in new sources for significant periods. Non-revenue losses are those that have no finance (revenue) generation.

Benefits from reducing WL include the following:

- Councils can gain access to a self-generated cash flow
- Creating greater fairness between customers as you reduce illegal connections and theft of water
- More efficient and sustainable water service provision, improves customer service reducing levels of complaints

There are a number of reasons why councils can struggle to successfully reduce WL, these can include:

- Confusion amongst stakeholders of definitions/terminology
- Determining actual 'real' and 'apparent' losses due to insufficient or poor data, lack of reporting tools and supporting data management systems,
- Lack of in house capacity, resourcing and training of staff
- Competing funding requirements resulting in insufficient levels of investment in water infrastructure
- Lack of management commitment through a difficulty in establishing firm business case and performance incentives

3.3 METERS & PRICING



The NIP recognised a key area of opportunity as - *“Building community understanding of the potential benefits of adoption of volumetric pricing of water as an alternative funding mechanism, a demand management tool, and a tool to improve equity across water users”*

Imagine a scenario where the local community is demanding its Council installs water meters. That they see it as the only option to reduce long term impacts on the environment, encourage greater efficiency in water use and minimise future price increases and the impacts on their own pockets. If this is a Council's vision, how do they get there?

Tauranga and Auckland have successfully introduced universal metering and seen the benefits with 15-20% reductions in per capita use and the delaying of major water infrastructure. However, there were, and continue to be, challenges and there are valuable lessons to be shared with other municipal supply authorities considering the approach. Rotorua District Council for example have explored metering and decided not to pursue it at this time. Sharing of information is now being seen and the collaboration between Council's is demonstrated through the publication of council universal metering case studies and business case papers on the Water NZ website, including Tauranga District Council, Rotorua District Council, Kapiti Coast District Council.

In Kapiti the installation of water meters polarised the community. Cr Lloyd, who opposed meters, said:



“The potential was there for ratepayers to be penalized for saving too much water, something Tauranga's residents could attest to. He said their water charges were increased to cover a shortfall in Council's income as a direct consequence of a higher than budgeted reduction in water usage.”

Due to mistrust many people see meters as a precursor to privatisation and therefore, strongly oppose the initiative. In Tasman, Golden Bay councillor Martine Bouillir was quoted as saying:

“I do not trust the national and global agendas of monitoring water quality and standards - I see it more as tying up and controlling community water systems which will inevitably lead to privatisation/corporatisation of another necessary life source for us all. It is particularly concerning to see such 'Water Management' workshops offered to councils as being sponsored by water specialists like Ingenium - who just also happen to be fracking experts with links to weapons manufacturing.”

I personally never thought I would see the day when water management was linked to the weapons industry! When we talk about demand management – how low you can go at what the cost – the cost can also be to a water provider’s public reputation and public confidence.

As an industry how do we build this trust and communicate the wider benefits to the community? As Engineers we are great at coming up with infrastructure engineered-solutions. How do we communicate with the ratepayer/customer - what is in it for them? How does it affect their life? Research has shown that the most effective demand management solutions are those where there is no loss of utility, or the end consumer directly sees a benefit to themselves, or their values.

How do we manage the funding implications? If water conservation and demand management measures are implemented too rapidly or are highly successful over a short period, water sales will fall and hence result in either reduced income streams or unacceptably high tariff increases. This may lead to negative attitudes from users towards a water conservation and demand management programme.

It is also ideal that Councils and municipal supply authorities lead by example, demonstrating their own commitment to water efficiency, before asking the same of their ratepayers and customers. By communicating this effectively to the community a relationship of trust can begin.

3.4 DEMAND MANAGEMENT TOOLBOX

Water conservation and demand management is simply “the effective and efficient use of water”. The main principles of water conservation and demand management are that water providers should strive to supply water in an efficient and effective manner, consumers should not waste water and should strive to use water efficiently and water conservation and demand management should be considered as part of the water resources and water supply planning process.

A robust water conservation and demand management plan (WCDMP) will also provide significant benefits for the local authority in terms of meeting legislative requirements, supporting the sustainable management of a finite natural resource, demonstrating an interest in efficiency and economy, assisting in maintaining an adequate water supply, reducing wastewater discharges and reducing return flows into the environment.

Demand management is a journey and every water provider and community will be at a different stage in their journey. The content of WCDMPs will vary depending upon how much is known about the network, where water goes and where the inefficiencies lie.

The speed at which a WCDMP can be implemented and the setting of and measurement of targets will be influenced by factors such as the funding base, knowledge of WCDM, existing levels of WCDM applied and the condition of current infrastructure,

Development of a WCDMP needs to be undertaken in consultation with communities and affected parties as well as utilising the best industry practise of the time. This will ensure not only a technically robust plan, but also one that has the buy in of relevant parties associated with the plan, raises awareness to a wider audience ensuring an easier transition of the plan and associated actions.



Demand management is a well-established practice. However, each council needs to develop a suite of tools and practices which meet the social and economic needs of their town / city as well as the environment. The range of methods used to conserve water and manage demand fall into various categories which are discussed below.

Water conservation and demand management measures can be grouped under the following generic tools:

- Education;
- Encouragement/ incentives;
- Regulatory measures;
- Management;
- Engineering/technology;
- Customer assistance programmes; and
- Integrated resource planning.

Some tools are “direct” tools, such as engineering solutions, and some are “indirect tools”, such as education and incentives.

Direct tools - Direct tools include technological measures and effective water saving practices and behaviour. The implementation of the direct tools will have a direct effect on water use and therefore on the expenses and income streams of the water industry in an area.

Indirect tools - The indirect tools on the other hand, can be used to promote the implementation of the direct tools amongst water suppliers and individual users. The effect of indirect tools on water use will therefore be delayed and gradual.

Further information can be found in the literature, including “The Case for Demand Management in Council Water Supplies” which can be downloaded from the Water NZ website.

4 CONCLUSIONS

Water is an emotive, polarising subject for many people in our community. The recently published National Infrastructure Plan 2011 identified water as the poorest performing sector and set objectives to identify alternative funding mechanisms. The issues surrounding water allocation and water quality have been recognised nationally of importance and change is being led by the Land and Water Forum. New standard performance measures are likely to be introduced as a result of the Local Government Act in 2012 – water efficiency is likely to be a measure.

For water service providers to act as advocates for the efficient and wise use of water through demand management, there needs to be an understanding of the drivers for efficiency, community perceptions and misconceptions and the funding challenges when implementing programmes. Only then we will know how far we can go and at what cost.



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