

The Effectiveness of the Brisbane City Council Incentive Scheme for High-End Industrial Water Users

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In Australia, there has been much debate about the true value of water in society compared to what is actually paid by domestic and industrial users. Over recent years, some local councils and water authorities have increased price of water supply and wastewater discharge as they head towards full cost recovery of service provision and to delay the need for expensive upgrades of water infrastructure. This has been introduced as part of the Council of Australian Government (COAG) reforms. However, in most regions of Australia, a kilolitre of water can be purchased for less than the cost of half a litre of bottled water. In 2001, Brisbane City Council introduced an incentive scheme for those companies in the Brisbane region that use over 100 ML of water per annum to encourage more efficient water use. In order to receive the incentive, the companies were required to submit a Water Efficiency Management Plan (WEMP) outlining proposed actions and targets for reducing water usage. A total of 36 companies submitted plans to Brisbane City Council and these plans have been reviewed annually by the UNEP Working Group for Cleaner Production.

Initially, there appeared to be slow uptake of the ideas of implementing actions to achieve water savings given the level of detail included in the early plans. Since then there appears to have been improved understanding of the concept of water effectiveness and the effort and management support to make real improvements. This paper discusses the outcomes of a number of the WEMPs and the overall effectiveness of the Brisbane City Council's incentive scheme in reducing water use by industry. The possibilities for further expansion of the scheme and the value of such schemes to Brisbane are considered.

WATER USE AND PRICING IN AUSTRALIA

Water use and its availability in Australia has been the subject of much scrutiny and debate and increasingly so over the past 10 years. Of all water consumed, agriculture makes up 67% of Australia's abstractions, followed by electricity and gas supply (7%), household consumption (9%), manufacturing (4%) and mining (2%) (ABS, 2004) (Figure 1). Australia is one of the largest extractors of freshwater in the OECD, owing to its extensive agricultural industry and predominantly dry climate (DEH 2004). After decades of inefficient and inappropriate water use exacerbated by water scarcity stemming from Australia's arid climate (Barr, N and Cary, J 1992; Yencken, D and Wilkinson, D. 2000), much needed reform has been introduced in Australia's regional and urban catchments. In April 1995, the Council of Australian Governments (COAG) endorsed the National Competition Policy for Australia. Under this policy, payments are made available for States and Territories that successfully implement a range of important reforms — including the COAG Water Reform Framework. The framework includes institutional reforms; the incorporation of environmental costs in water pricing; and ecologically sustainable water trading (DEH, 2004). However, in most instances, water pricing does not represent the true value of the product. Full cost recovery of water supply has not yet been achieved and many 'external' environmental costs are still not incorporated into pricing to produce a true cost of water. A Senate inquiry into Australia's urban water management found that

consumption levels continue to be unsustainable while at the same time consumers are paying among the lowest prices in the world (Senate 2002, cited by Uhlmann 2003). Table 1 indicates the price of town water for industrial and commercial customers in various regions of Australia. (Note that these are consumption charges and do not include access or service charges).

In many regions of Australia, including Queensland, water charges cover only the infrastructure costs of delivering that water, for example, the cost of dams, weirs, pipelines and channels, i.e. the charges do not pay for the water itself (NRM, 2003). In more recent years, water pricing is being reviewed to reflect the ‘true’ cost taking into consideration water management costs, external environmental costs and water scarcity (CSIRO 2000, NRM 2003, NRM 2004).¹

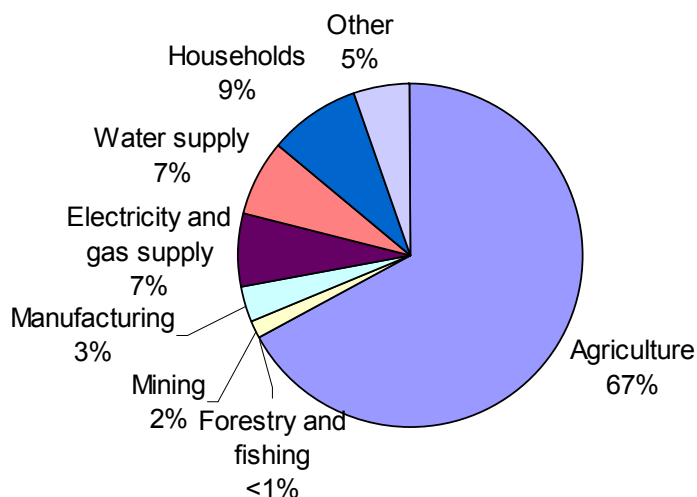


Figure 1: Water use by sector in Australia (ABS, 2000-01)

Table 1: Indicative commercial/industrial town water supply costs in Australia*

Council	State	Water supply cost (\$/kL) as at Jan 2005*
Sydney Water	NSW	1.013
South Australia Water	SA	1.03
Gippsland Water	Vic.	0.85
South West Water Authority	Vic.	0.93
Brisbane City Council	Qld	0.92
Ipswich City Council	Qld	1.30
Gold Coast Water	Qld	0.85
City West Water	Vic	0.83
Perth Water Corporation	WA	0.79
Power and Water Corporation	NT	0.67

* Consumption charges only - excludes any additional access or service charges. Prices are indicative of that paid by industrial/commercial users consuming over 100 ML/yr

¹ Water management costs include maintaining infrastructure, administration and planning and allocating resources. Externalities are the cost of the environmental impacts as a result of using water, for example, declining quality and salinity. These costs are currently born by the community rather than the water user. The scarcity value takes into consideration that supply of suitable quality water is limited and should be valued as such (NRM, 2003).

URBAN DEMAND MANAGEMENT SCHEMES IN AUSTRALIA

Urban water management in Australia is the jurisdiction of state and local government and water authorities. Some urban utilities have invested significant funds in demand management programs to reduce consumption and to defer the need for capital works in upgrading treatment plants and distribution systems (White and Fane, 2001). There are four main demand management responses for water conservation: conserve water, substitute potable water with a different source, extend existing supplies and supply of services that eliminate the need for water e.g. water-less urinals. Excluding the latter, water conservation is the most cost effective and resource-use-effective (Mitchell et al, 2004) and is promoted to industry via a variety of government programs. Examples are the Sydney Water 'Every drop counts' program, the Queensland Environmental Protection Agency (EPA) Ecobiz program and Victorian EPA Sustainability Fund. Early water conservation (and eco-efficiency) programs with industry involved a 'third party' approach with consultants undertaking audits and providing recommendations for companies to follow-up. It has been shown that findings from such audits are frequently ignored and so recent programs take more of a partnership approach with more responsibility put on industry to identify and implement improvements. The 'Every Drop Counts Business Program' has been relatively successful by working with industry and appointing a water manager accountable for an achievable target, motivating management and employees. The program has signed on over 200 of the highest water users in Sydney and saved over 4 GL of water per year (Swinton B, 2004).

Of the many government programs in place it is noted that there is often a limited review of effectiveness and it is important that an evaluation be undertaken at an appropriate time (WSAA, 2003) - something that this paper addresses.

WATER USE IN MANUFACTURING AND COMMERCIAL INDUSTRIES

With a population of 900,000, the City of Brisbane has a range of large manufacturing plants including oil refineries, chemical processing plants and food processing facilities. Commercial facilities using substantial volumes of water include an international airport, universities, hospitals, large hotels, and shopping and entertainment complexes. Brisbane Water supplies approximately 165,000 ML/yr to the City of Brisbane and services over 19,000 industrial/commercial customers which use approximately 31% of the Brisbane supply. In order to achieve conservation targets, the council aims to cap demand at 165,000 ML/yr by 2010 (Pers comm. Barry Ball). Of the water consumed, approximately 14,100 ML/year² (28%) is discharged as trade waste (Brisbane Water, 2005).

Table 2: Industrial and commercial water use

Categories for industrial water use	Example
Product formulation	Beverages, chemical solutions
Product specific processing	Pasteurisers, wet scrubbers
Heating/cooling	Boilers, cooling towers, condensers
Plant service water	Pump seals, vacuum seals, laboratory needs
Product transfer/conveying	Flumes
Categories for commercial water use	
Cooling	Air-conditioning

² Brisbane City Council Billed trade waste flow 2003/04FY

Heating	hot water, steam production
Services	Pump seals
Common to both	
Amenities	Toilets, showers, basins, kitchens, cafeterias
Irrigation	Landscaped gardens, lawns
Cleaning	Equipment, processing surfaces and areas
Fire services	Separate water supply

Water use categories are shown in Table 2. Typical uses of water in refining and chemical processing are for steam production, evaporative cooling, cleaning and product-specific processing purposes. In food processing, water is typically used as an ingredient in product, for specific processing purposes such as pasteurisation or washing in-process materials, in cooling towers and one of the major uses – cleaning. In commercial facilities, typical uses are for air conditioning, amenities e.g. toilets and basins, food production or preparation e.g. hotel kitchens or cafeterias and watering of gardens or landscaped areas.

OPPORTUNITIES FOR REDUCING WATER USE

There are a range of opportunities for Brisbane Water’s industrial/commercial customers to reduce water consumption. Quick wins can be gained through installing water saving devices in amenities and on hoses used for cleaning. More substantial savings in volume can be made through process improvements, fine tuning processes e.g. automated cleaning systems or through the installing more efficient equipment and technological improvements. Staff incentive schemes can be another useful way of getting people involved and making solid improvements. Where appropriate, there is also the opportunity for those companies in the vicinity of a water treatment facility to substitute their town water supply with appropriate quality treated wastewater. Some specific initiatives undertaken by companies are discussed further later in this paper. For those companies just starting to closely manage water consumption, it should be feasible to reduce total use by up to 10-15%, or more. Individual companies have been able to achieve this as demonstrated by a number of eco-efficiency assessments that have been undertaken by various groups (UNEP, 2004). ‘When faced with severe water restrictions, industry in central Queensland discovered water conservation savings of 10% from changes in practice with essentially no investment, and savings of 25% at an average cost equivalent to the marginal cost of water supply’ (Mitchell et al., 2003).

BRISBANE CITY COUNCIL ‘WATER EFFICIENCY MANAGEMENT PLANS’

In 2001, Brisbane City Council introduced an incentive program for those users consuming in excess of 100,000 kilolitres of water per annum. Companies that qualified for the ‘Water Efficient Users Tariff’ paid a flat rate of \$1.02 per kL for each kilolitre consumed in excess of 100,000, amounting to approximately a 10% reduction in costs. The plans were expected to include the following (Brisbane City Council, 2003b and UNEP Working Group, 2003):

Quantitative:

- Baseline information on current water usage;
- A water use assessment measuring inputs, outputs, usage and loss;
- An improvement strategy including targets, goals, actions responsibilities, milestones and implementation timeframes;
- Evidence of regular measurement and monitoring of water use;

- A periodic review and update of the plan and implementation timeframes; and
- Progress report listing milestones achieved.

Qualitative:

- Company policy;
- Evidence of management commitment and responsibility through management procedures and practices;
- Evidence of increased awareness of water conservation issues through staff training programs; and
- Evidence of how water conservation will be considered for any future equipment or plant upgrades.

In 2002, 36 plans were submitted by a range of commercial interests including food processing plants, chemical processing plants, petrochemical refineries, hospitals, commercial buildings and universities. The UNEP Working Group for Cleaner Production was invited to review and evaluate the plans as an external body. The plans were reviewed against criteria covering management commitment and responsibility; financial commitment; training; measurement and monitoring; opportunities for reducing, reusing and recycling of water; and building and design. The plans were given a rating on a scale of 1-10 where a score of 1-4 indicated that few criteria had been addressed, a score of 5-7 indicated that some criteria had been addressed, but more information was needed and 8-10 indicated that most criteria had been addressed. Of the plans submitted 66% were given a rating of 6 indicating that although some of the criteria had been addressed, more information was required to demonstrate how the plan was actually being implemented. Another 16.5% were rated 4 or below and had insufficient information to indicate what actions were being taken, who would be responsible and over what timeframe. Lastly 16.5% of the plans were rated 7 or above. These plans indicated that specific actions had been or were being taken to effectively reduce water usage and some results were already available to demonstrate this.

Plans were again submitted during 2003 and 2004 and were again rated using slightly modified criteria that included a water consumption reduction score to indicate if a company had met its planned target water reduction.

DISCUSSION OF PLANS

The plans were evaluated firstly in September 2002, again in April 2003 and lastly in June 2004. As mentioned, 36 plans were submitted in the first round of evaluations, 25 in the second round and 24 in the last round. There were 11 of the original 36 companies that did not resubmit in the second round and a further 5 companies that did not resubmit in the third round. There were 3 new submissions in the second round and 1 new one in the third round.

For the second and third round reviews, it was noted with a number of the plans (about 30%) that there was a lack of information or evidence to demonstrate what improvements or advances had actually been made, if at all. For some of the submissions it appeared that work was progressing and actions were being undertaken, but the plan did not demonstrate to what extent. For others it appeared that there was little progress and completion dates for the previous year were extended into the following year with comments such as 'in progress'.

Of the companies that did re-submit, 13 of the 25 did not provide a proposed target or goal for water reduction, even though it had been requested by Brisbane City Council. This

could indicate a lack of management commitment to the plan or possibly insufficient knowledge on water use to be able to nominate an appropriate target or both.

There were however, a number of outstanding plans that met most of the rating criteria and which included specific targets and objectives for reducing water consumption. These were generally submitted by some of the larger manufacturing companies such as Castlemaine Perkins, Coca Cola, Amcor Beverage Cans and Visy Paper Ltd as well as some non-manufacturing organisations such as the Wesley Hospital and the Queensland Cultural Centre.

The use of key performance indicators (KPIs) is an important means of measuring water use per unit of production or provision of service. Manufacturing plants may report in litres per tonne or kL of product, a hospital or hotel may report in litres per occupied bed or room, while a commercial building may simply report based on floor area i.e. litre per square metre. Of the plans reviewed during 2004, 14 of the 24 companies had provided key performance indicators that were based on production or service capacities, while 5 companies had target reductions for total volumes of water. However, the extent to which these figures were regularly monitored was difficult to determine given the information provided.

Another important means for measuring water consumption is through the installation of strategically placed water meters in addition to the mains water meter that is usually monitored. Of the 24 companies that submitted plans in 2004, 11 had installed additional sub-meters and a further 6 were planning to install them. Some of the larger companies had linked the meters to their process control systems to allow instant access to water usage information.

Water conservation initiatives adopted by Queensland companies

There were many water saving projects presented in the plans. Standard initiatives adopted by many companies were the installation of water saving devices in amenities, regular audits and maintenance of piping and installation to check for leaks or other problems.

Some specific examples of significant savings include:

- A chemical manufacturer reduced water use by 220 kL/day by reusing waste water in the process rather than directly discharging to drain.
- A beverage company identified the opportunity to save 850 kL of water per month by improving the operation of their water treatment plant.
- Another beverage company had a water management plan in place for several years prior to the council program and had reduced effluent discharge by 60% despite an 18% increase in production.
- An 8% reduction in total water for a university, saving approximately 18 ML/yr. This was through retrofitting and improving irrigation practices.

Depending on the location of the facility and the quality of water required, companies may have the opportunity to replace potable town water with externally supplied treated wastewater. An example of this is the BP Australia oil refinery at Bulwer Island which is receiving up to 10 ML/day of treated effluent from Brisbane City Council's Luggage Point

treatment plant (Brisbane City Council, 2003). Likewise, there may be opportunity for appropriate quality wastewater to be reused by a third party e.g. for the irrigation of parkland or other purposes.

EFFECTIVENESS OF THE WATER EFFICIENCY MANAGEMENT PROGRAM

The program was introduced as an incentive to industry to better manage and identify opportunities to reduce water use. During the introduction of the program the potential for reducing water use was unknown and so there were no specific targets for reducing overall use.

Table 3 shows the total water usage for the participating companies. Compared to 2000 data, water consumption decreased by 3.9%, 3.1% and 1.2% for the years 2001 to 2003 respectively. There was an increase of 2.8% in 2004 compared to 2000. During 2001, 59% of companies receiving the tariff showed a decrease in water consumption. For the following 3 years this was 47%, 44% and 37% respectively. Although total water use has increased in 2004 since the introduction of the rebate scheme, conclusions cannot be drawn from this without evaluating growth in production and services. This data is not freely available and so a comparison has been based on the economic growth for Queensland. The latest available statistics for Queensland indicate 'gross state product' of 5% from 2001 to 2002 (ABS, 2003). Based on this figure, expected growth from the year 2000 to 2004 would be in the order of 22% (Table 3). It is not unreasonable to say that water efficiency has improved significantly over the four year period given that total consumption decreased in the first three years and increased to a relatively small degree during 2004. Further conclusions cannot be drawn without evaluating the individual growth rates of the participating companies.

When the program commenced there was a participation rate of 85% i.e. 36 out of 42 companies submitted plans. This has since decreased to 64% (27 out of 42 companies). Many of the companies that did not resubmit were hospitals or commercial buildings (e.g. shopping centres) that consume close to the 100 ML/yr cut-off for the tariff. Although not surveyed, a likely reason for not re-submitting is the reduced opportunity for rebate savings the closer a company gets to the 100 ML quota. This coupled with the reporting requirements in submitting a plan may have dissuaded those companies from participating.

Table 3: Total water consumption for participating companies

Year	Total water use for participating companies (ML)	% increase in total consumption since 2000	% Economic growth compared to 2000
2000	15623	-	-
2001	15020	-3.9%	5%
2002	15132	-3.1%	10%
2003	15429	-1.2%	16%
2004	16058	2.8%	22%

*Based on ABS, 2003 statistics

A number of submissions indicated that individual companies were either achieving or were close to achieving best practice in their industry. It was apparent that those companies making significant savings were ones that closely monitored water consumption and managed water as part of their daily management procedures. Staff are involved via regular meetings so that water reduction measures were not being promoted by one or two managers, but by all staff. Some companies have reduced water consumption and achieved savings in water regardless of the council requirement for a

management plan, however the introduction of the program has provided the opportunity to promote what has already been achieved, thereby preventing possible future pressure from regulatory authorities.

In producing this paper, a number of companies were contacted to discuss company perspectives of the high water user's tariff. It was generally agreed that attitudes towards water conservation have changed over recent years, however it was felt that this has been a community shift rather than as a result of the program. One company stated that the requirement to submit management plans to council has put additional focus on water use and has enabled water conservation projects to be approved more quickly than they would have previously. The installation of water meters had also been extremely beneficial in identifying water leaks, water use hotspots and opportunities for improvement.

A few companies felt that the scheme required too much time and resources (paperwork) for little return and that the criteria for reviewing the plans were not totally practical or applicable. A number of companies felt that it would be more beneficial for council to 'come to the table' and form direct partnerships with industry to identify what the individual issues are. 'The most difficult part is investigating what is possible' and some companies feel they could be better supported in this regard.

A barrier in encouraging industrial and commercial users to reduce water usage is that despite it being an indispensable resource, it is often a relatively small component of total operating costs, usually less than 1-5%. As previously discussed, water is not appropriately priced to reflect its true value. Therefore, if supply (at current prices) is guaranteed, there can be little incentive to make improvements when more substantial savings can be achieved in other areas of production or service.

Total water use for the participating companies decreased by 852 ML for 4 years to 2004, compared to 2000. Given this, it can be concluded that the program has been effective in helping to increase industry awareness of the importance of water conservation and achieving real savings. There has been a general improvement in the amount of detail and data provided by companies to demonstrate their commitment to the management plans, however it can be difficult to determine to what extent companies are working on water conservation without one to one contact with individual participants. This would benefit industry and the council alike in determining what the limitations and opportunities are for improvement. The bottom line for industry and business is to be cost-effective and water consumption will not be reduced further if requirements for both financial returns and environmental gains are not met.

The program could be further supported by forming closer partnerships with industry to further identify what can be achieved and what are the barriers to further improvements. The program could also be extended out to companies that consume less than 100 ML/yr with the tariff being offered to those that are willing to participate in the scheme by submitting a plan. The formation of clusters with companies promoting what they have achieved may also help to encourage others to be involved and alert them to the opportunities. Finally the development and reporting of relevant key performance indicators should also be promoted by the council to help monitor progress.

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