DEMAND MANAGEMENT IS THE BUZZ - BUT IF YOU DON'T MEASURE IT, HOW DO YOU MANAGE IT?

Paper Presented by:

Peter McLennan

Author:

Peter McLennan, *General Manager,*

AllFlow Supply Company

35th Annual Qld Water Industry Operations Workshop
Community Sports Centre, CQ University, Rockhampton
22 to 24 June, 2010

DEMAND MANAGEMENT IS THE BUZZ - BUT IF YOU DON'T MEASURE IT, HOW DO YOU MANAGE IT?

Peter McLennan, *General Manager*, AllFlow Supply Company

ABSTRACT

Urban water supply is a growing issue for many cities and towns. Rapid population growth, droughts, ground water contamination, surface water pollution, greater use of water using devices as a result of higher incomes and ground water mining have all lead to water shortages in urbanized areas. D.E. Agthe et al (eds.), Managing Urban Water Supply. 2003, Kluwer Academic Publishers, Nederlands.

Demand Management, particularly in relation to water supply, can be described as understanding your customer's requirements and ensuring that sufficient supply is available.

This would be easy if you can be sure of the expected usage over a defined period. As population grows, demand grows. As water supplies deplete, demand still grows. Managing the demand so that there is always water available is becoming a complex issue which needs to be reviewed regularly and actively managed in line with the provider's Customer and Environmental policies.

1.0 DISCUSSION

In Duane D. Baumann's book, Urban Water Demand Management and Planning, McGraw Hill 1998, he asks that with the volume of water available, why do we have issues?

His ideas are based on the fact there is an abundance of water on earth and that is what distinquishes earth from every other known planet. In our world, water is literally everywhere. It covers more than 70% of the planet. It is over us, in us, under us and on us. Most of it (97.3%) is seawater and much of the rest is frozen (2.14%), but there is still a substantial quantity left (8556.25 cubic kilometres). So it is worth thinking about how the management of something that is so plentiful and so accessible still remains such a challenge.

A simple model relating water demand, cost and availability is shown in Figure 1.

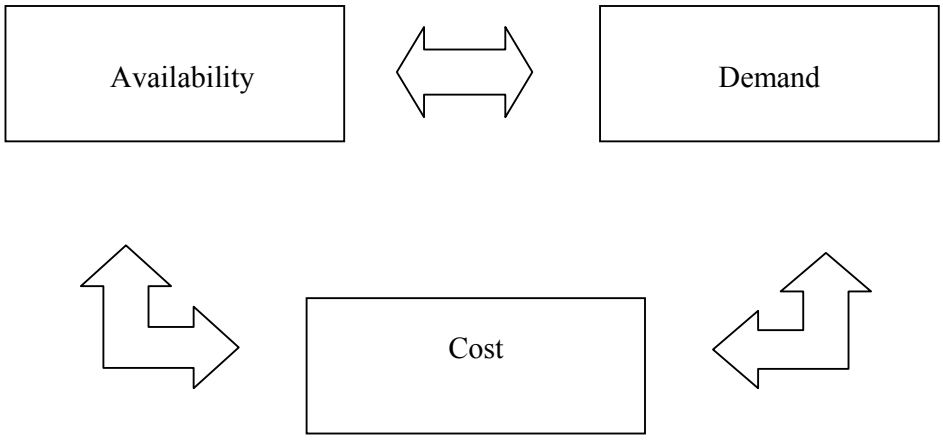

Figure 1: ***Water Use Cycle***

It is clear that cost influences both the availablility and demand for water. Demand affects the long run availability because as demand increases people seek new supplies of water by building dams, developing new well fields, and or contracting with more distant sources. Availability affects water demand because people are not likely to locate water using industrial activities in areas of limited water supplies. D.E. Agthe et al.

Identifying possible demand is based on local knowledge, empirical evidence and planned growth and this can be scientifically identified based on a number of readily available data points. But this depends on the availability of the water and having it waiting to be deployed to meet the demand.

Mathamatically, you could identify Demand through the following equation.

Demand = Consumption X Variables + Extraordinaries

Where Consumption is water use based on meter readings, variables include seasonal, demographical, industrial use and evaporation levels, plus extraordinaries which are things like leakage, fire fighting, extreme use etc.

This paper will provide the water manager who has isolated, or remote off takes and meter points or where the budget does not allow for a full demand management project, information on how to understand his network.

Water providers have a responsibility and a moral obligation to operate their system in an economic and environmentally sustainable way!

Demand management programmes do this by deploying various techniques for conserving water and improving the efficient use of water by end users.

The scope of an all encompassing Demand Management Programme is too complicated and too large to be covered here. A complete programme will include many aspects and cover the bredth of the resources of a water authority.

2.0 THREE STEP PROCESS FOR UNDERSTANDING WATER USAGE

I have broken this paper down to a 3 step process, that when implemented, will allow the water manager a better understanding of how, when, where and why the water is used.

These 3 steps are **Meter, Pressure Control and Leak Detection.**

Low cost components can be coupled together to provide information to allow significant savings in water consumption. The components can be integrated so that they are all remotely interrogated using radio waves or GSM cellular engines.

These will assist to;

- Identify leaks
- Reduce Consumption
- Identify peak load times and use the information to schedule non-critical functions.

2.1 Step 1 - Metering.

It is widely accepted that metering is now an important part of the dynamic of urban life. Most localities have a metering policy that covers residential and commercial users. These meters however are often installed and left. Only to be read periodically and not subject to any sort of management programme, other than to replace if damaged.

Water meters although an inexpensive item is your cash register by which people are charged for their use. Old, inaccurate and damaged meters allow the revenue to decrease and do not accurately identify the volume used.

Metering can also provide information on leakage and theft.

To address this, a meter replacement strategy is needed. Identify the age you feel appropriate and allocate the funding to change out the old meters.

An example of this is in a media release dated 11 January 2010, distributed by GWMWater in Victoria and available on their website www.gwmwater.org.au
"Under the program, 20mm water meters are replaced every eight years or once they have registered over 4000 kL of water usage" said Managing Director Jeff Rigby,
"This ensures that our assets are kept up to date and our customers receive the correct service", he said.

But……. Metering the consumer is only the first step to understanding how much is being used. You need to measure other points in the network to truly identify where the variances occur. Good practice is to measure both inlets and outlets of water towers and reservoirs. Meter water into and out of treatment plants etc. Technology allows the user to have the information relayed from these meters remotely so a picture of use is developed quickly.

Then once you have the meters, use a strap-on portable meter to check the meters on high use areas and questionable sites. This type of equipment can be relocated easily and should become a integral part of the meter management process.

2.2 Step 2 – Pressure Control

Pressure management in water distribution systems is an important issue for water suppliers as it can lead to substantial savings.

Water pressure management aims to adjust water pressure levels in the supply system to achieve more consistent pressure levels which will reduce the number of water main breaks, improve the reliability of the water supply system and conserve water.

Authorities lucky enough to have high pressure areas also know of the issues high pressures can cause. Likewise, very low pressures result in just as many issues. A network of zones can be utilized to level out the peaks and troughs and combined with individual fixture devices to limit the damage pressure causes.

Pressure control is also a major tool in leakage reduction.

Any pressure management programme must begin with a systematic logging analysis throughout the network. Results would be collated over a defined period to pick the pressure / flow dynamics and then pressure control valves would be installed where the outcomes of the analysis dictates.

Sydney Water has a Water Pressure Management policy and it is available on their website. It states that According to the NSW Government's Metropolitan Water Plan, the Leak Reduction Program and the Water Pressure Management Program are estimated to achieve a combined saving of 33 billion litres of water by 2011.

2.3 Step 3 – Leak Detection

Water lost through broken or aging pipes amounts to 20%, conservatively, for the water industry. Identifying and mitigating water loss represents the single greatest supply side opportunity for water authorities to conserve water, recover lost revenues and improve overall operational efficiency.

Main breaks are responsible for a majority of the water lost, typically accounting for more than 70% of the total water lost in the distribution system.

Breaks in mains tend to occur in particular areas related to pipe types and diurnal pressure variations and there is a tendency to underestimate the true cost of mains breaks by considering only the immediate operational cost, i.e call outs, repairs etc.

Improving pipeline integrity through pipeline monitoring can significantly reduce an authority's overall unaccounted for water, which in turn allows the authority to eliminate needless treatment costs, defer capital expenditure for additional infrastructure and recover the wholesale and retail value of the water that can now be delivered.

There is an increasing trend across the United States to use acoustical sensors. These effectively 'listen' to the distribution system and can be interrogated using automated meter reading technology type transponders that integrate into a water management programme. Results, and findings can be plotted and tracked giving around the clock vision through sound patterns in the water supply lines.

3.0 CONCLUSION

Demand Management is based on both science and technology. With water costs escalating and populations using more, water suppliers must be on top of the demand expectations.

A three stage approach using meters, pressure control and leak detection will provide the authority with the data on which to base strategic long term decisions.

The use of automated meter reading (AMR) technology in conjunction with radio frequency logging and acoustical sensors allows the information to be evaluated immediately or at set times, and then logged accordingly.
Water is an asset and as such deserves to be managed as any other revenue producing asset.

If you don't measure it, how do you manage it, and at what cost?

4.0 REFERENCES

Donald E. Agthe, R. Bruce Billings, Nathan Buras.
Managing Urban Water Supply. 2003, Kluwer Academic Publishers, Nederlands.

Duane D. Baumann, John J. Boland, W. Michael Hanemann. Urban Water Demand Management and Planning, 1998, McGraw Hill USA

GWMWater Victoria. Media Release. Meter Replacement Program, 11 January 2010.
www.gwmwater.org.au

Sydney Water, Water pressure management policy
www.sydneywater.com.au/OurSystemsAndOperations/WaterPressureManagement/index.cfm