SOAC 2013
Paper number: 105,
Title: Comparative policy analysis in Australian water and electricity demand management
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Comparative policy analysis in Australian water and electricity demand management

1. Abstract

Changing household consumption is one of the more difficult and contested areas of public policy making. This paper is specifically concerned with demand management and the variety of public policy approaches applied separately to residential water and electricity consumption. Using a comparative policy approach, a novel policy instrument typology is developed and used to review the current policy settings in Sydney, Melbourne and Canberra. Thirty four discrete policy instruments are identified in electricity demand management and thirty six for water. The development and application of this policy typology enables a number of evidence-based observations on the range and scale of current policy instruments. The implications for policy analysis, integration, learning and targeting are discussed in context of the current and potential policy debates.

2. Introduction

Within Australian cities the residential sector is the largest single user of water and electricity. It accounts for between 50 and 75% of urban use of these resources. As Australia grows, the majority of population growth will occur in cities and by 2056 over two-thirds of Australia's population is expected to be living in the capital cities (ABS, 2008), further concentrating environmental and resource issues.

Changing household consumption can involve changing very widely distributed and very personal behaviours embedded in technology, private and public lives (Shove and Chappells, 2001). Government policy making to this end is difficult and sensitive for politicians and voters, let alone without the surrounding policy debate by scholars and behavioural scientists. Much of the debate in both water and electricity can be characterised as a contest between singular policy and technical responses (Dovers, 2008). For example, in both water and electricity sectors smart meters for in-home displays or advanced metering infrastructure are heralded as solutions to sustainable household consumption (IEA, 2011; AEMC, 2012a & b; Liu *et al.*, 2013). Scholars may consider the merits of policies, the discourse surrounding their use or their ability to adapt to changing circumstances (Head, 2012), however there has been limited thorough review of the policy settings in either water or electricity demand management.

Demand management is defined broadly as reducing or delaying consumption. Demand management includes demand response, efficiency and conservation but not distributed generation (where there is export to the grid). Demand management policy is any attempt to effect this change, and which is implemented through policy instruments. Policy instruments are programs and measures, the building blocks of government policy (Dovers, 2005; Rose, 2005).

We have within water and electricity a rich tapestry of government programs and measures aimed at changing household's consumption. David Crossley (2011) and the AEMC *Power of Choice* (2012b) reviews provide informative summaries of the institutional settings in place for encouraging retail electricity policy in the National Electricity Market (NEM), but take a narrow view of demand management and the scope of current policy settings. Within the water sector, the National Water Commission reviews the performance of water utilities annually and which includes some measures of customer water costs (NWC, 2012). The Productivity Commission recently reviewed the urban water sector (PC, 2011) but took a limited scope of analysis of policy settings for demand management. The range and nature of government intervention in household water and electricity consumption has not been reviewed in a manner that can inform the current academic debate and future policy making in these critical sectors.

The study locations used for this paper are the cities of Sydney, Melbourne and Canberra. These cities have experienced a proliferation of policy making for water and electricity over recent years. Government policy is often developed alongside, or implemented by, the water and electricity retailers and distributors however this analysis will focus on the Commonwealth and state government policy for the sake of clarity. Local government policy examples are referenced where relevant but are not reviewed in systematic form.

The paper is structured as follows: section 3 introduces the policy framework, section 4 and 5 review residential electricity and water demand management policy respectively and section 6 synthesises and discusses the findings.

3. Comparative policy analysis and policy frameworks

This section details the policy framework used in this study in context of relevant policy studies and behavioural science literature. Following Rose (2005) comparative policy study and policy frameworks are used to draw 'policy lessons' in subsequent sections. Policy settings are observed through review of policy announcements, public reports, annual reports, reviews by statutory authorities, and academic and media commentary.

Policy frameworks

General use policy instrument typologies, that is, systems of categorising types of policy instruments or government programs, were pioneered by Christopher Hood's resource based typology of government tools as Nodality, Authority, Treasury and Organisation (1983). Arie Freiberg's (2010) more recent general use typology has informed our understanding of the scope of government policy instruments in Australian legal contexts. Hood and Freiberg's typologies are intended for all-purpose use, and though they provide sound foundations they overlook many of the nuances associated with policy making for residential water and electricity systems and human behaviours. Ayres and Braithwaite's (1992) policy framework was an early and useful means of matching business behaviour and regulation type, but the behavioural types are unsuited and unrecognised in human behavioural science.

Independent of policy studies, different behavioural sciences disciplines have described categories of policy instruments conform to their particular model of behaviour. Broadly representative of the economic approach, Olmstead and Stavins (2009) have categorised policies as either price or command-and-control. Abrahamse *et al* (2005) focused on feedback strategies for households, of much interest to social psychologists, but acknowledged monetary rewards and regulation as other policy options. Social practice theorists, such as Strengers (2011), have given a somewhat dichotomous view of policy making in this area as either individual-focused or whole-of-system changes to technology, practice and culture. Wilson and Dowlatabadi (2007) have broadly summarised the differences between these disciplinary approaches to energy efficiency, even if policy instrument definitions and conceptions have been made without reference to policy studies literature. These systems of categorisation are adequate for analysis within discipline but inadequate for policy studies purposes.

A policy studies approach would view each of the behavioural sciences as different epistemic communities seeking to influence the policy debate (Howlett and Ramesh, 2003). Their efforts are valuable to identify targets for government policy and help understand the mechanism to be addressed, so called 'problem diagnosis' (Abrahamse et al., 2005). Unfortunately like western and eastern medical practice, their advice to the patient can't always be reconciled. Thus a policy typology will be highly useful if it incorporates the lessons from behavioural science and allows policy makers and behavioural scientists to use a common terminology. The next section provides an outline of such a framework.

A policy framework for demand management

Following Rose's concept of learning from parallel policy (p19,2005), a policy typology is used as a framework to identify discrete instruments used in both water and electricity sectors. The criteria used to identify separate policy instruments are the *target*, *scale* and *instrument category*. The *target* is the

desired change in household consumption volumes, practices, technology or other aspect of consumption. *Scale* is a measure of the number and composition of parties necessary in implementing the policy instrument, from individual and basic instruments through to societal and complex instruments. The *instrument categories* are the well recognised instrument forms of regulation, economic incentives, educative, self and voluntary regulation and private regulation. A summary of instrument categories across scales is shown in Table 1.

Table 1. Policy instrument definitions and examples across scales (targets not shown)

	Definition	**Individual scale (major examples)**	**Community scale (major examples)**	**Societal scale (major examples)**
Primary actors involved	Individuals and groups who are directly involved in the actions of government	Individuals and households, single government departments, utilities	Communities and groups of households, multiple government departments, utilities	Cities and towns, manufacturers, retailers, marketers and advertisers, multiple levels of government, utilities
Economic instruments	Financial incentives	Prices, taxes, subsidies	Property rights, negotiated	Markets
Educational instruments	Free information to increase knowledge of resource and situation, and self awareness	Metering, personal consumption feedback, home audits, general advertising	Metering and comparative consumption amounts, display and demonstration houses	Comparative performance and consumption, school education programs, appliance ratings (eg. smart water labels)
Regulational instruments	Rule making abilities of government	Behavioural restrictions	Per capita consumption limits	Regulation of technology supply industry (importers, manufacturers, retailers)
Self and voluntary instruments	Regulatory approaches initiated and undertaken by the regulated party, with and without assistance of government	-	Co-management, Community Based Social Marketing	Citywide voluntary targets for consumption (eg. T140, T155), industry self regulation
Private regulation	Regulation of non-government parties by non-government parties	-	-	Professional regulation, industry regulation of plumbing codes

Well known to many policy studies in conservation and efficiency (Gellings and Chamberlin, 1988; Vickers, 2001; WSAA, 2008), but absent in commentary by Wilson and Dowlatabadi (2007), is the essential step of identifying a target for policy action. In the case of demand management in the residential sector, a target can be a certain technology or behaviour, a class of behaviours or technologies, practices, habits or resource volumes. It is often engineering or behavioural sciences that identify the target through empirical means or 'problem diagnosis' (Abrahamse et al., 2005). The behavioural discipline used for problem diagnosis usually dictates the target of policy action.

The scale of policy action is measured by the number and type of parties involved in delivering the policy 'message' the household. Once a target has been identified, policy analysis would incorporate an analysis of the governance networks and the parties necessary to be involved (Bridgman and Davis, 1998; Gunningham et al., 1998; Dovers, 2005). At each scale of policy action, the available instrument categories change as do the discrete instrument within each category (see Table 1). The use of scale as criteria in this typology incorporates the findings of social practice theory and socio-technical studies that consumer choice is often externally structured by social and technical systems (Bijker *et al.*, 1987; Shove, 2003), and thus attempts to change individual consumption behaviours may need to address the broader system structures. Though systems of provision and regulatory networks are identified as important to policy distinction and implementation, scale has yet to be used in policy frameworks for this area.

The preceding steps in the policy typology introduce a the conception of target and scale into policy making, however the choice of instrument categories draws on the work of previous policy scholars. The policy instrument categories selected are: regulation, economic, educative, voluntary and self regulation, and private regulation (definitions are available in Table 1). These categories reflect those identified in previous energy and water policy studies (Gouldson *et al.*, 2008; Haney *et al.*, 2011).

Instrument categories with labels of 'regulation' and 'markets' are actually broader categories within which multiple discrete instruments exist (Dovers, 2005). Incorporating scale as a step in the policy analysis enables the inclusion within economic instruments of both the price set by government and the price set from a market. Scale determines the use of each: taxes and prices can usually be raised directly, but creating a market involves many actors and can systemically change the nature of the good and the behaviours associated with it (Sandel, 2012). Regulation as an instrument can become more nuanced as the scale of action increases: governments may decide not to regulate household behaviour but regulate the technology options available to households instead. Necessary generalities have to be made however. For example, behavioural restrictions in water use by households are very variable in their rules, stages, triggers and levels of service (Chong *et al.*, 2009) however they are broadly defined here as one regulatory instrument at an individual scale.

4. Australian Residential Electricity Demand Policy

This section summarises the key policy initiatives for electricity demand management affecting households in Sydney, Melbourne and Canberra. Policy is reviewed by the level of government process in which it originates. COAG and intergovernmental processes are treated as a separate source of policy. Australian electricity consumption over the past forty years has grown significantly, and NSW has been a significant driver of the total (Figure 2).

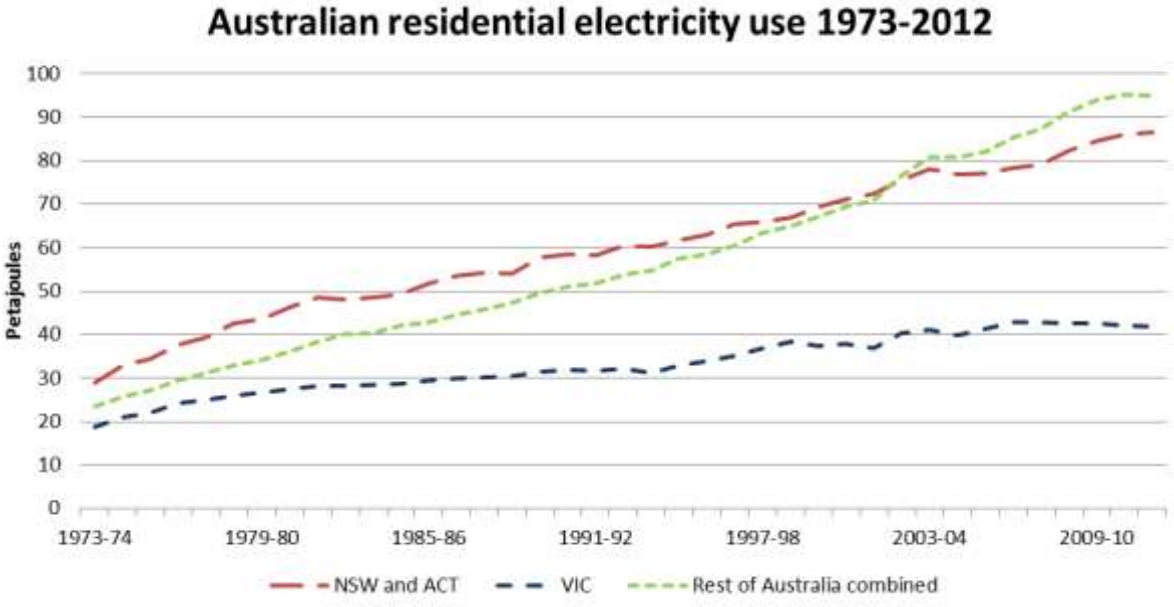


Figure 2. Residential electricity use in Australia, NSW and ACT, and Victoria. Source: BREE (2013)

COAG and intergovernmental processes

Cutting across all government levels, the Council of Australian Governments (COAG) process has developed a number of intergovernmental agreements relevant to household energy efficiency and conservation. The most important current intergovernmental agreements include the National Strategy on Energy Efficiency (NSEE, 2008) and the National Construction Code (NCC, 2011). Of lasting importance has been the National Electricity Market (NEM), created in 1995, and whose establishment created a number of independent institutions for regulation and operation, which in turn have shaped policy towards household energy efficiency.

Much of the COAG-driven change to demand management has come though the Ministerial Council on Energy (MCE) and NEM legislation. Agreements on the National Energy Consumer Framework (NECF, 2011) and installation of smart meters in residential buildings have both been developed through ministerial council processes. The institutions created to manage the NEM, such as the Australian Energy Market Operator (AEMO), Australian Energy Market Commission (AEMC) and Australian Energy Regulator (AER) among others, have contributed to the debate and policy for demand management. Due to its ability to regulate participants in the NEM, such as electricity retailers, the AEMC has the ability to indirectly influence household demand management policy. So far it has not intervened in policy however the recent *Power of Choice* (AEMC, 2012b) review has promoted the use of interval metering and variable pricing as the primary tools for changing household consumption.

COAG has been largely successful in driving substantial reform in Australian energy markets and energy efficiency. However not all of the agreed actions have been implemented. For example, despite COAG agreement in 2009, Australia does not have mandatory energy efficiency disclosure in the sale and lease of houses (action 42.4, COAG, 2009).

Commonwealth Government electricity policy settings

The release of the Commonwealth Government's *Energy White Paper* (DRET, 2012) gave a sufficiently broad encapsulation of the policy priorities of the previous Labor government. Whether these priorities remain under the Coalition is yet to be seen. This section confines itself to a review of the most prominent policy instruments currently used by the Commonwealth Government. Large scale technology trials supported by the Commonwealth, such as *Smart Grid, Smart City* and the *Solar Cities* program*,* are not considered policy instruments for household behaviour change because they are intended as short term trials in specific localities.

The National Construction Code (NCC, comprised of the Building Code of Australia and the Plumbing code of Australia), though agreed and supported by cooperative state and territory legislation, is maintained by the Commonwealth Government. The most recent and important updates have been 2010's update to include energy efficiency and 2011's inclusion of the Plumbing Code of Australia. The NCC sets the desired outcomes for housing standards, is prescribed in technical manuals of States and enforced by local governments through the Developments Approvals process. .

As with the NCC, the Minimum Energy Performance Standards (MEPS) for appliances and the National Electricity Retail Law (NERL) required passage of coordinated and complementary commonwealth and state government legislation. For MEPS this legislation was necessary for the states to confer certain regulatory functions on appliance standards regulator, which is administered by the Commonwealth Government in concert with industry representatives. For NERL, the legislation enabled consistent business practice across the NEM. Under NERL the AER is to provide a price comparator and educational website for household energy use (energymadeeasy.gov.au) and all electricity retailers are to provide comparative consumption information on energy bills.

The Commonwealth-developed rating tool for household energy efficiency (NatHERS) is also widely used but it is voluntary and the selection of NatHERS over others (such as NSW-developed NABERS or the privately developed Green Star accreditation) is still subject to the preferences of state and local government.

Despite the failings of the Household Insulation Program and the Solar Homes Scheme, the Commonwealth Government has persisted with financial assistance to change household consumption. Small Scale Technology Certificates (STCs) and Solar Credits have been used to increase the penetration rate of energy efficient and distributed energy generation devices through the creation of a market for energy efficiency.

State government electricity policy settings

While much of the framework development for the national electricity market has occurred at COAG level, states and territories still exert considerable policy making leverage in electricity markets within their jurisdictions. This occurs through state level energy efficiency trading schemes, state interpretations of the Building Code of Australia, home energy rating schemes, and education through schools, websites and mail outs.

Similar to the Commonwealth Government's STC scheme, NSW, Victoria and ACT all have established energy efficiency trading schemes with the financial obligation largely imposed on electricity retailers (Crossley, 2011). These schemes involve the creation of efficiency certificates upon an eligible action, which are purchased by primarily electricity and energy retailers so as to be surrendered back to government on an annual basis.

Partially deregulated electricity retail markets have provided a myriad of supply contract options to households. Victoria has fully deregulated the price of electricity, in accordance with COAG agreements, however the ACT and NSW have retained government price regulation standing contracts (p.160,DRET, 2012). In all study locations electricity retailers are allowed to offer unregulated contracts to households that may offer economic incentives to reduce peak or overall demand. These contracts offer demand management incentives to households beyond the standard government regulated contracts.

Each of the Australian states and territories has passed legislation to align construction codes with the NCC, however their implementation and interpretation differs in each jurisdiction. NSW has the BASIX process for development approvals. The Victorian government uses a star rating system for building standards, which has only recently been brought it into line with the NCC.

The rating of energy efficiency of houses sees similar issues of parallel methods under different names. NSW developed and uses the National Australia Built Environment Rating System (NABERS) for energy and water efficiency ratings, though it is now maintained by the Commonwealth Government alongside the NatHERS system for energy efficiency ratings. Only the ACT government requires disclosure of energy efficiency ratings of residential buildings during the sale process.

NSW, Victoria and the ACT all have websites and mail-out programs to households to educate and promote energy efficient behaviours. NSW, Victoria and ACT all have government school sustainability education policies and curriculum which include energy use, efficiency and conservation to varying depths. There are no restrictions on behaviours and there are limited financial incentives to change technology or behaviours outside of assistance for low income groups.

Local government electricity policy settings

Local government can play a significant role in energy planning (Pasimeni *et al.*, 2013). Within the study locations, the major area of local government involvement in demand management has been through the inclusion of energy efficiency criteria in Development Approvals. These have been used primarily as a regulatory instrument but have found additional use as an educative instrument where an assessment is required for home sales but no minimum standard is to be met. Some local governments have acted independently (such as Waverley Council), while other local governments have formed partnerships to create their own sustainability assessment methods and accreditation (such as the STEPS program used by City of Melbourne and other Melbourne councils). There is substantial variation in local government policies for regulation, education and private and voluntary regulation for energy efficiency in their communities.

5. Australian residential water demand policy

This section summarises water demand management policy currently in place in Sydney, Melbourne and Canberra. As per the previous section, it reviews policy settings by government level.

COAG and intergovernmental processes

At the COAG level, much of the activity for residential water policy and reform has occurred through the National Water Commission (NWC) under the auspices of the National Water Initiative (NWI). The NWC's ongoing role in independent advisor to COAG on urban water is a much reduced role from its pre-2012 role as administrator of the Commonwealth Government's initial $1.5 billion funding of the NWI. Through the initial funding for the NWI, a number of educative instruments were funded for household water demand management. One of the most recognisable instruments is the Smart Approved Watermark Labelling Scheme (Smart Approved WaterMark, 2011) for labelling of water efficient devices and which remains the eligibility criterion of many products in state and territory government rebate programs.

Other less apparent intergovernmental processes that have occurred outside of the NWC are the Water Efficiency Labelling and Standards (WELS) scheme and consolidation of the Plumbing Code of Australia into the National Construction Code (NCC). Both the WELS scheme and NCC involved the passage of complimentary and cooperative legislation at Commonwealth and state and territory levels (Guest, 2010). These two changes do represent significant intergovernmental steps in the process of demand management through technological change.

Commonwealth Government urban water settings

Since the end of the drought on the east coast of Australia in 2010, the Commonwealth Government has largely removed itself from urban and residential water management. *Water for the Future* (2010) was the last major urban water policy announcement, though there has been ongoing institutional reform in urban water. The main policy mechanisms of Commonwealth Government involvement in household water use are through administration of the WELS scheme and the National Construction Code. Rainwater tank subsidies are no longer offered by the Commonwealth Government. There are a number of websites with information on water saving, such as livinggreener.gov.au .

State government urban water settings

Substantial variation exists between Sydney, Melbourne and the ACT's approaches to water cycle management in urban areas. However their choices of policy instruments for residential demand management are similar in a number of ways.

NSW, Victoria and the ACT all have building codes that require additional water efficient design aspects beyond the basic NCC. For example, the ACT has an amended plumbing code that ensures shower and laundry wastewater is separated and available for reuse as greywater (ACT Government, 2013). Under the BASIX system, NSW's building code for new houses includes provision for rainwater tanks or greywater systems. Victoria's plumbing code, and in particular Melbourne-specific requirements, may change as a result of the water sensitive urban design requirements for *Melbourne's Water Future* plan (OLV, 2013).

The Victorian government has extended many of the rebates for water efficient appliances that were common during the Millennium Drought (1996-20010). However current NSW and ACT governments offer very limited economic support for water efficiency. For example, the NSW government's free water efficiency home audits (Waterfix) has been combined with the debtors program (BillAssist) to form the PlumbAssist service for debtors in distress, and thereby reducing bad debts for Sydney Water Corporation.

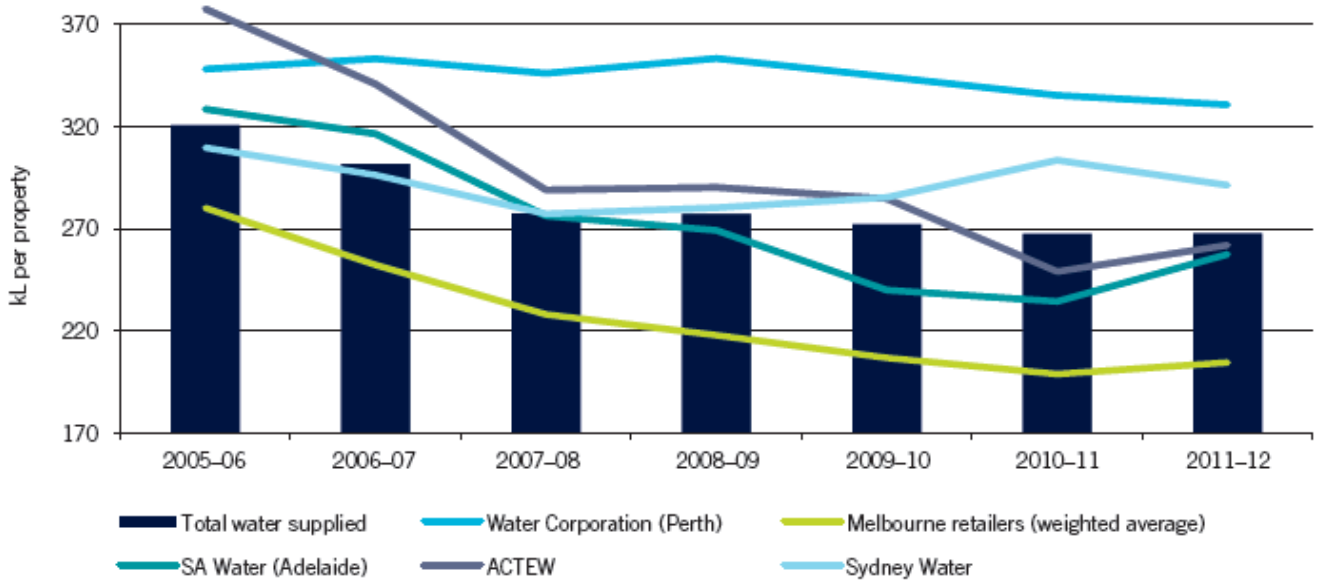
As with energy, NSW, Victoria and ACT retain education programs on water efficiency and conservation through mail outs and websites, and education policies and curriculum for government schools.

Though the Millennium Drought ended in 2010, Melbourne, Sydney and Canberra all retain behavioural restrictions in the form of Permanent Water Saving Rules (PWSR) or the like. These are primarily targeted at the outdoor behaviours such as garden watering and car washing. As evidenced by drought response plans, behavioural restrictions in response to acute and extended drought remain the policy preference despite the remonstration of economists (Grafton and Ward, 2008).

Sydney Water is required under its operating licence reduce or hold steady household water consumption at under 311 litres per day per person (Sydney Water, 2012). Taken at face value, this might appear as an alternative to the energy efficiency trading schemes imposed on the electricity retailers. However, Sydney Water Corporation's the target was set two years after it already been had been surpassed (2008) and well above the actual consumption at the time and since. Similarly the ACT targets set in 2004, a 12% reduction by 2013 and 25% reduction by 2023, were soundly achieved by 2009 (Figure 3). Efficiency targets have not been included in the proposed new ACT water policy *Water for the Future*.

Actual water consumption in the study cities of Canberra, Melbourne and Sydney has reduced significantly from the early 2000s and has not returned to pre-drought levels (Figure 2). A variety of lasting technological, behavioural, environmental, social and cultural explanations can be found. The use of government policy to harness these factors should be acknowledged but the relative and absolute extent of policy effect on short and long term consumption continues to be debated.

Figure 3.7: W11 Total urban water supplied, 2005–06 to 2011–12 (kL/property)



Note: Chart shows the weighted average for those utilities that reported data in all seven years for all indicators. The weighted average is calculated by dividing total urban water supplied by total connected properties.

Figure 2. Water supplied per connection in Sydney, Melbourne and Canberra. Note this includes business consumers as well as residential customers. Source: NWC (2012)

Local government water policy settings

As with energy efficiency, local government has intervened in household water efficiency through the development approvals process. This is often through the same tool that is used for energy efficiency, such as NABERS, Green Star or council specific assessment tools like STEPS. As with energy, there is a large variation in local government policy activity in education and regulation of household water efficiency and conservation.

6. Discussion and conclusion

This paper has developed and applied a novel policy framework to analyse the range and nature of policy instruments for water and electricity demand management currently in place in Sydney, Melbourne and Canberra. The results inform and contribute to debates about the selection, mix and targets of policy instruments for demand management.

Four findings and their implications for policy debates are discussed in this section. The first is that a large number of discrete policy instruments are currently used in water and electricity demand management. The second is that the current policy instrument mix operates across scales and involves a large number of parties outside of government and households. The third is the identification of policy learning opportunities between sectors. The final finding is that the majority of attention is focused on the physical determinants of demand: appliances and building stock.

The first finding is that there are at least thirty four discrete policy instruments for electricity demand management and thirty six for water identified in this analysis of policy for Sydney, Melbourne and Canberra. This is a large and combined use of instruments by a variety of governments that are addressing a range of targets towards what might broadly be called demand management.

The range of policy instruments identified in this study has implications for further studies that seek to evaluate policy instruments against criteria of effectiveness, efficiency or equity. Analysts seeking to evaluate policy impact on consumption are already plagued with collinearity of policy use within a single level of government (Syme *et al.*, 2000). In this study we identify that there are multiple levels of government policy in action and which may impact the results of policy evaluations and assumptions of pareto efficient changes to policy (Lipsey and Lancaster, 1956). The constraints of multiple existing government interventions may need to be considered before making claims of the desirability of certain policy instruments over others.

An important aspect to complementary policy instrument mixes is that they do not create perverse incentives (Gunningham *et al.*, 1998). Given the number and variety of instruments identified here, it does not appear that there is a great level of coordination of instrument use between and within governments within sectors. This is supported by qualitative review of policy documents. For example, the Commonwealth Government's 2012 *Energy White Paper* did not identify the National Construction Code or state government energy efficiency trading schemes as factors shaping electricity demand. The observed reality of policy integration within sectors does not bode well for hopes of integration between energy, water and other sectors (Hussey and Pittock, 2012).

The second observation is that policy instruments for changing household consumption are operating at multiple scales and involve numerous actors (Figure 3). This finding is interesting in and of itself when one considers the broad debate between behavioural disciplines that focus on individual choices (economics and psychology) and disciplines that have examined the social structuring of choices outside the individuals own choice (such as sociology). Claims that policy makers are focusing on individuals and individual choices only (Sofoulis, 2005) are not borne out by this analysis. Political rhetoric may identify individual as the locus of action (Gyberg and Palm, 2009), but the underlying policy layout appears to consider both individual and socially structured choices.

The third finding from this study is the identification of opportunities for policy learning between energy and water sectors. We find that policy making for electricity demand management is more focused on the socially structured choices of consumption: the majority of policy attention has been focused on industry regulation and efficiency trading schemes as a means of raising household electricity efficiency. In contrast, water retains a greater proportion of government policy instruments that directly interact with the individual and household. Drawing policy lessons on the process, effectiveness and efficiency of these diverse approaches may benefit both water and electricity management. Another learning opportunity is revealed in the difference between widespread use of market based schemes for energy efficiency, such as the STCs pursued by state and Commonwealth Governments, and their entire absence in the water sector. Another opportunity lies in potentially applying city-level water resource planning tools to city level electricity planning (which so far doesn't publicly exist). Differences in policy approaches may result from different geographic ranges of water and electricity grids (catchment-based vs ostensibly national), but it does not explain the different policy approaches adopted by the same level of government.

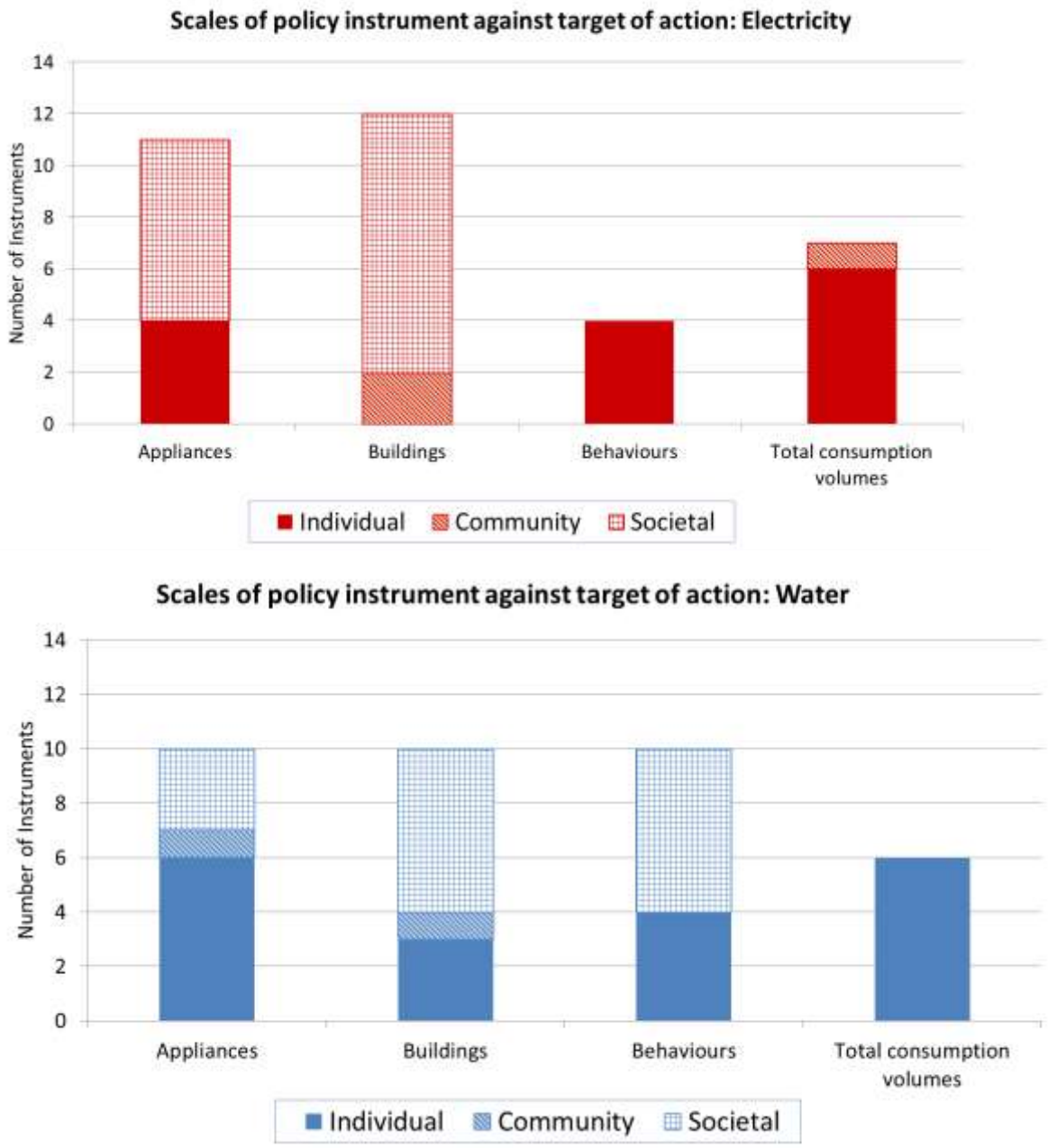


Figure 3. Scale of policy instrument use in water and electricity across a number of targets for change (appliances, building stock, behaviour and consumption volumes).

The final observation is that the majority of current policy attention is focused on the appliances and building stock. Policies directed at changing technology outnumber those aimed at changing usage behaviour and volume consumption on a 2:1 basis for electricity and 5:4 for water (see Figure 4). This may reflect the current lack of political interest in changing actual behaviours, which can be quite personal and sensitive (Dovers, 2008), while long term water and energy efficiency is pursued through gradual technical change.

The final observation begs the question: who is making policy? The COAG and intergovernmental processes over the past decade have allowed the Commonwealth Government to enter into realm of the building and appliance standards and ratings. It has achieved this through cooperative legislation with states that allows the Commonwealth Government to set performance standards and for states to interpret and implement these. This is independently occurring in both water and electricity.

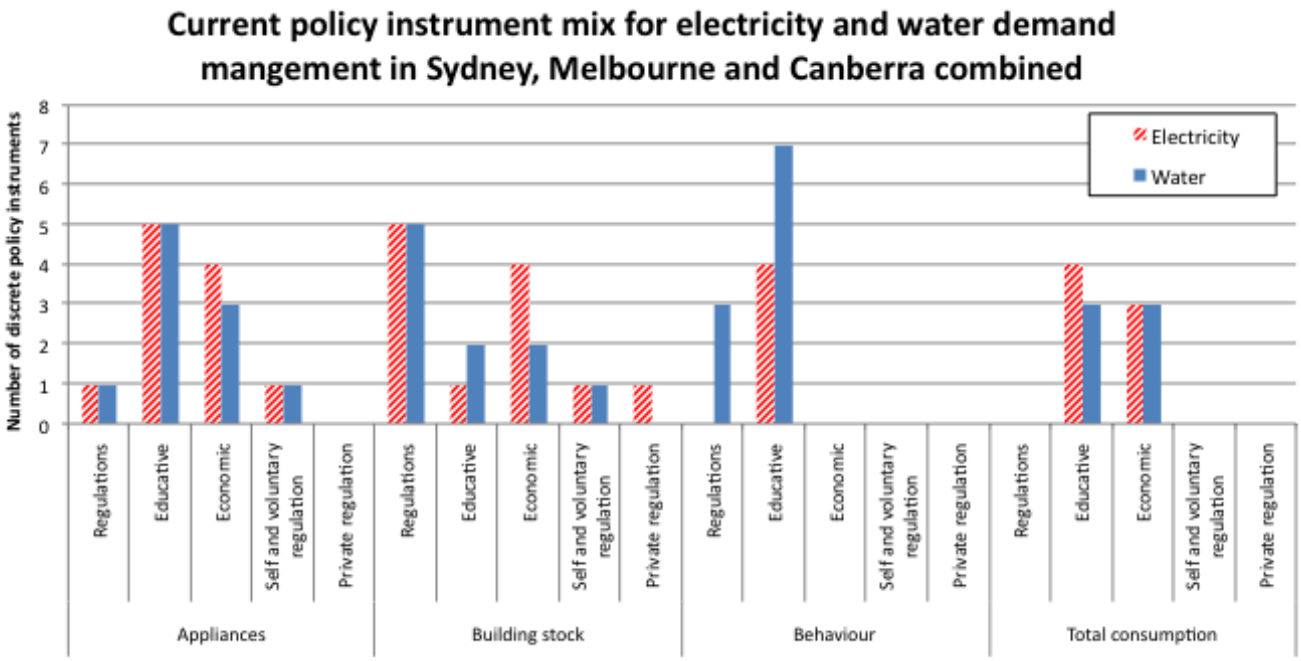


Figure 4. Dispersion of policy instrument categories against targets. Policies that target technology outnumber other policies on a 2:1 ration for electricity and 5;4 ratio for water.

Commonwealth Government leadership may be an essential enabling step for technologically harmonious demand management policy but it may also lead to unpredictable or unresponsive policy. There are a number of outstanding implementation actions for states in water and energy that are likely to continue incomplete in the absence of Commonwealth leadership. Water and electricity policy reform may become embroiled in broader negotiations commonwealth-state issues (such as GST, environmental approvals etc) and the results may be unpredictable in timing or conclusion.

Standards and efficiency outcomes set at a national level may be unresponsive to local design interests and capabilities. A strong uniform National Construction Code is usually cited as a tool to reign in local governments and to some degree, state governments from parochial and expensive design requests (PC, 2004; CIE, 2012). However local desires and capability for urban design may change over time and between places. For example, the transformative change in Melbourne's water resource management is expected to require variation to the National Construction Code (p48, LVMAC, 2011).The extension of Commonwealth Government policy making power may bring economies of scale but at the cost of reduced local flexibility and responsiveness. This may lead to a lowest common denominator housing standards: low minimum standards and progressive local governments unable to deliver higher standards in suburbs which can afford and desire them.

The findings of this paper have informed and contributed to a number of ongoing policy debates on policy analysis and policy targets. It raises new questions on policy learning between sectors and responsiveness of housing standards for energy and water efficiency across government levels. Finally, it has identified a number of further lines of inquiry that are noted here in closing. In both water and electricity there remains very limited use of community scale instruments, despite much academic interest in their use. The history of policy instrument use in demand management has not been investigated with this policy framework, but may inform future government responses to crises and drought. Finally, a systematic analysis of the scope and scale of policy making by local government may well complement this analysis and identify further policy learning opportunities between water and energy sectors and between government levels.

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