

An Institutional Economics Perspective: The Impact of Water Provider Privatisation on Water Conservation in England and Australia

Greg Barrett · Margaret Wallace

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Abstract In the context of the world-wide trend towards the privatisation of water supplies, this article uses institutional economics to examine the incentives for English and Australian water providers to implement strategies to reduce household water consumption. The authors hypothesise that the effective marketing of reduced domestic water consumption is likely to be strengthened by the extent of government control over water providers. This hypothesis is examined using a case study of ten English water companies (all privately owned and subject to identical government regulation) and ten Australian water utilities (with varying degrees of government ownership and regulation), focusing on their promotion of home retrofitting with water-efficient technology. The examination supports the hypothesis, leading to the conclusion that significant government control of water utilities is necessary to curb domestic water consumption.

Keywords Water · Regulation · Privatisation · Conservation · Marketing · Institutional economics

1 Introduction

During the 1980s and 1990s, the role of private sector water provision increased in both England and Australia. This trend has been more uniform and more extreme in England, where the entire water infrastructure is now owned by private companies.

At the same time, in both Australia and England, demographic and climate factors led to growing demand for a limited water supply and increased concern with

G. Barrett (✉) · M. Wallace
Faculty of Business and Government, University of Canberra,
Canberra, ACT 2601, Australia
e-mail: Greg.Barrett@canberra.edu.au

M. Wallace
e-mail: Margaret.Wallace@canberra.edu.au

water conservation. In both countries, water utilities are required to encourage their customers to use water more efficiently. However, privatisation has been identified as limiting the implementation of laws and regulations to protect freshwater resources (Agboola and Braimoh 2009:2765).

Water conservation (demand management) programs increase the water suppliers' costs and reduce their revenues, and in the case of private water companies, will reduce returns to shareholders. Our hypothesis is that water utilities will be more likely to incur the costs of an effective water conservation program where there is a greater degree of government control, either through ownership or regulation.

We examine this hypothesis by focussing on home retrofitting of a water efficient technology, which is a water conservation measure of proven efficacy. We rank water utilities' web based marketing of home retrofits in England and Australia and conclude that this form of water efficiency is more likely to be marketed effectively if there is more government control over the water utilities, including the imposition of specific water conservation targets in the water utilities' operating licence. This conclusion reinforces concerns about the prevailing world trend towards privatisation of water supplies identified by Bakker (2003).

2 The Public/Private Conflict: An Institutional Economics Analysis

Institutions are a key concept for understanding water use and conservation (Barberán and Arbués 2009; Centner 2010; Fadlelmawla 2009).

The public/private conflict has been explored by Hall (2001:3), who observes that when a utility is privatised, "there is a profit-seeking dynamic which may, and often does, conflict with the public objectives of the water service". Hall also points to the fragmentation of responsibility exhibited by many privatised water systems, with the result that profitability may override the requirement to provide the public with a safe and reliable water supply. Hall and Lobina (2005) in their global survey of the relative efficiency of public and private sector water, point out that the great majority of the world's urban water supply is provided by public sector operators. Even so, these authors observe that policies have become seriously imbalanced, with the introduction of forms of privatisation resulting in economic, social and political damage.

While it may be tempting to see the public/private divide as a clear-cut distinction, in fact as Bakker (2003:11) points out, there is a continuum of water management options between these positions. We use this continuum to rank water providers.

Institutional economics examines institutions (e.g. ownership, licensing regulation, etc) which provide incentives (costs and revenues) for organisations such as water utilities to adopt behaviours (such as water conservation) which then affect the profitability and survival of the organisation. Profits allow the organisation to survive and encourages others to reproduce the profitable institutions (business model). This final step is also known as evolutionary economics.

In this analysis the behaviour being examined is water conservation (marketing of low flow showerheads), the organisations are the water utilities, the institutions include water charging rules, ownership and environmental regulations, and the incentives are the profits resulting from revenues and costs.

Our institutional economic assessment of water utilities' water conservation behaviour focuses on the fall in profit (reduced revenues from conservation and higher

costs from promoting conservation) resulting from effectively marketing water conservation. The dominant institution here is the market for water with a regulated price. In the absence of a higher price from the regulator, a water utility promoting water conservation would lower profits and not be acting the financial interests of their owners. Therefore other institutions such as government ownership or conservation regulations are needed to achieve a water utility behaviour of effective water conservation marketing. The hypothesis we examine is that private water providers will be more sensitive to lower profits than more public water providers and as a result will be less effective in promoting water conservation.

Evolutionary economics extends this analysis by focusing on incentives as a selection mechanism. In markets, profitable organisations will expand while unprofitable organisations will die out. In the public sector, organisations without government or public support will not be funded and will die out. For our water utilities both profitability and government support are necessary for survival. The market will not reward conservation promotion where it reduces revenues and raises costs. Therefore institutions of government ownership or regulation are required to reward water conservation promotion.

An Australian water utility (e.g. Sydney Water) earns revenue in proportion to the metered water volume it sells to its customers. It will have no incentive to incur the costs of marketing a water conservation program (which will reduce its sales revenue) unless institutions provide conservation incentives.¹ Private English water utilities are less dependent on metered water sales revenue, but still have no incentive to increase costs (and reduce returns to shareholders) by marketing water conservation unless institutions provide conservation incentives.

It is a common claim that conservation will reduce costs (e.g. water pumping and treatment) and therefore will be profitable where the revenue losses are less than the cost reductions. Unfortunately in water supply fixed costs are typically very large therefore average total cost will rise as conservation reduces output. Therefore it is unlikely that water conservation will increase profits in the absence of an offsetting price increase from the regulator.

Bakker (2003:185) traces the re-regulation of the English and Welsh water industry following privatisation, and concludes that there is a need for regulatory mechanisms (institutions) that adjudicate “between economic and social equity, and between (narrowly defined) economic efficiency and environmental protection”. Bakker (2003:114) also quotes an Environment Agency source who suggests that there may be a structural (regulatory) disincentive for demand management, because allowable profits are based on capital employed. Although the Water Services Regulation Authority (Ofwat) favours Demand Side Management as a means of keeping water prices down, price increases to consumers are based on capital expenditure. Thus, the incentive for the water company is to maximise capital expenditure (supply) and minimise operating expenditure (promoting water conservation).

Institutional economics is used in this article to provide a framework for analysing the relationship between the *behaviour* (e.g. promoting water conservation) of *organisations* (water supply utilities) and the *incentives* (e.g. profits) which derive

¹Water conservation does free water for alternative uses, but if those uses receive the same price as the original use there is no net increase in revenues merely an increase in costs.

from *institutions* (ownership and regulation). Phumpiu and Gustafsson (2009) recognise the need for strong institutions, in their case a national legal institutional framework, when public/private partnerships are an alternative for public delivery of water.

3 Public and Private Institutions for Water Provision: A Historical Perspective

The history of water provision reveals substantial movement along the public-private institution continuum in response to changing political and environmental pressures. The conflict between public and private interests in the provision of water has a long history, as Barron (2005) explains in her account of medieval London. In the early medieval period, water was sourced from private wells and Thames water was sold by private water carriers. However, in 1237, the City of London purchased access to springs and built pipes and conduits to provide free water. In 1368, a lessee took responsibility for the water supply and the above ground infrastructure, but after ten years the lease was not renewed. Clearly, the problem of separating the institutions of water's ownership and control is longstanding.

Bakker (2003:46–73) traces the evolution of state involvement in English water supply from the mid 1700s when urban water was supplied by a variety of local, unincorporated commercial bodies. In the first half of the 1800s, private joint stock water companies incorporated by individual Acts of Parliament grew sharply in number and coverage, until by 1851 there were 44 which covered 61% of the population of Britain.

The Waterworks Clauses Act of 1847 was a reaction to the failures of private provision and provided for regulation of maximum charges and dividends. The Gas and Water Facility Act of 1870 simplified the establishment of municipal water companies, and the Public Health Act of 1875 authorized municipalities to take over private water companies on health grounds. These Acts encouraged a rapid expansion of municipal water companies, so that by 1907, 81% of waterworks output was controlled by local authorities.

This shift from private to municipal water provision reflected a change in the perception of water from a commercial good to a public health and environmental issue. Public health concerns drove water supply towards universal provision. Environmental concerns led to the Water Act of 1945 and Water Resources Act of 1963 in an effort to regulate water abstraction and control pollution. Both health and environmental concerns supported government provision of water.

In 1974, nationalization of the water supply aggregated the mixed private/municipal system to a regional basis. The 200 statutory water undertakings, 29 river authorities and 1400 local authority sewerage services were amalgamated into 10 Regional Water Authorities based on major watersheds. Financially the RWAs came under the control of the Treasury and the consequent focus on financial restraint led to underinvestment, particularly in pollution control.

Meeting European Union water quality regulations required massive investment which the government avoided by the 1989 privatization of the water industry. The 10 RWAs were sold for £5.2 billion. Government control via ownership was replaced with government control via regulation.

In summary, water supply institutions in England have evolved through medieval municipal corporations to private corporations in the 1700s to municipalisation in the 1800s to nationalization in 1974 and finally privatisation in 1989. Clearly institutional evolution is a significant part of organisational survival and adaptation to changing circumstances and policy objectives. This article examines success in achieving water conservation in relation to the variation in current institutional experience, in particular comparing England and Australia.

In Australia, the aboriginal peoples' communal use rights over water were expropriated by the British Crown. This began with Sydney's Tank Stream in 1788. Government regulation of the water supply began with Governor Phillip creating a green belt 15 metres on both sides of the stream where he prohibited polluting activities, grazing stock and cutting trees. To enhance the water supply Phillip had storage tanks dug in the sandstone streambed. Despite introducing heavy penalties Governor Phillip's successors were unable to protect the Tank Stream and by 1828 it was an open sewer and was abandoned as a source of drinking water. In its place a tunnel (Busby's Bore) was dug from Centennial Park (Lachlan Swamps) to Hyde Park (then the racecourse). This was completed in 1837 when Sydney's population was 20,000. Initially, distribution within Sydney was by horse drawn cart but in the 1840s reticulation pipes were installed.

In 1842, the New South Wales Legislative Council established the City of Sydney as a municipality with responsibility for water and sewerage. The municipality built new water supplies and a reticulation system to houses and public standpipes. But it struggled to keep up with demand and in 1888 the NSW Government established a water supply and sewerage board which took over the municipal assets. The board consisted of representatives of the State government, the City council and the suburban municipalities. In the 1990s, the board began to adopt more commercial management and accounting practices and in 1995 it was established as a government-owned corporation which it remains today (Butlin et al. 1982; Coward 1988).

Other Australian cities have generally followed the Sydney example. The States (Crown) owned the water. Municipalities or States owned and managed the water supply infrastructure which was financed through water rates on property values. Private sector involvement was typically limited to sub-contracting particularly for infrastructure construction. In the 1990s, government water managers adopted more private sector practices, particularly financing by water use charges, corporatisation and greater use of private contractors. By the 2000s, private sector involvement expanded to include examples of private sector leasing, financing and management of government owned infrastructure.

Thus in both countries, much of the twentieth century was dominated by the 'state hydraulic' paradigm, characterised by state management of the water network and investment in large-scale infrastructure projects aimed at securing supplies: a supplied approach to water provision, which focused on remedying what were seen as market failures.

According to Bakker (2003:27), by the last quarter of the century, the 'state hydraulic' strategies were challenged on environmental, social and economic grounds, leading to the emergence of 'market environmentalism' characterised by demand management, institutions of private management and /or ownership of infrastructure, and a growing emphasis on environmental values.

4 The Current Water Supply Organisations and Institutions in England and Australia

In England, the water utilities were fully privatised in 1989, and the entire water infrastructure (for abstraction, treatment and distribution) is privately owned. Bakker (2003:165) points out that no other country in the world has emulated the UK in privatising through asset sale. England thus offers a model of extreme privatisation.

Three different English public bodies are responsible for overseeing aspects of the water companies' operation, thus demonstrating the fragmentation of responsibility that concerns Hall (2001):

- the Water Services Regulation Authority (Ofwat),
- the Environment Agency and
- the Department of the Environment, Food and Rural Affairs (Defra).

According to Bakker (2003) there is no clear hierarchy among these agencies, although each plays a specific role in water conservation.

Ofwat is responsible for the economic regulation of the water companies (including pricing) and for ensuring that they “promote economy and efficiency ... in their work” (Ofwat 2008a). Following the Yorkshire drought of 1995, water companies have had a statutory duty to conserve water. Ofwat publishes the “Water Efficiency Initiatives—Good Practice Register”, a checklist of water efficiency options “which companies can choose to engage in if their specific situations are suited” (Ofwat 2007a). Ofwat's examples of baseline good practice include distributing free cistern displacement devices (to reduce the volume of water used in toilet flushing) and promoting mail order water butts (for the collection and storage of rainwater). Good practice in water-stressed areas includes many more suggestions, among them subsidised home retrofitting of water efficient technology and increased metering. The companies are required to report in detail to Ofwat on their strategies for promoting household water efficiency by means such as cistern devices, water butts and water audits (Ofwat 2007b). Required information includes details of how customers are made aware of water-saving devices and an estimate of how much water has been saved as a result of the company's household water efficiency program. By 2008, Ofwat had concluded that there were opportunities for companies to improve their approaches to water efficiency and installing devices at a lower cost. They set each company a base level target of reducing water consumption by one litre per property per day through water efficiency in 2010–2015, while leaving the companies free to choose how they achieved this (Ofwat 2008b). The relevant institutions are government regulated water conservation information and non-binding water consumption targets.

The Environment Agency is responsible for managing water resources (including drought management) in England and Wales. It reviews the water companies' resource management plans, (including their efficiency measures and metering programmes) and issues abstraction licences. The Agency refused a licence to England's North-West Water (now United Utilities) on the grounds that the company had not implemented sufficient conservation measures (Bakker 2003).

The Department of the Environment, Food and Rural Affairs (Defra) established a Water Savings Group in 2005, with the aim of reducing the per capita consumption

of water in households. The Group was established to deal with the expected increase in water demand as a result of demographic change, new housing development and environmental change. Its Revised Action Plan identifies the need for “the development of key proposals for mandatory water efficiency targets for each company by 2010” (Defra 2007). Thus, although the water companies at present have a choice in how they pursue the goal of water efficiency, it seems likely that they will come under increased pressure to meet externally imposed standards. Further pressure arises from the 2009 Building Regulations requiring new homes to have a water use standard of no more than 125l/h/d (Environment Agency 2008). According to its Water Strategy for 2008 the Government welcomes voluntary water efficiency targets but will consider whether some form of water efficiency obligation may be necessary in the form of mandatory targets (Defra 2008).

In England, unlike Australia, the use of water meters is not yet widespread, so water companies cannot insist on payment by metered volume, except in certain circumstances such as ownership of a power shower or location in an area of water scarcity (Ofwat 2002). Water shortage was a particular concern following the drought of 2005, and in 2006, Folkestone and Dover Water became the first water company to seek water scarcity status, enabling it to force 65,000 households to install meters. According to the water industry body, Water UK, in 2007, 30% of dwellings in England and Wales had a water meter. Ofwat prefers metered consumption as the basis for water payment, rather than rateable property value, and notes that households without meters use on average 154 l per person per day, whereas households with meters use 139 l per person per day, or 10% less (Ofwat 2005). During the Yorkshire drought of 1995, Yorkshire Water’s share prices remained relatively high because its revenue, based on rateable value rather than metered volume sold, remained steady. It therefore had no financial incentive to conserve water by repairing leaks, estimated to lose more than 30% of the water put into supply (Bakker 2003:108).

In Australia, the federal political system allows for considerable variation between the States in the control of water. In general, the trend has been towards increasing privatisation, sometimes marked by service failures such as Adelaide’s 1997 “Big Pong”. This occurred after United Water International, formed by Thames Water and Vivendi, took over the South Australian government’s Engineering and Water Supply Department (Hartley 1997). The 1998 cryptosporidium outbreak in Sydney involved Australian Water Services’ (a French-American consortium) water treatment plant (McClellan 1998). Brisbane Water remains the closest to a public sector organisation, owned and operated by the city council. In contrast, the Melbourne, Adelaide and Canberra water utilities model their operations more closely on private firms (Wallace and Barrett 2007).

Australia has avoided the ‘extreme’ privatisation model characterised by sale of assets to the private sector. Nevertheless, public-private partnerships are common, and in fact many Australian water utilities display some of the characteristics which Bakker (2003) identifies in her ‘market environmentalist’ paradigm, in the sense that they are run as businesses to serve customers, sell water by metered volume, and are scarcity-responsive and demand-led. Vestiges of Bakker’s ‘state hydraulic’ paradigm can still be found, in the provision of water as a cheap resource which should be available to all citizens, and in the varying degrees of state control that remain in spite of a trend towards privatisation.

Water shortage is especially acute in Australia, the driest inhabited continent (ABS 2005:1). In January 2008, dam levels in Melbourne, Canberra, Brisbane and Perth were all below 50% capacity, and water restrictions were in force in all those cities and also in Adelaide and Sydney (Water Services Association of Australia 2008). The use of meters is widespread in all Australian capital cities except Hobart.

In a dry climate, such as Australia's, it is more likely to be cost effective to conserve water rather than to increase the supply (Wallace and Barrett 2007). However, water utilities continue to build new dams and desalination plants to increase water supply while increasing prices to consumers to pay for these improvements. This is driven, at least in part, by the pricing institutions (rules) where operating costs (such as water conservation expenditure) are recouped via higher prices but do not increase profits. In contrast, capital costs (building dams and desalination plants) add to profits via the pricing regulator's rate of return formulas for price setting. To encourage water conservation this incentive can be offset by regulations (institutions) which require water conservation; for example, Sydney Water's operating licence has an explicit mandatory conservation target.

5 Social Marketing of Water Conservation

Domestic water users in England and Australia are familiar with advertising campaigns urging us not to be drips, to stop the drop and to go slow on the H₂O. We are accustomed to the imposition of occasional hosepipe bans (in the UK) and to mandatory permanent outdoor water use restrictions (in many Australian cities). These are all manifestations of social marketing, defined by Kotler and Zaltman (1971:5) as "the design, implementation and control of programs calculated to influence the acceptability of social ideas". In this case, the idea that we should conserve the water supply. Social marketing "seeks to influence social behaviours not to benefit the marketer but to benefit the target audience and the general society" (Kotler and Andreasen 1996: 389). As so often with social marketing, the "product" water utilities are trying to "sell" is one with negative demand, as marketers are asking consumers to give up things they enjoy: deep baths, long showers, green lawns. As MacFadyen et al. (1999:5) point out, "in those situations where product benefits are intangible and relevant to society rather than the individual, ...social marketers must work much harder to generate a need for the product."

MacFadyen et al. (1999:6) argue that consumer inertia is a "very powerful competitor" to behaviour change. This suggests that marketers need to assist consumers to change their behaviour, a view supported by environmental psychologist McKenzie-Mohr (2005:19) who emphasises the importance of identifying the barriers to behavioural change and removing them if possible. These barriers may include "changes that need to be made in order for the desired behaviour to be more convenient". For these reasons, Wallace and Barrett (2005) advocate a four part strategy to promote and assist behaviour change through attitude change campaigns, legislation, water price increases and encouraging the use of water efficient technology by assisting customers to retrofit their homes.

Shove's (2003) work is useful in reminding us that consumer attitudes to water consumption are in fact highly variable over time. In discussing the escalation during the course of the twentieth century from the once- or twice-weekly bath to the daily power shower, she points to increasing demand for cleanliness, convenience,

speed and invigoration, while stressing that this occurred because of a combination of conditions that are themselves changeable. She concludes that more, but also less resource-intensive conventions of normal practice may arise in the future: in other words, the escalator is in fact potentially reversible, given consumers' ability to change what they view as normal.

6 Home Retrofitting of Water Efficient Technology

Household water conservation is heavily influenced by the type of household appliances used (Lyons et al. 2010; Zhang et al. 2010).

A home retrofit program may include various forms of water efficient technology, such as:

- Cistern bags/bricks to reduce the water used in toilet flushing (e.g. the Save-a-Flush and Hippo),
- Water butts/tanks for rainwater harvesting,
- Installation of flow regulators,
- Water-efficient showerheads,
- Dual flush toilets,
- Water-efficient washing machines.

The technology may be provided free, or at a reduced price. It may be installed by the customer, or the water utility may arrange for installation by a plumber. According to social marketing theory (see above), free installation by a plumber is likely to result in greater consumer acceptance, since this overcomes the barriers of cost to the consumer and consumer inertia (Wallace and Barrett 2005). In the UK, the Consumer Council for Water (2006) found that consumer attitudes to the retrofitting of water efficient devices were generally positive, but that "companies could take a more proactive approach...for example by visiting people's homes to fit...devices." This study also found that the cost of water efficient devices was a concern to 53% of consumers.

Strang (2004) points out that water users may be suspicious of the motives behind private water companies' exhortations to save water, when the companies clearly make money from what might be seen as a public resource. Howarth (1999:20) argues that since privatization, there has been a deteriorating relationship between many water utilities and their customers and "there is a feeling that the public are less prepared to respond to calls to reduce water use". There is an expectation that a private company should deliver what the customer wants. Howarth quotes Thames Water's view that "the adoption of a retrofitting policy would be promoting a policy of enforcement and confrontation with our customers".

However, according to Howarth (1999:20), "more progressive companies" have been conducting pilot studies of water conservation programs and "almost without exception the response to these studies has been positive, with willingness to participate as high from unmetered as metered customers". Howarth (1999:20) cites Smith of Anglian Water: "Customers are asking us to help them save water....".

Consumer involvement in installation forms a barrier to behavioural change. Installing a cistern device may require considerable consumer involvement: for example, Thames Water offers a Save a Flush or a Hippo depending on the capacity

of the cistern, but how many householders know the volume of their cisterns? English water companies provide mail-order discounted water butts, but connecting the water butt to the downpipe is the responsibility of the householder.

In this article our measure of water utility water conservation behaviour is based on a form of retrofit (water-efficient showerheads) that has been shown to be economically efficient in saving water, and well accepted by consumers in Australia and the UK.

7 Shower Retrofits

Water efficient showerheads have been identified by Barrett (2004) as an economically efficient water-saving technique. Stinchcombe et al. (2005) argue that water efficient showerheads can reduce both water consumption and greenhouse gas emissions. Critchley and Phipps (2007) cite a Liverpool John Moores University trial of shower retrofits which found that 8 out of 9 households trialling aerated showerheads asked to keep these efficient devices after the trial. The showerheads were effective in cutting flow rate by 28% (3.2 l/min) on average whilst improving or only marginally reducing customer satisfaction with the shower performance. These findings are consistent with an Australian retrofit pilot program by Gold Coast Water. Of 500 participants in the pilot, 92% responded that they were very satisfied with the overall experience (Gold Coast City Council 2005:3).

In Australia, bathrooms account for 20% of total household water use and 36% of all indoor water use (ABS 2004). In the UK, baths account for 15% of household water use, and showers for only 8% (Critchley and Phipps 2007). However, these authors state that a rapidly increasing number of customers own showers with a high flow rate, which together with high frequency of use, results in water and energy use by showers often being greater than for baths. Shove (2003) reports that ordinary power showers pump between 20 and 50 l/min. According to Critchley and Phipps (2007:2), water use for showers is expected to double over the next 20 years, and they conclude that “the major challenge for the UK [is] to implement actions that will influence water use in showers in order to minimise the potential for major increases in water and energy use in the future”.

In the context of this rise in demand, an effective household demand reduction strategy is desirable, and consumer studies in the UK and Australia suggest that this will include the retrofitting of water efficient technology such as low-flow showerheads and cistern devices, since these can be shown to reduce water consumption reliably over the long term. Ofwat estimates that a Hippo cistern device can save 18–36 l per household per day (Ofwat 2007a). The argument for rainwater tanks/butts is less clear, as the benefits will vary according to the rainfall in each area, and also according to individual household use: users who hoard rainwater will collect less than those who empty the tanks regularly (Ofwat 2007a).

Social marketing theory suggests that the retrofit will need to be done for the consumer free or at a nominal charge, thus overcoming the barriers of inertia and cost to the consumer. However, the more generous the program is to the consumer, the greater the cost to the water company: in Australia, Gold Coast Water estimated the cost per retrofit at AUD140 per household reducible to AUD120 by charging the customer AUD20 (Gold Coast City Council 2005:9). Ofwat (2007b) is clearly aware of the inertia problem: its Reporting Requirements Manual states that if water saving

devices are fitted by company staff, up to 100% installation rates can be achieved, if they are distributed at the request of the customer, installation rates between 60% and 70% can be achieved, and if distributed by blanket mail shot, companies should assume installation rates of 10–25%.

8 Methodology

To examine the hypothesis that government control (either by ownership or regulation) is likely to strengthen the effective marketing of water conservation (ideally through prominently advertised, free retrofitting by a plumber) we compared a measure of the commitment to water conservation with a measure of the balance between private and public institutions for 10 Australian and 10 English water utilities.

We use content analysis to extract a numerical measure (a ranking) from written records existing in a non-numerical form (water utility web sites). The content analysis covered all the major water utilities in Australia and England giving a complete sampling frame. Using content analysis on web based documents is a well established research technique (McMillan 2000; Weare and Lin 2000).

Websites form only one component of the communication strategies used by water utilities. Other means of communication may include brochures mailed out with bills, conservation projects with schools, advertising and publicity, and waterwise display gardens. However, websites are representative of the broader promotion of water conservation by each water utility, and are therefore an appropriate measure of each

Table 1 Ranking of selected urban water utilities

Utility	Private/public rank	Water conservation rank
Sydney Water	1	1
Brisbane Water	1	1
Hunter Water (NSW)	1	1
Gold Coast Water (Qld)	1	1
Hobart City Council	1	1
Actew/AGL (Canberra)	2	1
WA Watercorp (Perth)	2	2
SA Water (Adelaide)	2	2
Melbourne water retailers	2	2
Power & Water Corporation (Darwin)	2	3
Anglian Water (England)	3	3
Northumberland Water (England)	3	3
Severn Trent Water (England)	3	3
Thames Water (England)	3	3
United Utilities PLC (England)	3	3
Yorkshire Water (England)	3	3
Wessex Water (England)	3	3
Southern Water (England)	3	3
South west Water (England)	3	3
Folkestone and Dover Water (England)	3	3

Private/public rank: 1 all categories (asset ownership, planning, construction, operation and maintenance) are public, 2 mixed public/private, 3 full private ownership; Water conservation rank: 1 utility directly provides showerhead retrofit, 2 utility partly rebates consumer's showerhead retrofit, 3 no showerhead retrofit

utility's efforts in this area. Kallis et al. (2010) confirm that there are measurable differences in water conservation promotion on websites of private and public water providers. For the content analysis in our study the focus was on water utility promotion of shower retrofits.

Using content analysis to transform our web-based qualitative data into quantitative data required the definition of mutually exclusive and exhaustive categories. The specific categories used to measure water utility promotion of shower retrofits included the cost to the householder, availability, scope of features, advertising prominence on the website and convenience of registration (online/phone). In January 2008 data was collected on the frequency of each category in the documents studied from the 20 water utilities. This numeric data on frequencies was used to construct a ranking of water utility conservation behaviour (promotion of shower retrofits).

The water conservation behaviour ranking was matched with our ranking of the degree of public sector involvement each utility. The public sector involvement ranking was based on data on asset ownership, planning, construction, operation and maintenance (Wallace and Barrett 2007). This data included measures of both public sector ownership and regulation. The utilities surveyed and their rankings are given in Table 1.

9 Comparing the Results

9.1 Australian Water Utilities

Five out of ten of the Australian utilities offered shower *retrofit* programs, in which a plumber visited the home and installed a water efficient showerhead (and sometimes performed other water conservation services) for a charge ranging from free (for Sydney pensioners) to AUD39 (for Hunter Valley customers). In each case the retrofit program was advertised on the home page, with details accessible via one or two mouseclicks.

Four of the remaining five utilities offered the less effective shower *rebate* program (AUD10 per showerhead) and rebates for installing other water efficient technology such as washing machines or dual flush toilets. From a social marketing point of view, these rebates are likely to be less effective than the retrofits described above, because the rebate relies on the customer to buy and install (or pay a plumber to install) the water efficient technology. The rebate programs were less well advertised than the retrofits, with only two out of four advertised on the home page.

These findings were then compared with the level of public sector involvement (through government ownership or regulation) in each utility. Of the five utilities offering shower retrofit service, four out of five demonstrated the greatest public sector involvement. Four of the five non-retrofiters showed a greater emphasis on private sector involvement. These results are broadly consistent with the view that greater public sector involvement in water supply is likely to be associated with superior water conservation behaviours.

9.2 English Water Companies

All ten companies offered an almost identical program to householders: a free cistern displacement device and a rainwater collection butt for the discounted price of £39.95 (in the case of Southern Water, £34.99) including delivery. In every case,

the householder is responsible for installation. The offers were not advertised on the home page, but could be found under headings such as “environment” (Severn Trent) “top ten searches” (Southern Water) “waterwise” (Thames Water). Ease of finding information about the offers varied considerably. For example, Anglian Water has a “waterwise tips” button on the homepage so that one click leads to information about the water butt offer and free cistern device. Yorkshire Water is less direct: the searcher must mouse over the “Home” button on the homepage, then click “save water” to reach a page asking them to “click here to order free water saving goodies.” This takes the searcher to the home page of the “Be Cool” website, where the “Freebies” button leads to the Save a Flush order form, and the “Water harvesting” button leads to a page promoting water butts, with a further click needed to access further details of the offer, including price and a “Buy now” button.

The consistency of the companies’ water efficiency offers to households (free cistern devices, and water butts for the discounted price of £39.95) reflects Ofwat’s Water Efficiency Initiatives—Good Practice Register (2007a), a checklist of water efficiency options “which companies can choose to engage in if their specific situations are suited,” and Ofwat’s reporting requirements (Ofwat 2007b). It appears that English water companies generally offer the minimum water conservation measures recommended by the regulators. These findings are consistent with the hypothesis that highly privatised water utilities are likely to engage in weak promotion of water conservation, with a notable absence of assistance for installing low flow showerheads or other conservation devices.

Our content analysis of the website promotion of water efficiency measures undertaken by the highly privatised English water companies bears out Howarth’s (1999:22) comment that “the approach to the [water efficiency] plans does not seem to be ‘what can we achieve in terms of water saving’ but rather ‘what is the minimum we have to do to get the regulator off our backs?’”. This is also consistent with Sharp’s (2006) view that the companies’ efforts to stimulate water-efficient customer behaviour appear to be produced as a required response rather than a genuine effort to support customers in using less water.

Privatized English water utilities have not provided retrofitted low flow showerheads. This is consistent with the Australian evidence that the most privatized water utilities are least likely to promote retrofitted low flow showerheads. Comparing English and Australian water utilities it is clear that water conservation behaviour is stronger in the Australian utilities and that the Australians have stronger public sector involvement in utilities.

This finding is consistent with the work of Kallis et al. (2010) who compare six Californian private and public water providers. In that study the public providers make greater water conservation marketing efforts on their websites and are more likely to proactively seek voluntary water rationing early in a drought.

10 Control (Regulation) of Water Utilities

The institution of a high degree of private ownership and control is associated with a lesser commitment to water conservation.² Institutional economics can explain this

²While the coverage of water providers in Australia and England is comprehensive, 20 observations are insufficient for statistically significant inference.

through the private sector's incentive to maximise profits by minimising expenditure on demand management. Achieving water conservation behaviour by private utilities requires government involvement establishing institutions (regulations) such as mandatory targets in abstraction licenses.

The profitability of water conservation is governed by the institutions (rules) faced by the water utilities. New institutions such as penalties for missing mandatory water conservation targets (fines or revoking water abstraction licenses) or water abstraction charges will improve the profitability of water conservation behaviour by English and Australian water utilities and provide incentives for water conservation behaviour.

11 Further Research

There is scope for much larger-scale research (involving a wider range of countries) to investigate the arguments for and against the privatisation of water and other resources, and to establish the best institutional models for managing the water supply in a privatised environment.

12 Conclusion

The question of incentives for water conservation and their relationship to the public or private control of water provision gains added importance from the rapid growth of privatization and private sector participation in water supply around the world (Bakker 2003:188). Our analysis shows the degree of public sector involvement has a positive impact on the adoption of effective demand management measures.

This article identifies the institutions of ownership and control of water utilities as important to achieving water conservation behaviours. Where demand management is seen as socially desirable, there is a need for increased public regulation of domestic water provision and possibly increased public ownership.

Overall, this research supports the view that if privatization is to achieve socially desirable objectives, such as water conservation, there needs to be significant public control of the water utility, ideally in the form of specific mandatory targets.

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