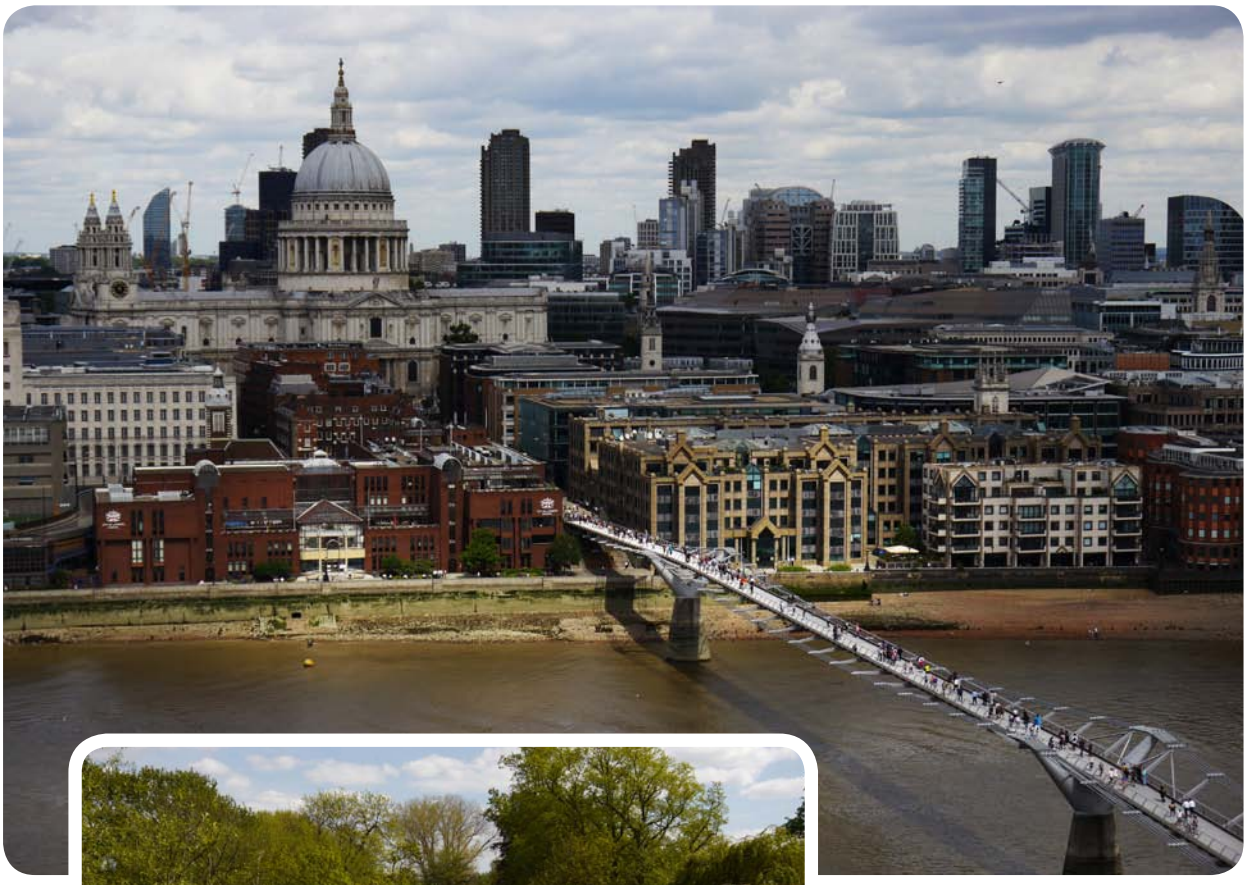
PRIMER

Water efficiency in the public sector

The role of social norms

Kevin Grecksch & Bettina Lange



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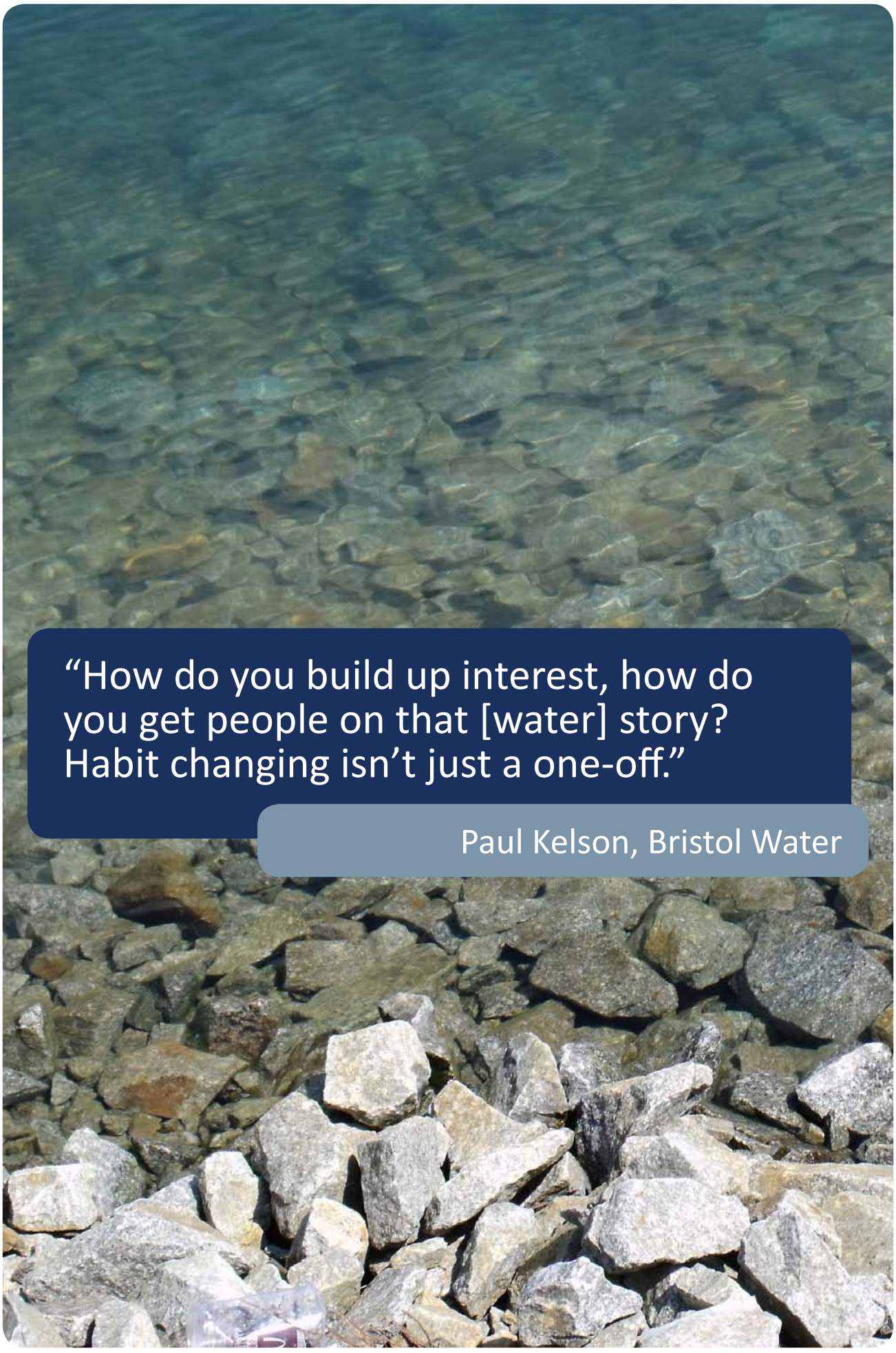


“How do you build up interest, how do you get people on that [water] story? Habit changing isn’t just a one-off.”

Paul Kelson, Bristol Water

Chapter 1

A different way of building water efficiency campaigns: harnessing social norms

This Primer presents findings from academic and grey literature and previous case studies about the potential of water efficiency campaigns to contribute to water saving in the UK within public sector and large organisations - universities, schools, hospitals, council buildings, offices and housing associations. These organisations provide significant untapped potential for water saving by virtue of their size and/or their nature as public organisations.

We focus on the role of social norms, i.e. community standards, to promote the uptake and effectiveness of water efficiency campaigns. Hence, this Primer is intended to make a case for water efficiency campaigns and to provide building blocks for developing such campaigns. We seek to reach in particular:

- water resource managers, and environmental or sustainability managers in large, including public sector organisations who want to save water

- water resource managers and water efficiency managers in water companies and the environmental regulators, such as the Environment Agency, Natural Resources Wales, the Scottish Environment Agency and the Northern Ireland Environment Department

- non-governmental organisations active in the field of water resources management, such as Waterwise, the Rivers Trust, the Canal and Rivers Trust, Friends of the Earth,the World Wildlife Fund for Nature, and the Catchment Based Approach (CaBA).

We start from the fact that water scarcity and drought are increasingly occurring also in the UK.

Box 1

The bigger picture – drought and water scarcity in the UK

"Drought is a recurring feature of the UK climate" (Marsh et al., 2007, p.88) and the UK experienced a recent dry spell during the summer 2018 (Hannaford, 2018). The last drought event was between 2010 and 2012 (MetOffice, 2013), before that 2004-2006 (MetOffice, 2016) and 2003 (MetOffice, 2013). Other major drought events occurred in 1995/1996 and 1976 (Marsh et al., 2007). The UK Climate Change Risk Assessment 2017 attributes a "medium magnitude now" but a "high magnitude in future" for the "risk of water shortages in the public water supply, and for agriculture, energy generation and industry, with impacts on freshwater ecology" (Committee on Climate Change Risk Assessment, 2016). The overall assessment is that more action is needed in this area.

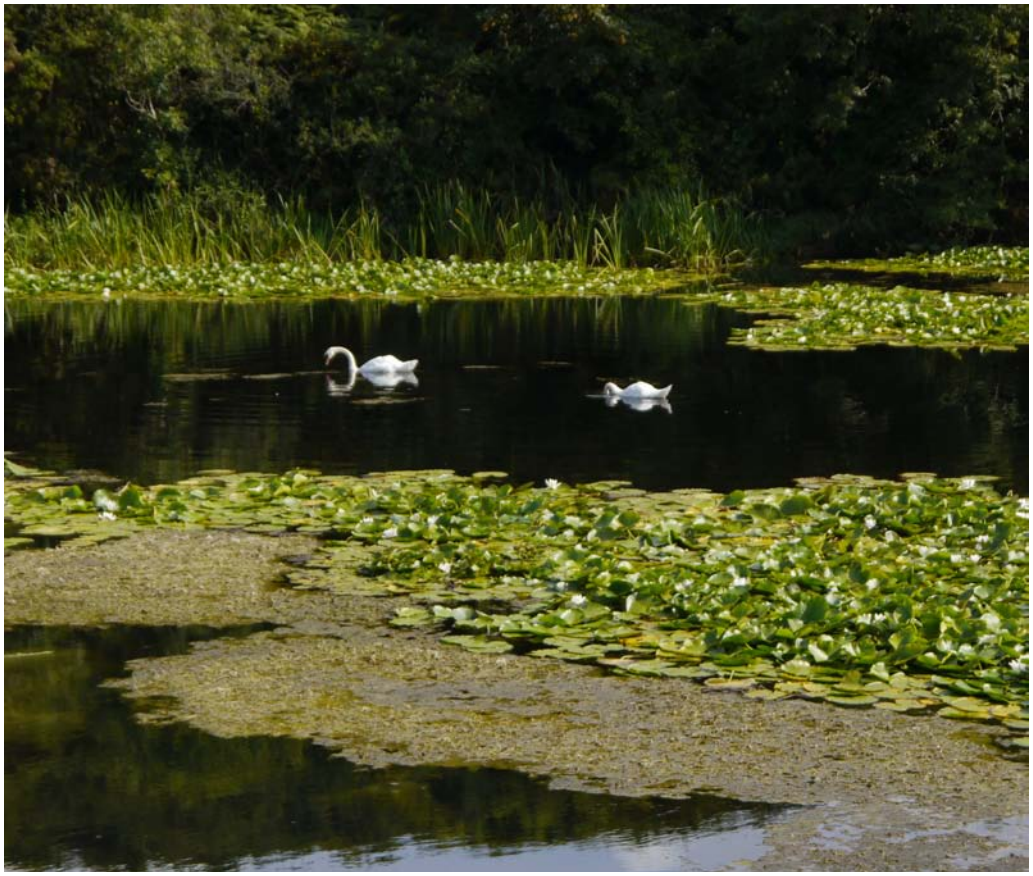
Further Reading:

Cook, Christina. (2017). Drought planning in England: a primer.

1.1 Water efficiency at the heart of water resources management

Water efficiency is a cornerstone of contemporary management of water resources and public water supply. It refers to all efforts to reduce wastage of water. The United Nations Sustainable Development Goal 6 'Clean Water and Sanitation' aims to:

> *"[by 2030], substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity" (UNDP, 2018).*



1.2 The power of social norms

We consider engagement with social norms as key to devising and implementing successful water efficiency campaigns. By social norms we mean value commitments that shape water use behaviour. These can be community standards held by a group of water users in relation to efficient water use.

Social norms have become the tool of choice for today's behavioural policy-makers. The inclusion of a social norm in a message can be a way to encourage citizens to carry out a wide range of socially desirable acts.

According to Lede & Meleady (2019, p.2) social norms serve as cues that help people make sense of social situations (especially those characterised by high uncertainty or ambiguity) in terms of how people are expected to behave. They motivate action by providing information about what is likely to be effective and adaptive.

Box 2

Social norms

Posner (2002, p.34) delivers a very elaborate definition of social norms: "Social norms describe the behavioural regularities that occur in equilibrium when people use signals to show that they belong to the good type. Social norms are thus endogenous: they do not cause behaviour, but are the labels that we attach to behaviour that results from other factors. Social norms should be distinguished from behavioural regularities that emerge in cooperative relationships simply because they are value maximising. For example, in a merchant community the exchange of gifts on holidays reflects a social norm, whereas the rule that the seller pays for freight insurance probably does not, but simply reflects the cost-minimising strategy."

Social norms also feature as part of the UK government's use of behavioural economics to affect behaviour change. Building on the work of academics such as Cass Sunstein and Richard Thaler (2009), who won the Nobel Prize in economics in 2017, social norms, such as 'keeping up with one's neighbours' are deployed here in order to 'nudge' people towards particular behaviour. 'Nudging' involves to enlist people's voluntary engagement in the desired behaviour rather than prescribing it through formal legal rules. For instance, the Behavioural Insights Team that advises the UK government published a study that shows that simple alterations to tax letters which contained the information that the majority of people in a local area had already paid their taxes, increased repayment rates by about 15%, thus boosting significantly cash flow to the Inland Revenue (Cabinet Office. Behavioural Insights Team, 2012).

Two specific types of social norms can be distinguished, **descriptive and prescriptive social norms**. Environmental behaviour messages usually indicate that a large majority of citizens have already carried out the task, which creates the norm of compliance among non-compliers. This is often called a descriptive social norm. Descriptive social norms represent beliefs about what people do, or in other words, the typical patterns of social activities and choices (Larson & Brumand, 2014) For example, a water bill may contain a comparative number, i.e. how a customer's water use compares to the average water use in the postcode area. There are also **injunctive social norms**, which convey a more prescriptive message. This is less frequently used, but can feature in interventions or an account of environmental outcomes. Injunctive social norms involve judging the un/desirability of specific actions.

Social norms are often formed and applied in settings with a public character, e.g. in the work place, educational or National Health Service (NHS) institutions.

Hence, Comodi et al. (2012) discuss the potential for public administration and local authorities to play their role in moving towards a low-carbon society, for example by implementing water savings in municipality-owned properties.

Important are also third sector organisations such as housing associations. They have a public character since they involve communal administration of housing.

Box 3

Housing Associations

Housing association homes account for 10% of occupied dwellings in the UK (Ministry of Housing, 2018). Housing association homes offer similar types of housing as local councils, often to people on a low income or who need extra support. They are private, non-profit making organisations. They provide easy access to a large number of customers, and water companies often collaborate with housing associations with regard to retrofitting homes with water-saving devices.

For example, Essex and Suffolk Water's H2eco retrofitting programme worked predominantly with private domestic customers but one phase of the project also worked with two housing associations to increase the uptake of the project. According to the water company, the project provided benefits to customers in terms of reduced water use and reduced water bills. **In phase 6 of the project, which included working with two housing associations, the savings per property per day were 44.4 litres** (Essex & Suffolk Water, 2014, p. 216).

But existing water efficiency campaigns in England and Wales leave unexplored the potential of social norms to create behavioural commitments to water saving. **They usually focus on two key drivers of water saving behaviours, technological devices and economic incentives.** Technological devices focus on locking water users' behaviour into a particular pattern, i.e. the water saving showerhead that reduces the amount of water for showering available. Economic incentives, which can also be used to promote the uptake of techno-

logical devices, seek to harness the financial interests of water users in paying less for water in order to generate more efficient use of water.

In the academic and grey literature technical and economic drivers of water efficient behaviour are sometimes portrayed as - by themselves - sufficient to explain water saving behaviour (see sections 3 & 4 of this Primer below). In contrast to this, we consider social norms as the '**missing link**'. They can play a significant role in making technological devices and economic incentives work for water efficient behaviour. For instance, water saving showerheads will not make a difference, if users simply prolong the time spent on having a shower.[1] Similarly, economic incentives, such as rebates on water bills for water users who purchase water efficient appliances, still require uptake of such schemes. Whether such schemes will be taken up also depends on the social norms of water users.

Education is often perceived as a third driver of water efficiency campaigns frequently aimed at young schoolchildren, teaching them water saving behaviour. This can include TV characters such as United Utilities' "Gabi H2O" (United Utilities, 2015, p.59) or leaflets and posters to encourage water efficiency. As we further discuss in section 4 below, reliance on social norms can build on educational campaigns, and ensure longer lasting effects of these.

Hence, in practice, technological devices, economic incentives and educational campaigns can be interrelated. Sometimes such a mixed approach can enhance the effectiveness of water efficiency campaigns, at other times it can also create further challenges. For instance, metering of customer supplies mixes technological device use and financial incentives. A number of water companies in the UK seek to increase metered supplies in their water resource zones through voluntary uptake of meters by customers. In those areas of England that are declared by the EA as water stressed, water companies can introduce compulsory metering (Environment Agency & Natural Resources Wales, 2013). Note that there is no compulsory metering in Wales. In water stressed areas water saving becomes particularly important during drought, but the challenge here is that customers may have already significantly reduced water use due to metering. Hence, during drought episodes finding extra water savings may be difficult.

1.3 The gap: public sector and large organisations

Currently approaches to water efficiency in the UK typically focus on private domestic customers, i.e. either single or multiple occupancy households, or private businesses (Grecksch, 2018). Given that public water supply to domestic customers makes up the largest share of public water supply use, this focus is justified (Office for National Statistics, 2015, p.38; Lawson et al., 2018, p.9). In terms of water companies' business customers, water efficiency campaigns, for instance with private businesses usually comprise a water audit and subsequent recommendations on how to further reduce water usage (Grecksch, 2018). But more than 5 million people are employed in the public sector in the UK. This includes government departments at central level, and local government, the NHS, schools and universities. Hence, a large number of people spend a significant number of hours per day in their workplace.

We would therefore like to shift attention to the public sector and large organisations, and their potential to make an important contribution to water efficiency campaigns.

> *"In 2017 the total HSC [Health and Social Care] consumption of water (direct and indirect) was 2,319 million m3, similar to that of a country such as Estonia"(Public Health England and NHS England, 2018, p.12).*

A review of grey literature suggests that it is possible to pinpoint specific 'hotspots' of untapped potential for water saving in public sector and large organisations. This makes it relatively easy to target water efficiency campaigns at quick and substantial wins. For instance, a recent report on both virtual and actual water use in the Health and Social Care sector in England suggests that food production, preparation and consumption is with 28.7% the single largest area of water use by the sector. This includes water used to grow, clean, process, transport, cook and dispose of food for Health and Social Care facilities in England (Public Health England & NHS England, 2018, p.12).

Exact numbers of water use for the public sector as a whole in the UK are hard to come by. We have some information from various water companies on water use in the public sector mainly from their previous Water Resources Management Plans covering the 2014-9 period (see Appendix 1). Different water

companies use different methodologies for how to present data about non-household demand. The figure presented in Appendix 1 presents non-household water use by sector based on data from 2006/07 and published by Defra in 2012. Out of a total non-household water use of 2534 million m^3 'Education, Health and Social Work' used 153 million m^3 or 6% . Another category, 'Public and Commercial Services' used 217 million m^3 or 8.6%, however, the category is not further specified and it is not possible to differentiate between 'public' and 'commercial' services.

In the past non-household demand was reported in English water companies' Water Resources Management Plans using so called SIC (Standard Industrial Classification) categories. But water companies are no longer required to do this in their latest plans. In Wales, water companies still have to report in supplementary documents how they have calculated and considered their non-household components of water demand.

For the WRMP 2014-19 period (see Appendix 1), some water companies provide pie charts with non-household demand presented in percentages and according to different SIC categories. **For instance, a breakdown of all metred non-household demand by Sutton & East Surrey Water shows that 29 percent of water use can be assigned to schools, healthcare, emergency services, hospitals, and leisure centres** (SES Water, 2014, p.91). Some water companies present numbers in megalitres per day (Ml/d). For example, Severn Trent breaks down 18 Ml/d for public administration, 29.5 Ml/d for education and 22 Ml/d for health (Severn Trent, 2014a, p.56). Other water companies do not break down numbers for sectors, provide no data at all, or data is very difficult to read (see Appendix 1). The use of different categories by various water companies (public administration/public sector/government etc.) and the use of percentages or actual use figures or no data at all makes comparisons and estimating aggregate water demand from the public sector in England and Wales difficult.

This points to scope for guidance, e.g. from the EA/NRW for a standardised methodology to calculate and present water use by different sectors, including the 'public sector'.[2] Moreover, from the data that are available non-household demand from the public sector mainly ranges between 6 and 29 percent of the total water use recorded by individual water companies. This constitutes significant water use, which we suggest can be tackled by water efficiency campaigns drawing on social norms. In the following sections we provide further information on what water companies, regulators and the public sector itself are already doing in relation to efficient water use.

1.3.1 What water companies are already doing

So far only a few water companies in England & Wales explicitly aim water efficiency campaigns at the public sector. Many water companies engage with housing associations as they provide easy access to a large number of customers (see the text box in section 1.2). This, however, has usually involved merely distributing water saving devices. Examples of water companies that mention these activities in their 2014/2015 Water Resources Management Plans are Thames Water, Dee Valley Water, Essex and Suffolk Water and Welsh Water. Welsh Water also mentions that they work with universities (Welsh Water, 2014) as does Severn Trent Water (2014b). Yet while Welsh Water states that it will focus on audits, leakage surveys and technical water saving devices, Severn Trent Water does not further specify its plans. Sutton & East Surrey Water (SES Water, 2018, p.50) concludes that:

> *"The largest category is schools, the second largest Gatwick Airport, after that shops, farms and accommodation (domestic and managed flats). A large part of the non-household consumption is associated with the general population (e.g. schools, healthcare, entertainment, food, sports.) as opposed to industrial use."*

However, there is no further elaboration on this or the potential consequences of this crucial information with regard to water efficiency. Essex & Suffolk Water (ESW) initiated an ongoing project with local councils in 2011. The A.C.E.S. initiative (Auditing Councils in Essex and Suffolk) is based on the success of a standalone project to make a local town hall water efficient. Brentwood Town Hall was retrofitted in early March 2011, saving a total of 5,157 litres of water per day. This retrofit highlighted to ESW how beneficial water efficiency could be to borough, district and county councils, not just in terms of water savings, but also monetary savings (Essex & Suffolk Water, 2014, p.230):

> *"By December 2012, a total of 89 buildings had been audited, including large office complexes, public toilets and town halls, across five councils within Essex and Suffolk. As a result, 33,929 litres of water per day is being saved" (ibid.).*

Thames Water (2014) states that:

> *"Public sector and third sector organisations often act as positive intermediaries and may be more trusted by a customer than a water company when communicating water efficiency messages."*

In their DraftWRMP19 Thames Water envisages water efficiency initiatives for households, businesses, schools, local authorities and housing associations (Thames Water, 2018). An innovative and community-oriented measure has also been developed by Wessex Water (2014). It introduced the so called 'water efficiency community fund' to provide and install water saving devices for schools and other not-for-profit social organisations, such as hospitals, councils and local services. However, there is no further mention of this in Wessex Water's DraftWRMP19. The fact that a number of public sector organisations obtain from external contractors water use relevant services may constitute a challenge to water efficiency campaigns. For instance, hospitals may use third parties for doing laundry and catering. In that case including water efficiency as a criterion for the award of procurement contracts may be an option to consider.

1.3.2 What regulators are already doing

From a regulator's perspective, the picture is mixed as well. Defra's 25 Year Environment Plan only sets household water reductions as a goal without specifying an actual target (HM Government, 2018, p.70). The National Infrastructure Commission (2018) also focusses on technological fixes and metering to increase water efficiency. For government owned and occupied buildings, the Greening Government Commitments (Defra, 2014) encourage all government units to embed sustainability, which includes water saving without further specifying how this could be done. The Water Resources Management Plan (WRMP) Guideline (Environment Agency and Natural Resources Wales, 2016) prescribes what water companies have to include in their WRMPs regarding water efficiency. The text, however, is fairly general:

> *"Demonstrating how you will fulfil your obligation to promote water efficiency and your plans for increased customer metering, thereby reducing abstraction and its impact on flows and groundwater levels."*

An Ofwat report from 2007 encourages schools and hospitals to carry out self-audits and to involve key stakeholders in spreading the water efficiency message e.g. local MPs, trade bodies, and local authorities (Ofwat, 2007).

The academic literature on water efficiency and the public sector is scarce. Only a few studies look explicitly at this issue (Petersen et al., 2015; Roccaro et al., 2011). There are more studies that feature energy saving in companies or public buildings (Siero et al., 1996; Comodi et al., 2012; Liu et al., 2016; Dieu-Hang et al., 2017). We will discuss these studies further in the following sections of the Primer. What is clear though is that there is scope for more attention to the issue of water efficiency in public sector organisations.

1.3.3 What the public sector itself is already doing

The picture regarding water efficiency in the public sector is at times patchy and evolving. While water companies in England and Wales do engage with the public sector this is either not very much specified in WRMPs or confined to audits and technical devices. Smart tariffs, a further option to incentivise water savings, are on the agenda of water companies, yet they are dependent on the introduction of smart water metres, which are not widespread yet (Grecksch, 2018). But an element that is mentioned by almost all water companies in their WRMPs and that is the focus of this Primer, is the role of behavioural change and social norms, that is informal understandings that guide and govern our behaviour in society.

Kristian James, an environmental public health specialist comments:

> *"You will find an appetite for public sector interventions especially if they encourage employees or tenants to adopt practices at home too. The Wellbeing of Future Generation (Wales) Act 2015 requires organisations to operate in accordance with the principles of sustainability so therefore there is a need to support and inform actions" (email communication with the authors).*

1.4 Legal duties in relation to water efficiency

Water efficiency campaigns in England and Wales are not just a matter of choice, but can be required by legal duties imposed upon water companies, public authorities, and regulators to promote water efficiency:

Box 4

Legal duties for water efficiency

Part I of the Water Act (WA) 2003 introduced a range of legal provisions in relation to water efficiency.
For instance, the Environment Agency has now a legal duty to secure the efficient use of water resources (section 6 Environment Act 1995 as amended by section 72 Water Act 2003).
Section 22 of the Water Act (WA) 2014 introduced a primary duty upon the economic regulator (Ofwat) to secure the long-term resilience of water undertakers' supply systems and sewerage undertakers' sewerage systems.

Moreover, the Secretary of State and the Welsh Assembly have to take appropriate steps to encourage water conservation (section 81 WA 2003). Water undertakers are also under a wide duty to further water conservation when formulating or considering any proposals relating to any of their functions (section 82 WA 2003). Also, public authorities have to take into account, where relevant, the desirability of conserving water supplied to premises (section 83 WA 2003). The scope of this duty is broad, it may apply not just to the use of water by public authorities themselves, but also to the exercise of public authorities' functions where these have an impact on water use by others. This may be relevant for the decision-making of local planning authorities about land use and housing, as well as for procurement policies of local authorities, that may refer to the desirability of choosing water suppliers which promote efficient water use, e.g. through grey water recycling.

Finally, the WA 2003 provided for water resource planning tools. Water companies in England and Wales have to provide statutory Water Resource Management Plans and Drought Plans every five years. Water companies set out in their Water Resources Management Plans how they will meet demand for water in the light of existing or planned future supplies over the medium and long-term. One strategy for meeting demand can be the promotion of a variety of water efficient behaviour. What water companies cover in these Water Resources Management Plans can also be further shaped by government policy. The Secretary of State or the Welsh Assembly can issue directions in relation to matters that the plan must address.

Note that the UK has a non-governmental organisation - Waterwise - that is solely dedicated to water efficiency.

There are differences with regard to legislation and governance of water in the various nations that constitute the UK. The main text of this Primer focuses on England and Wales. In England, the legislative framework and policies are developed by the Department for the Environment, Food and Rural Affairs (Defra). The regulatory agency is the Environment Agency and the economic regulator is Ofwat. In Wales, the legislative framework and policies are put in place by the Welsh Government and the regulatory agency is Natural Resources Wales (NRW). The economic regulator for Wales is also Ofwat (Water Services Regulation Authority). Often, however, reports or guidelines are collaboratively produced by both the English and Welsh environmental regulators (e.g. the Water Resources Management Planning Guideline (Environment Agency & Natural Resources Wales, 2016)).

In order to provide a bigger picture we briefly present here the situation regarding water efficiency in other constituent parts of the United Kingdom - Scotland and Northern Ireland (NI). There is further information about Scotland, Wales and NI in Appendix 2.

Box 5

Water efficiency in the public sector in Northern Ireland

Northern Ireland Water, a government-owned company, is the sole provider of drinking water and wastewater services for Northern Ireland. It does not provide any specific document or strategy for water efficiency in the public sector in Northern Ireland. A document aimed at business customers, however, mentions behaviour change and educating employees: "Change employee's behaviour by explaining the importance and practices of water efficiency" (Northern Ireland Water, 2012, p.5). The document also provides an example of water usage in typical office business premises based on an average of 50 litres of water per person per day (ibid., p. 3). Water usage is made up of toilet flushing (43%), urinal flushing (20%), washing (27%), cleaning (1%) and canteen use (9%). Under the heading 'why should a business save water?' the document states that it will contribute to reducing the water and energy bills, lessen the carbon footprint and increase the reputation - socially and environmentally. The document concludes:

> *"Small behavioural changes, could see a business reap big benefits" (ibid., p. 2).*

Box 6

Water efficiency in the public sector in Scotland

Scottish Water is a publicly owned company providing drinking water and sewerage services to the public and businesses. In addition, the retail market for water has been open to business customers in Scotland since April 2008. Scottish Water published a Water Efficiency Plan in 2012 (Scottish Water, 2012). Scotland is considered to be a water-rich country. Hence, customers expect a high quality of drinking water (ibid., p. 1). Behaviour change is one of the strategic objectives pursued by Scottish Water, in addition to water efficient fixtures and fittings (ibid., p. 13). While water companies in England and Wales are able to communicate with their customers directly through bills, e.g. including messages and leaflets about water efficiency, water bills in Scotland are incorporated into the council tax bill sent out by local authorities. Scottish Water is working with local authorities, housing associations and Scottish Building Standards, in order to incorporate water efficiency policy and standards in development plans including those relating to new-building specification (ibid., p. 3).

> *"Local authorities & Housing Associations – we are actively promoting our water efficiency activities to local authorities with a view to influencing emerging Local Development Plans and are engaging with Housing Associations to identify pilot projects to trial water efficiency measures on the ground" (ibid., p. 12).*

The plan also identifies 'customers' behavioural legacy' as a risk and promises to change this by ensuring "we engage fully with the customer and invest in market research/ focus groups to understand the barriers to water efficiency" (ibid., p. 16).

1.5 Data, methods and scope

This Primer presents results from social science research on achieving water efficiency in the public sector through social norms. It rests on two main pillars. First, an extensive academic and grey literature review that included topics such as water efficiency, water behaviour, the use of behaviour change methods, social norms and resource efficiency strategies in the public and private sector, including energy saving initiatives.

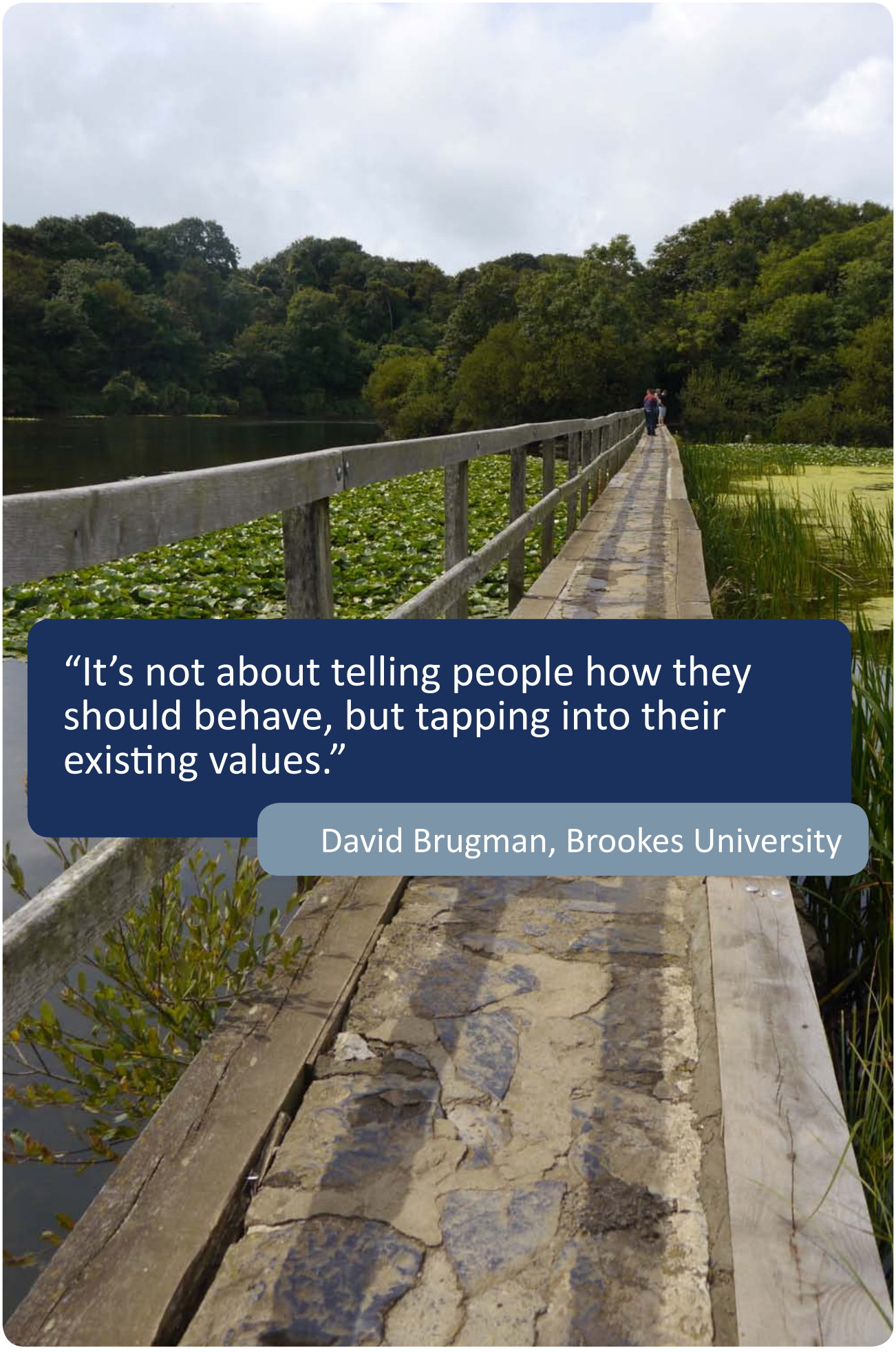
The academic literature review was based on searches using Web of Science, a meta-search engine for peer reviewed academic journal articles that allows detailed keyword search. For example, we searched for studies using search terms such as: 'water efficiency AND public sector', 'energy saving AND public sector' or 'water AND social norms'. The initial search period were the years 2008 to 2018 but cross-referencing from identified studies lead to the inclusion of earlier studies on the issue as well. The grey literature, i.e. studies, or reports from policy-makers and environmental management professionals included documents from Waterwise, Ofwat, Defra, EA and other regulatory bodies as well as English and Welsh water companies' Water Resources Management Plans for the years 2014 to 2019 and some draft WRMPs for the subsequent water resources planning period.

Second, we organised a workshop 'Achieving water efficiency through social norms in the public sector' with stakeholders from a water company, regulatory agency and a university in January 2019. This Primer includes feedback received from stakeholders during this workshop.

Notes

[1] Personal communication from water resources manager.

[2] Current guidance enables water companies to present their data either with reference to a general distinction between 'household' and 'non-household' demand, and identifying key sectors within the latter, OR to use the Standard Industrial Classification (SIC) categories provided by the Office for National Statistics (Environment Agency & Natural Resources Wales, 2016).



“It’s not about telling people how they should behave, but tapping into their existing values.”

David Brugman, Brookes University

Chapter 2

How can social norms create behaviour change?

This section further fleshes out what we mean by building on social norms for designing and implementing water efficiency campaigns in the public sector, and the extent to which water companies and regulators already draw on social norms for developing and targeting such campaigns.

2.1 The citizen-consumer motivation

The idea that social norms matter is further supported by research on environmental governance, which has coined the term 'consumer-citizen'. This suggests that individuals' contribution to more environmentally sustainable production and consumption cannot be explained simply through reference to economic motivations. Instead, consumers are often keen to contribute through their consumption habits to sustainable development also because they think of themselves as 'ecological citizens' (Spaargaren & Mol ,2008). Moreover, this research also points out that 'lifestyle politics' can help to bridge private and public spheres and thereby contribute to more sustainable behaviour. For instance, learned behaviour about recycling waste acquired in the private domestic sphere may translate into behaviour in favour of recycling also in work places (ibid.).

We suggest that insufficient attention to social norms is influencing how economic incentives work and whether technological devices are taken up. This creates a significant conceptual gap in our understanding of water saving behaviour. But there is also an empirical gap. We learned from a conversation with a water resource manager in a UK water company that current engagement exercises that water companies conduct with their customers do not identify the values that customers hold and that may lead customers to engage

with water efficiency campaigns. By 'value' we mean the regard that something is held to deserve, its importance, worth, and usefulness (Oxford English Dictionary). We suggest that identifying, mapping and understanding such values, and how they relate to wider social norms held by communities, may be important in order to target water efficiency campaigns to particular customer groups and to potentially increase their chances of success. For instance, water resource managers in water companies told us that water saving campaigns have limited impact on affluent households, also because the economic incentives for water saving are in this case not strong enough. Campaigns that focus in the first instance on efficient use of water for large gardens coupled with messages about the contribution of household water use to overall water use in a catchment may thus be a relevant response here.

In the following sections we will therefore identify the limits of what we already know about water efficiency campaigns and highlight the current state of affairs in relation to water efficiency campaigns for the public sector in England and Wales. We then explain further the notion of 'social norms' in relation to water efficiency campaigns in the public sector. Based on previous studies we discuss factors that enable successful water efficiency campaigns. This includes information about how to build water efficiency campaigns on experiences gained from energy saving campaigns. To begin with, we discuss academic literature about the link between social norms and behaviour change that also provides helpful insights into barriers to behaviour change.

2.2 Values and barriers to behaviour change

As mentioned above whether we change behaviour also depends on the values we hold. Sharma (2017) in particular highlights the role of values in behaviour change and applies a social-practices approach to understand consumer behaviour. In approaches based on social practice, the importance and power of collective human agency is emphasised, while at the same time close attention is paid to the role of technological systems and infrastructures. Part of this approach is a recognition that the value systems of people in different cultures **are influenced by society, religion and wider belief systems,** which determine the reasons for which people engage in sustainable consumption behaviour. Hence, water efficiency campaigns, not just for the public sector, should carefully take into account regional cultural differences within the UK as well as the values towards water in different religious communities.

According to Corral-Verdugo et al. (2008), motivation plays an important role for conserving a resource such as water. The more motives a person has for saving this resource, the more he or she conserves water. Sofoulis (2005) highlights that changing consumption patterns means changing habits and routines. More efficient water use may thus first require the **de-routinising of habits and learning new ones**. That includes becoming aware of one's habits and subjecting them to scrutiny and reflection. Other steps include conversations with family, friends and neighbours and experiential learning about alternative water-use systems, for example new technologies or housing design (ibid., p. 448).

In this context, Hoolohan & Browne (2016) - who focus in their study on collective approaches to change water use - emphasise the importance of understanding and addressing broad social and technological trends that could also **inhibit behaviour change**. The idea is that consumption is shaped by shared and collective drivers, and hence consumers have varying degrees of control over their water use. One such important collective driver is what we understand as 'normal' and 'acceptable' in terms of water use and whether we perceive water as a scarce resource. The authors of the study conclude that consumers reflect on behaviour of relatives and friends and on their experiences gained from when they were abroad, e.g. during holidays especially in water scarce regions. According to the authors, social network discussions are thus important and they caution that **just because people are given the right information, it does not mean they will change their behaviour, especially if people think their excessive water use is normal**. Hence, more important was the experiential process of learning consumers gain throughout their lives, including **interaction with places, people and objects throughout their life-course** (ibid., p. 186).

Rocarro et al. (2011) present one of the few studies regarding water saving in the public sector. In this case schools and sports centres in an Italian community are the focus. The objective of this study was to verify and compare water conservation in residential and public buildings (schools and sport centres) located in Sicily (Italy) by implementing high-efficiency plumbing fixtures (structural measures) and educational programmes (non-structural measures). The results show that structural measures led to relevant water savings, while non-structural measures only added a negligible effect. According to the authors, **non-structural measures only seem to be successful if they do not involve personal sacrifice or a reduction in comfort or a significant change in behaviour.**

Also, experience of actual drought events can contribute to shaping social norms in relation to water use. Simpkins (2018) discusses how an event such as the 2018 Cape Town 'Day Zero' threat can increase the value of water. This further illustrates that new ways to save water can be found during extreme water scarcity scenarios.

Table 1

Drivers of water efficient behaviour and potential barriers (1 of 2)

Driver of water efficient behaviour	Finding	Study
Values individual people hold	important to consider how values link to technological systems and infrastructures social practices are further influenced by society, religion and wider belief systems	Sharma (2017)
Motivation to conserve a resource	the more motives a person has for saving this resource, the more he or she conserves water	Corral-Verdugo et al. (2008)
Ability to change habits and routines	changing consumption patterns means changing habits and routines more efficient water use may thus first require the de-routinising of habits and learning new ones	Sofoulis (2005)
Collective drivers over which consumers may have limited control	important to understand and address broad social and technological trends that could also inhibit behaviour change just because people are given the right information, it does not mean they will change their behaviour, especially if people think their excessive water use is normal	Hoolohan & Browne (2016)

Drivers of water efficient behaviour and potential barriers (2 of 2)		
Driver of water efficient behaviour	Specific finding	Study
Water company's attitudes	entrenched attitudes within organisations can be a major barrier water companies are traditionally focused on changing infrastructure not customer behaviour some water companies do not see it as their responsibility to educate people about water consumption potential lack of knowledge and skills about behaviour change and its success	Lewis (2017)
Experience of actual drought events	2018 Cape Town 'Day Zero' threat increased the value of water to people	Simpkins (2018)

Having outlined some key barriers to behaviour change, we present in the next section the current status of behaviour change with reference to social norm approaches among English and Welsh water companies and regulators.

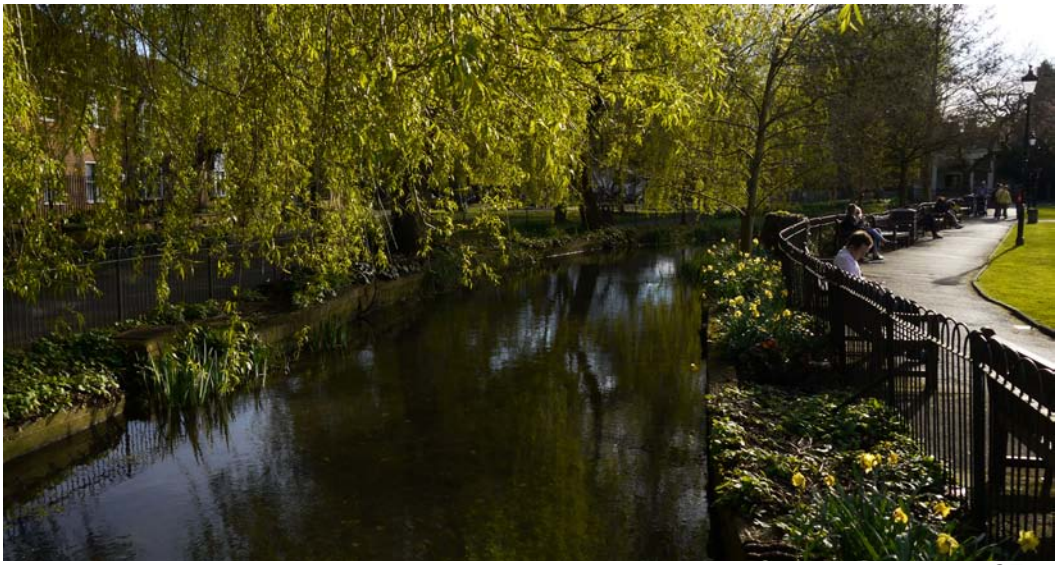
2.3 How social norms are currently harnessed

Lewis (2017) discusses a range of barriers to behaviour change with reference to UK water companies: first, entrenched attitudes within organisations can be a major barrier. Second, water companies are traditionally focused on changing infrastructure not customer behaviour, also in light of the fact that revenue is generated by selling water to customers. Third, some water companies do not see it as their responsibility to educate people about water consumption; and fourth, there may be limited knowledge and skills about behaviour change and its success.

In this context it is important to note Hoolohan & Browne's (2018) **focus on social practice theories that present an alternative perspective to individual demand management carried out by water companies.** Against this backdrop the Primer suggests that there is scope for exploring a social norm approach to water efficiency campaigns for public sector organisations.

Waterwise (2017) sees a **water-saving culture** as the goal in order to accomplish wide scale water efficiency:

> *"We know that most people take some actions to save water, but we also know that there is a lot more to do. Water efficiency needs to become the norm across all activities throughout everybody's lives - wasting water should be seen as going against the norm. In order to achieve this, water efficiency activities must be scaled-up across the board, by all parties – nobody should be reporting having received no help or information" (ibid.).*



Box 7

Waterwise – Key recommendations

1) Closer collaboration between all actors

2) Develop a national water efficiency communication/engagement platform

3) Water efficiency references in Local Area Agreements, i.e. local planning policies

4) Provision of guidance for local councils on how they should interpret their water efficiency duties imposed by the Water Act 2003

Waterwise's Year 1 report (Waterwise, 2018) on its water efficiency strategy for the UK reviews the goals it set out in the original strategy document discussed above. It also sets priorities for the second year. Waterwise welcomes the fact that budgets set by water companies for water efficiency activities are increasing, yet the overall focus is on per capita consumption (PCC) reduction. Behaviour change is listed as a barrier to reduce PCC because behaviour change is not straightforward and there is no guarantee of success. According to the report, a priority for future work should therefore be to generate more evidence to "understand best practice on PCC and the behavioural, technological and regulatory tools that are needed to meet this." Furthermore, the report stresses the importance of people and communities for water efficiency as behaviour change and greater customer engagement and participation are linked to water efficiency. The report highlights water companies' measures, which consider innovations in behaviour change:

- Northumbrian Water's Innovation Festival
- South Staffs Water is trialling a bespoke online customer engagement portal, WaterSmart, to influence customer water-using behaviours with personalised and targeted communications about water efficiency

Waterwise is also engaging in a long-term communication and engagement programme to target behaviour change and advice based on information related to different emotional and social outcomes of water use. Again, all of these priorities and programmes are aimed at household water users.

2.3.1 What water companies are already doing in relation to social norms

Essex & Suffolk Water (2014) refer to the potential of social norms to shape behavioural change. But the focus is on individual/household customers:

> *"Influencing customer behaviour, through informing customers how much water they use, how they use water and challenging the habitual nature in which they use water, in turn delivers quantifiable and sustainable water savings. The company has understood this for many years and therefore behavioural change underpins all projects and initiatives."*

Several of its projects use social norms theory and behaviour change: 'Good Water Habits, Little Green Riding Hood, Challenge Twenty:12' (see box 8). In their DraftWRMP19 Essex & Suffolk Water talk about increasing reliance on behaviour change methods. Yet, while many water companies mention behaviour change, they mean different things. For example, Bournemouth Water (sembcorp Bournemouth Water, 2015) regard moving customers from unmetered to metred supply as behaviour change. They also suggest:

> *"We cannot accurately quantify behavioural change activity although we acknowledge that this is possibly the single most important driver of water efficiency" (ibid.).*

There are various social science methods available in order to understand drivers of and outcomes of behaviour change, such as water efficiency campaigns. Among these are randomised controlled trials. Such trials seek to understand the specific impacts of particular interventions, e.g. being exposed to a water saving message drawing on particular social norms. One group of water users is exposed to the intervention, while the other is not. Comparisons can then be drawn about how the behaviour in relation to water use may have changed in the two groups after the intervention has occurred. Well-designed trials try to keep constant the range of other factors that may influence water use, such as access to technical devices, type of housing tenure etc., in order to identify the distinct impact, e.g. of a social norm based message. The UK Behavioural Insights Team provides interesting examples of how to use randomized controlled trials.

Box 8

Essex & Suffolk Water Key Behaviour Change Projects (1 of 3)

As mentioned above, many water companies engage in water efficiency campaigns involving the use of behaviour change methods. We selected three examples from Essex & Suffolk Water mainly for the reason that the company describes their campaigns in detail in its WRMP.

Good Water Habits – Using Social Norm Theory (Essex & Suffolk Water, 2014) In 2010/11, ESW initiated a project entitled 'Good Water Habits'. This initiative focused on influencing customers' water use behaviour using social norms theory. Market research was carried out between November 2010 and January 2011 in Southwold, Suffolk to create '8 out of 10 cats' style statements, which were then used in conjunction with various water-saving products to encourage behaviour change. Questionnaires, asking general questions about customers' water use, were sent to over 3000 customers, resulting in 199 customers returning completed questionnaires. Analysis of the results provided a series of 20 social norm statements including:

- Only one out of 20 customers know that the average personal water use is 150 litres per day.
- Only one out of 10 customers know that they can save 12 litres by spending one minute less in the shower.
- Three out of 10 customers have recently repaired a dripping tap and know this has saved them 50 litres per week.
- Seven out of 10 customers only use a washing machine when fully loaded.
- Eight out of 10 customers turn off the tap when brushing their teeth.
- Four out of 10 customers know that leaving a basin tap running uses at least six litres per minute.
- Nine out of 10 customers found it easy to change habits.

The statements were then incorporated into a leaflet, which in turn was enclosed in a self-audit style pack. The pack and leaflet cover all aspects of behaviour change associated with water use and also provided a range of water-saving products, such as a universal plug and a trigger hose gun, to provide a mechanism for making changes to behaviour. The Good Water Habits packs were distributed to 846 customers in Halesworth, Suffolk.

Box 8

Essex & Suffolk Water Key Behaviour Change Projects (2 of 3)

Follow-up questionnaires were then sent to all 846 customers, in order to understand whether the social norm statements and approach had an effect on how the customers use water. A substantial amount of information was collated, helping ESW to understand the effect the project had on their water use. The information, along with the social norm statements, have been used to help shape future projects.

Little Green Riding Hood (Essex & Suffolk Water, 2014)
ESW recognises the importance of stopping bad habits from developing at an early age and that working with younger generations is key to affecting sustained behaviour change. In 2010, ESW developed what has become a long term and highly effective relationship with a professional theatre company to deliver a fun and educational programme about the importance of using water wisely.

The Little Green Riding Hood programme, aimed at primary school children and teachers, involves a pantomime, which is based around the children's fairy tale Little Red Riding Hood. After the pantomime, which incorporates messages about saving water and changing bad water habits, the pupils then attend a good habits workshop, which reinforces the message of using water wisely. In the ESW region, 51,927 primary school pupils from 207 schools have taken part in the initiative. Based on Ofwat's guidance for calculating the water savings achieved through behaviour change initiatives, the total water saving achieved through the Little Green Riding Hood educational programme is 0.862Ml/day. In 2016 ESW renamed the programme 'Super Splash Heroes' based on the concept that pupils themselves could become Super Splash Heroes (Essex & Suffolk Water, 2018, p. 196).

Challenge TWENTY:12 (Essex & Suffolk Water, 2014)
During September 2012, ESW took on a fresh challenge to assess the impact of successive behavioural change messages on customers' household water consumption. ESW devised a year long project called Challenge TWENTY:12 which primarily focuses on the importance of customer engagement and the delivery of behavioural change messages.

Challenge TWENTY:12 aimed to achieve sustained water savings of 20 litres per property per day over a 12 month period, hence 'TWENTY:12'. By feeding the

Box 8

Essex & Suffolk Water Key Behaviour Change Projects (3 of 3)

customer with monthly messages over a prolonged period of time, ESW hoped to influence water use through encouraging long-term behaviour change. Customers were provided with monthly fact sheets themed around seasonal events such as Christmas, Halloween and Easter. In addition to the general water saving facts, each letter showed a personalised consumption chart, which demonstrated a customer's water usage over the last month and details how they compare to the rest of the participants in the project.

The behavioural messages disseminated through the Challenge TWENTY:12 programme were reinforced through the receipt of a piece of exclusive magnet puzzle, which portrays each monthly message. Each month the customer received a different piece of the magnetic puzzle. Alongside the puzzle, each month the customer was also offered the opportunity to request free water saving products such as a trigger hose gun and aerated tap inserts.
In order to assess the impact of various behavioural change messages on customers' water consumption, a series of meter reads were obtained at the beginning of each month. This will enable ESW to: (1) calculate the month by month water savings resulting from individual messages and (2) assess the impact of the project on water consumption as a whole. In total, 912 homes in the Chafford Hundred area of Sussex were invited to participate in the programme with 817 accepting the challenge.

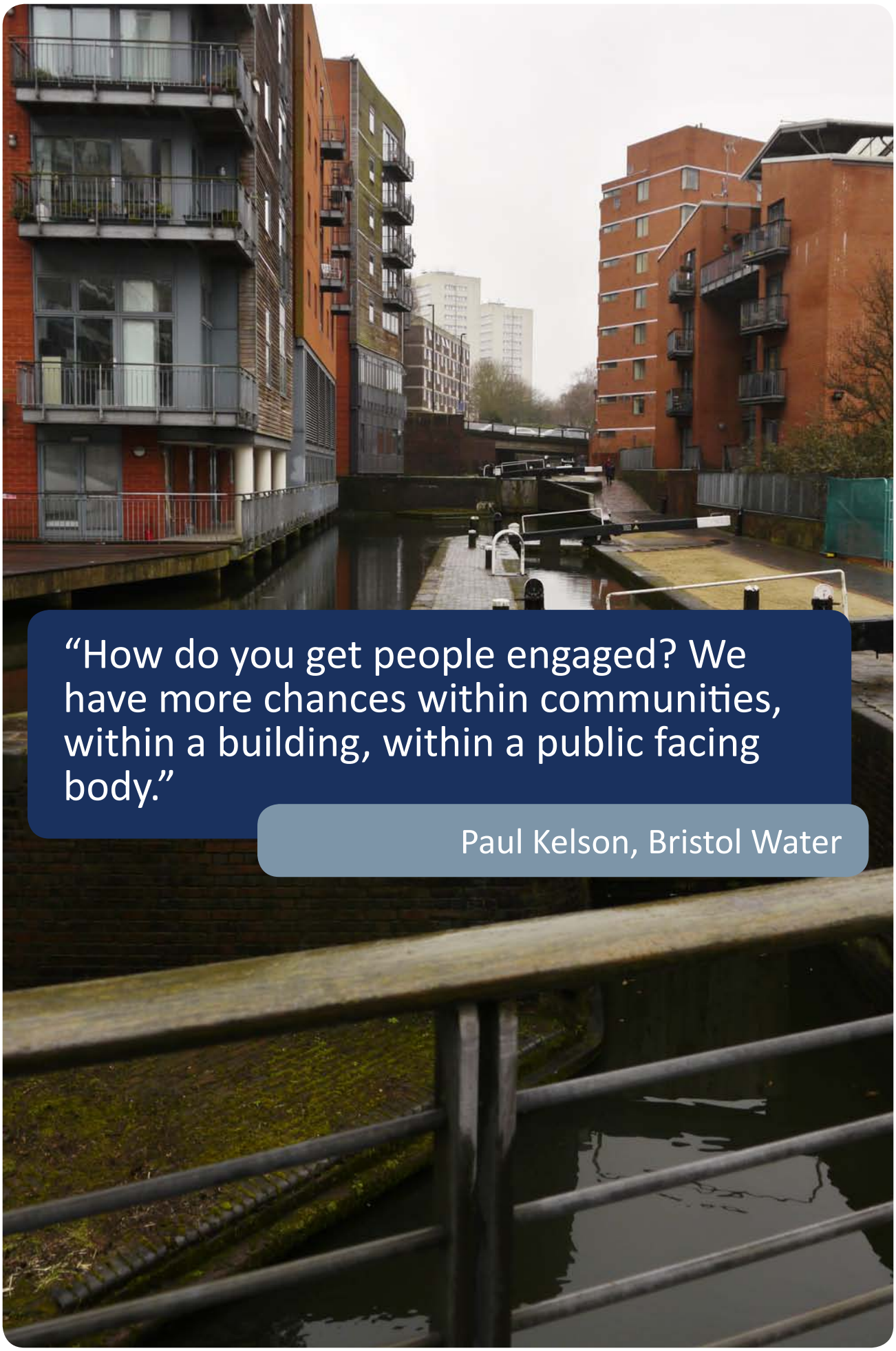
In their latest DraftWRMP19 (Essex & Suffolk Water, 2018, p.195), refers to a piece of research from 2015 that aimed to establish the proportion of water savings achieved through the installation of products compared to those achieved through effective behaviour change engagement. The research was conducted in conjunction with a phase of home retrofits audits undertaken during the summer of 2015 in which 1,495 properties participated. The properties were randomly assigned to two groups; one receiving the full audit (product installation and customer engagement) and the other receiving a product-only audit (product installation but no engagement). Customers that received a full audit saved on average 24.9 litre per property per day. Customers that received a product-only audit saved on average 18 litres per property per day, suggesting that behaviour change accounts for between a quarter and a third of water savings achieved through home retrofit projects.

2.3.2 What regulators are already doing in relation to social norms

A press release from the Environment Agency from May 2018 (Environment Agency, 2018) urges:

> *"[The water] Industry must innovate and change behaviours in order to reduce demand and cut down on wastage."*

An Ofwat (Water Services Regulation Authority) report (Lawson et al., 2018) about the long-term potential for deep reductions mentions several barriers to water usage reductions: lack of national holistic long term thinking, fragmented responsibilities (with this potentially even more salient in the context of the opening up to competition of the market in water retail services in England, and to a limited extent also in Wales), and a lack of widespread collaborative multi-sector solutions to water scarcity, going beyond the water companies. The Ofwat report suggests under the heading of 'changing public perceptions of water', the use of the following tools: home water reports, smart bills, social norms and feedback (ibid., p. 20). The Ofwat report further suggests that prioritising research into behaviour change for influencing consumer choice of products and changing water use practices is one of the first steps to deliver deep reductions in household demand (ibid., p. 34). In the next section, we discuss a systematic way of harnessing insights from social norm theory in order to build models for environmental behaviour change. These, in turn, can provide an important foundation for water efficiency campaigns in public sector and large organisations.



"How do you get people engaged? We have more chances within communities, within a building, within a public facing body."

Paul Kelson, Bristol Water

Chapter 3

Models of environmental behaviour change as a basis for water efficiency campaigns

This section presents and synthesizes conceptual models of environmental behaviour change with a focus on the ISM (Individual, Social, Material) model. We consider a critical discussion of these models important also because they could provide the basis for customised water efficiency campaigns that public sector and large organisations may want to tailor to their specific water users, past water use practices and particular water needs.

3.1 Limited use of models for a systematic approach to behaviour change

A recent assessment by Defra (Orr et al., 2018) generated evidence about what approaches to water efficiency and behaviour change have been used so far in the UK. The study also identified key evidence gaps. According to the report water saving devices, information provision and two-way engagement have been so far key interventions. Used together these interventions led to reductions in household water consumption in England and Wales. However, despite the use of multiple engagement routes, there has been a generally low take-up of water saving initiatives by private households. The authors identify gaps in evaluating the relative contribution of different components of behaviour change interventions and note only one study (Ross, 2015) that examined how much water saving produced by the intervention could be attributed to the behaviour change. Customers who received behaviour change information coupled with a water saving device increased their water saving to 7 litres per property per day. This was a water saving that was by 38% higher than the water savings achieved by those household customers who apparently did not receive the behaviour change information, and only received the water saving device. Furthermore, the Defra report notes that UK water companies

are providing information to customers as part of water efficiency initiatives through one-way, two-way and online channels. But, there is little detail about the way the information is provided and how it affects outcomes. It also seems that water companies do not carry out evaluation studies of the effectiveness of their water efficiency campaigns (Orr et al., 2018).

The Defra report concludes that examining water use in terms of social practices is important for identifying and targeting consumers based on the way they use water, for example in relation to gardening or washing. The authors also suggest that further work is needed to test these approaches in practice. It is also noteworthy that underlying assumptions about what influences water consumption behaviour were only set out clearly in less than half of the documents reviewed in the Defra study.

Hence, the authors of the Defra study suggest that a lack of a robust theoretical framework was common to publications looking at interventions to reduce water consumption. Consequently, a lack of clarity about what factors are expected to produce the desired behaviour change, such as reduced domestic water consumption, makes it difficult to assess the effectiveness of the approaches or actions described (ibid., p. 73). We therefore present in the next subsection a specific model of environmental behaviour change that has been widely discussed in the literature: the ISM model (Individual, Social and Material). We chose this model over other approaches as it combines behaviour change approaches from different disciplines such as sociology, social psychology and behavioural economics (Orr et al., 2018). Other approaches are for example Defra's '4Es model' (Defra, 2005) (e.g. Sharma & Jha, 2017) or the MINDSPACE mnemonic presented by Dolan et al. (2012). For further information about this see Orr et al. (2018) who provide a good overview of different approaches.

3.2 The Individual, Social and Material (ISM) factors model

A very promising model of environmental behaviour change is the Individual, Social, Material (ISM) model (Darnton, 2014; Darnton & Horne, 2013). The ISM model is based on theory and empirical evidence. It suggests that three different contexts – the Individual, Social and Material – influence people's behaviours. Attention to these contexts matters in order to achieve substantive and long lasting behavioural change. ISM can generate a wide range of ideas for interventions because it draws on insights from all three of the main disciplines, which study behaviours and practices – social psychology, behavioural economics and sociology:

Box 9

The ISM model (Source: Darnton & Horne, 2013)

Individual: This includes the factors associated with an individual that affect the choices and the behaviours he or she undertakes. These include an individual's values, attitudes and skills, as well as the calculations he/she makes before acting, including personal evaluations of costs and benefits.

Social: This includes the factors that exist beyond the individual in the social realm, yet shape his or her behaviours. These influences include understandings that are shared amongst groups, such as social norms and the meanings attached to particular activities, as well as people's networks and relationships, and the institutions that influence how groups of individuals behave.

Material: This includes the factors that are 'out there' in the environment and wider world, which both constrain and shape behaviour. These influences include existing 'hard' infrastructures, technologies and regulations, as well as other 'softer' influences such as time and the schedules of everyday life.

By differentiating between individual, social and material contexts, the ISM model provides a valuable framework for several reasons.

First, the model highlights the role of social norms and the desire to engage in behaviour that is approved by others in the same social group (Schirmer & Dyer, 2018). We will see in the discussion below how important a person's reference group can be when it comes to resource saving at the workplace.

Second, even if attitudes are favourable towards the environment this does not guarantee positive action but further constraints may need to be taken into account (Stern 2000, Mondejar-Jimenez et al., 2011). For example, water saving behaviour may be guided whether a property is rented or owned (Russell & Fielding, 2010). This is a fact that is particularly salient in the light of an increase in renting in the UK in comparison to ownership as a form of housing tenure.

Table 2

Types of dwelling and housing in England

Type of dwelling	English Housing Survey 2009-2010	English Housing Survey 2016-2017
owner-occupier	67%	62%
private renters	16%	20%
local authorities	17%*	7%
housing associations		10%

*the 2009-2010 Housing Survey does not differentiate between local authorities and housing associations homes but refers to this category as 'social renting'.
Sources: Department for Communities and Local Government (2011), Ministry of Housing (2018)

> *"The kind of homes people live in and whether they own or rent not only influences overall water consumption levels, but also how people think about water use" (Russell & Fielding, 2010).*

Homeowners have direct control over their homes and are in a better position to undertake retrofitting of efficient devices. Private tenants on the other hand have less control over the installation of water efficient devices (ibid.). Yet, the installation of small technical devices such as tap aerators should be possible independent of whether one owns or rents a property. The installation of water meters, which can become obligatory in England's water stressed areas may help to incentivise water saving behaviour. Typically a metered household in England and Wales uses 129 litres per person per day, compared to 162 litres per person per day in an unmetered household (DiscoverWater.co.uk, 2018)

The ISM model has been further specified by a range of authors. For example, Darnton & Horne (2013) present an example of waste recycling. At the 'individual' level a lot of messaging was provided about the importance and benefits of recycling, also working on people's attitudes and emotions. Recycling was made easier by providing for example new infrastructure for kerbside collection and providing clear and simple information on how to recycle. At the 'social' level, the kerbside boxes send out a strong visual message about who was and who was not recycling. The recycling campaign was also promoted at workplaces, schools and colleges. One of the outcomes was that people took their new behaviours home from these organisations with a public dimension. At the 'material' level, the EU Framework Directive on Waste (2008/98/EC) incentivised local authorities to provide infrastructure for collections.

The following paragraphs flesh out further how the ISM model approaches behaviour change. A summary of this is provided in Table 3.

Schirmer & Dyer (2018) mention four areas that commonly influence the adoption of pro-environmental behaviour:

- pro-environmental values and norms
- awareness and knowledge
- proximity and place-related identity
- life stage and lifestyle.

With regard to the first: pro-environmental values are in turn influenced by social norms, i.e. the desire to engage in behaviours that generate approval by others in a person's social groups. However, Schirmer & Dyer (2018) also mention that studies are inconsistent. Holding a value may be necessary but not sufficient to trigger behaviour change. Factors such as the cost and difficulty of taking action, and the relative priority of environmental in comparison to other values may moderate the link between values and behaviours (ibid.). Mondejar et al. (2011) claim that the roots of environmental problems lie in human behaviour, so the solution could lie in changing the behaviour of organisations and groups and so in cultural and lifestyle changes. They also describe four stages to achieve ecological behaviour: 1) awareness, concern and consciousness-raising; 2) development of environmental attitudes; 3) if the attitude is favourable, consumers seek information about the matter and 4) the previous three elements do not guarantee ecological behaviour because further restraints are adequate economic resources, confidence etc.

Russell & Fielding (2010) review literature on conservation behaviours and identify two types of behaviours:

1) efficiency behaviour (rainwater tanks, showerheads) and
2) curtailment behaviour (washing full loads).

The authors claim that this distinction is necessary because each type of behaviour is underpinned by different social and psychological drivers. Referring to Stern (2000) they say that the determinants of water conservation behaviour can be categorised into five underlying causes: attitudes, beliefs, habits and routines, personal capabilities, and contextual factors.

Table 3

Key studies of environmental behaviour change

Study	Key points
four areas that commonly influence the adoption of pro-environmental behaviour: 1) pro-environmental values and norms 2) awareness and knowledge 3) proximity to an environmental problem (space and time) and place-related identity 4) life stage and lifestyle	Schirmer & Dyer (2018)
four stages to achieve ecological behaviour: 1) awareness, concern and consciousness-raising 2) development of environmental attitudes 3) if the attitude is favourable, consumers seek information about the matter 4) the previous three elements do not guarantee ecological behaviour because further restraints are adequate economic resources, confidence etc.	Mondejar et al. (2011)
two types of behaviours, each underpinned by different social and psychological drivers: 1) efficiency behaviour (e.g. rainwater tanks, showerheads) 2) curtailment behaviour (e.g. washing full loads)	Russell & Fielding (2010)
water conservation behaviour can be categorised into five underlying causes: 1) attitudes 2) beliefs 3) habits and routines 4) personal capabilities 5) contextual factors	Stern (2000)

The ISM model directs attention to individual, social and material contexts. In relation to water efficiency campaigns one such important individual and social context is the link between saving water and saving energy, a point discussed in chapter 4.


“The very first thing I do is talk about the broader context of [water shortages] and then I zoom in on how we contribute to it.”
David Brugman, Brookes University

Chapter 4

Building water efficiency campaigns

This section draws conclusions regarding water saving behaviour from studies that discuss other forms of resource saving, mainly energy saving. Based on this and the discussion in the previous sections we describe nine building blocks for a successful water efficiency campaign with the public sector involving social norms. We also provide two diagrams:

- one to visualise each step of the water efficiency campaign and
- a second diagram visualising and describing a specific example for a water efficiency campaign involving a school and social norms.

We also provide examples of successful water efficiency campaigns involving the public sector in other jurisdictions (USA, Australia, South Africa). We introduce the concept of social learning as a potential way to instigate organisation change towards more water saving behaviour, and thus to promote also learning from the examples of successful water saving campaigns in other jurisdictions.

4.1 The energy-water-saving nexus

The energy-water saving nexus is well established but not yet sufficiently harnessed in the public sector. Waterwise UK, for instance, notes that hot water use in the home accounts for around 5% of UK carbon emissions, which represents a key opportunity for promoting water efficiency as well as reducing fuel poverty (Waterwise, 2018).

Some academic studies have discussed water and energy saving in the public sector. For example, Petersen et al. (2015) conducted a large study about electricity and water saving on US college and university campuses. They

found that the impact of financial and other incentives and knowledge is often overestimated, while people's perceptions of what other people are doing, i.e. social norms, is underestimated:

Box 10

Water-Energy use: social norms and large organisations

"While schools and other organizations often focus on infrastructure renovation as a primary mechanism for increasing resource use efficiency, occupant behavior is recognized as a key determinant of consumption and therefore a crucial target of conservation efforts. The emphasis on achieving behavioural change in colleges and universities also recognizes the undergraduate experience as a seminal and transformative period during which future decision-makers develop knowledge and habits that inform the personal, professional and political choices that they make throughout the rest of their lives" (Petersen et al., 2015).

Petersen et al.'s study provides a detailed analysis of the first two Campus Conservation Nationals – a competition among college dorms to save resources. The study assesses the efficacy of competitions as a means of changing thought and behaviour and to better understand the psychological factors involved. Referring to Vine & Jones (2016) Pedersen et al claim that structured competitions, one form of social comparison, provide a potentially powerful mechanism for leveraging the social norms:

> *"Survey responses indicate that social norms – perceptions and beliefs about how members of a group think and behave relative to others – were a significant determinant of motivation to participate in the competition. This is evident in the high percentage of survey respondents who indicated that they were interested in how their dorm was performing relative to other dorms and how their school was performing relative to other schools" (Petersen et al., 2015).*

Petersen et al.'s study also provides examples of barriers to conserving water: need (washing hands, clothes), lack of control (infrastructure), apathy (e.g. community, roommate, personal) and love of showers (hot and long).
Liu (2016) who asks how to incentivise individuals to change their behaviour in a lasting way also concludes that the strongest predictor of energy conservation intentions were in fact, social norms, group-based standards or rules regarding appropriate attitudes and behaviours. They refer to a study by Schultz et al. (2007) on household energy conservation and the role of social norms:

> *"Providing residents with descriptive normative information had a dramatically different effect depending on whether they were initially above or below the average level of energy consumption in their neighborhood. Providing high-energy-consuming households with descriptive normative information regarding the average home energy usage in their neighborhood constructively decreased energy consumption. In contrast, for households that were initially low in their base rates of energy consumption, the same descriptive message produced a destructive boomerang effect, leading to increased levels of energy consumption. However, adding an injunctive component to the message proved reconstructive by buffering this unwelcome boomerang effect. That is, for people who were initially low in energy consumption, the same descriptive normative information combined with an injunctive message of approval led to continued consumption at the desirable low rate, rather than a significant move toward the mean" (ibid., p. 433).*

Petersen et al.'s study provides a further illustration of the 'material' dimension referred to in ISM models. Students participating in the National Campus Competition felt that they had more control over both their individual and community electricity than water use. For example, many students reported turning off lights in public spaces to conserve electricity, but there is no clear parallel to this for water use. Exhortations related to water use are likely to be perceived as more intrusive into personal life (ibid., p. 38).

Dieu-Hang et al. (2017) have studied the effects of both energy efficiency and water-efficiency labelling on the uptake of energy and water-efficient appliances. They state that green household behaviours include two types of decisions: (1) no-cost or low-cost behaviours that require only behavioural changes, such as turning off water while brushing teeth, plugging the sink when washing dishes, or turning off lights when leaving a room. And (2) behaviours that require an explicit investment, such as the adoption of efficient appliances.

Table 4

Studies that link water to other resources (1 of 2)

Water or resource efficiency strategy	Evaluation of strategy	Evaluation of strategy
Structural (plumbing) vs. non-structural measures (educational programme)	structural measures led to relevant water savings in two schools in Sicily, while non-structural measures such as education only added a limited effect. Non-structural measures only seem to be successful if they do not involve personal sacrifice or a reduction in comfort or a significant change in behaviour	Rocarro et al. (2011)
Educational campaigns	likely to be necessary, but not sufficient for behavioural change. Educational campaigns may especially be advisable when people are unaware of energy use and environmental problems associated with their behaviour	Abrahamse et al. (2005)
Harnessing the interconnections between water and energy sectors	green household behaviours include two types of decisions: 1) no-cost or low-cost behaviours that require only behavioural changes, such as turning off water while brushing teeth 2) behaviours that require an explicit investment, such as the uptake of efficient appliances	Dieu-Hang et al. 2017)
Incentivising behaviour change in a lasting way	strongest predictor of energy conservation intentions were: social norms, group-based standards or rules regarding appropriate attitudes and behaviours	Liu (2016)
Combining descriptive (e.g. average neighbourhood use) and injunctive messages (e.g. conveying social approval/disapproval)	combining both, descriptive and injunctive, messages can offset the boomerang effect that tends to steer people who are low energy consumers to the median, meaning they use more energy than before, if only provided with a descriptive message on average neighbourhood use	Schultz et al. (2007)

Table 4

Studies that link water to other resources (2 of 2)

Water or resource efficiency strategy	Evaluation of strategy	Evaluation of strategy
Campaigns focused on direct and specific targets, e.g. actual consumption data instead of averages	likely to promote water conservation	Mills and Schleich (2012); Steg (2008)
Structured competition	social norms were a significant determinant of motivation to participate in the competition	Petersen et al. (2015)
Campaigns that provide specific information	specific information outperforms campaigns providing generic information	Ek & Söderholm (2010)
Comparative feedback	receiving information about the performance about other groups can lead to competitive feelings and a better performance changing behaviour in an organisation must appeal to the collective and not the individual and the higher the performance goal, and the more precise the goal has been formulated, the better the performance will be	Siero (1996)
Harnessing identification with a reference group	a descriptive normative component to persuasive appeals or information campaigns should ensure that the norms of the reference group are as situationally similar as possible to the intended audience's circumstances or environment	Goldstein et al. (2008)
Specific framing and communication of interventions	Behaviour change can be influenced by the identity of the messenger who suggests the behaviour change	Byerly et al. (2018)

Abrahamse et al. (2005) **claim that educational campaigns are likely necessary, but not sufficient to induce behavioural changes**. Steg (2008) and Mills & Schleich (2012) report that only campaigns focusing on direct and specific targets, such as actual consumption data are likely to promote conservation behaviours. Similarly, Ek & Söderholm (2010) show t**hat campaigns that provide specific information tend to outperform those that provide generic information.**

Siero et al. (1996) focus on comparative feedback to look at how a company can motivate its employees to save energy. Comparative feedback involves receiving information about the performance of other groups, i.e. another department within the same company with regard to saving resources. Drawing attention to the existence of another group with whom a group can compare itself makes the behaviour of one's own group more salient. Receiving information about the performance of other groups can lead to competitive feelings and an improved performance (ibid., p. 236). Siero et al. also warn that in case of continuing bad performance, comparative feedback can have negative impacts. Under competitive conditions people tend to avoid comparisons with people who perform better. Thus, continuous telling that others perform better may result in demoralising and even worse performance. Therefore, Siero et al. (1996) suggest that changing behaviour in an organisation must appeal to the collective and not the individual and the higher the performance goal, and the more precise the goal has been formulated, the better the performance will be.

Goldstein et al. (2008) use social norms in their study about the reuse of hotel towels and conclude **that another well-established factor affecting norm adherence is the extent to which individuals identify with the reference group:**

> *"In experiment 2, we examined whether the towel reuse norm of hotel guests' immediate surroundings (i.e. the provincial norm for their particular room) motivates participation in the conservation program to a greater extent than the norm of guests' less immediate surroundings (i.e., the global norm for the whole hotel)" (ibid., p. 476).*

In other words, if the message was 'other people who used this room, reused their towels' people were more likely to reuse towels than in the case of the more general message of 'other hotel guests reused their towels'. Siero et al.'s study also suggests that managers, policy makers, and communicators implementing water efficiency campaigns should ensure that the norms of the

reference group are situationally very similar to those of the intended audience's, taking into account their circumstances and environment.

Byerly et al. (2018) refer to the fact that people respond not only to incentives, information and persuasion, but also to how these interventions are framed and communicated. Hence, altering the context within which decisions are made can encourage socially desirable behaviours and discourage socially undesirable behaviours. Thus, they conclude that choices can be swayed by the identity of messenger who suggests the behaviour change. People also respond to information that they recall from memory, even unconsciously (via priming) and to which their attention is repeatedly drawn (via salience). In the following section we draw together key overarching findings of academic and grey literature on water efficiency campaigns by outlining nine key building blocks of a successful water efficiency campaign.

4.2 Nine building blocks

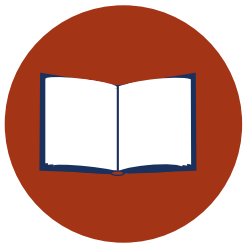
In this section we outline nine key building blocks of a successful water efficiency campaign. The first building block consists of identifying why and how relevant target groups value water. The second building block consists of the development of 'narratives and stories' that form the core of the campaign. The third step involves identifying a specific thematic frame for these 'narratives and stories'. We can then choose between different tools aimed at behaviour change, such as competition and/or referring to water use by relevant reference groups. In addition, it will be important to align structural and behaviour change measures, and to consider whether a water efficiency campaign should be combined with an energy saving one. Finally, it will be valuable to collect data about the outcomes of the water efficiency campaign, also because this provides an opportunity to evaluate its approach. The next section explains these various building blocks in further detail.

Understanding why and how water is valued

It is important to explore what values citizen-consumers hold towards water and why or why not they engage in water efficient behaviour. Apart from values a range of other factors can influence citizens-consumers' decisions in relation to water too, for example, whether people perceive water as a scarce resource.

The city of Cape Town in South Africa suffered from a severe drought in recent years and was nearing a so-called 'Day-Zero', i.e. the day when water supply would be shut off. According to Simpkins (2018) stringent water restriction limited daily use first to 87 litres per person per day and later to 50 litres per person per day. This was accompanied by regularly updated information about dam levels, daily water use etc. on a **'water dashboard'**. Simpkins (2018) cites a senior research officer at the University of Cape Town: "Capetonians have learned the value of water, and water saving hardware will now put them in a very good position to tackle any drought." For England & Wales a similar portal is offered – **Discover Water** – to inform consumers about water. It was set up by regulatory bodies, water companies and water industry organisations in England and Wales but should be publicised and advertised more widely and actively.

Narratives and Stories



The ancient philosopher Plato said that those who tell the stories rule the world. All workshop participants agreed that telling a story or shaping a narrative matters. Simple messages such as: 'Save more water' do not get through to water users. Instead it can be important to tell the bigger story, i.e. water efficiency should be linked to the wider environmental story that includes, for example, the management of a river catchment, or includes the water-energy-food nexus. The story must also resonate with existing audiences' values and could be built around a local community or organizational communities, such as a school. The idea here is to put water efficiency into context – and to make an explicit case for why it is necessary. The narrative should therefore contain an element explaining water shortages in the UK

Framing

How social norms and behaviour change are framed and communicated is an important factor for successful strategies. Framing, a term commonly used in mass communication theory and journalism, can be understood in two ways. First, it refers to how information is shaped and contextualised within a familiar frame of reference and meaning. Second, it concerns the effect of framing on members of the public. Audiences may adopt the frames of reference offered by journalists or a messenger and see the world in a similar way (McQuail, 2005). Hence, the context in which decisions are made and who conveys the message or who suggests the behaviour change, i.e. water companies, regulators or intermediaries, is important (Whiting, 2019). Also, water use is of a very personal nature. Everyone has different attitudes and values when it comes to washing, showering, toilet use etc. Hence, communication in relation to this must be adapted so as not to be felt as too personal and intrusive.

Setting realistic targets

There is a limit to water conservation as we need, for example water to wash or to wash clothes. People may need water for religious reasons and some people simply do not care about efficient water use. There may also be unintended rebound effects, i.e. a water-saving shower head may lead to longer showers.

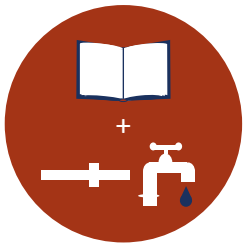
Competition

Competitions can leverage the power of social norms. Perceptions and beliefs about how members of a group think and behave relative to others have been found to be a significant incentive to participate in a competition. In other words, people like to know where they stand compared to others and they like to be told that they are good (Sieroet al., 1996; Petersen et al., 2015).

Reference groups

Reference groups are people close to us, e.g. work colleagues or friends and family. Our behaviour orientates itself to the behaviour of reference groups, also through group think. In other words, we tend to adapt our behaviour according to what is the norm within a reference group. Herein lies a significant potential for water efficiency campaigns in the public sector. Work teams or units are important reference groups and could help to influence water-saving behaviour either through competition or other behavioural change approaches, such as targeted messages containing descriptive and injunctive messages.

Align structural and behaviour change measures



Installing water saving devices or new plumbing and harnessing social norms to change behaviour can go together. Behaviour change measures seem to fail if they involve too much personal sacrifice or discomfort. However, water saving devices combined with very specific and targeted behaviour change messages may overcome this barrier. The studies by Goldstein (2008), Ek & Söderholm (2010), Steg (2008) and Mills & Schleich (2012) suggest this to be a successful strategy.

Building water saving messages on energy saving campaigns

A big factor discouraging people from water-saving behaviour is the fact that they have less control over water infrastructure as, for example, compared to energy. Switching off a light is easy but most of the water infrastructure is actually hidden. The study by Petersen et al. (2015) revealed that changing the water behaviour of others was seen as more personal and intrusive, i.e. suggesting to someone to switch off a light or turn down the heating was seen as less intrusive by study respondents compared to telling others to close the tap while brushing teeth or taking a shorter shower. One solution is to use a strategy that sends messages with different levels of appeal to self- and collective self-efficacy. For example, a message that targets shorter showers could primarily appeal to the fact that it saves energy instead of focussing on the water-saving aspect that comes with it.

Data and evaluation

Having a good data basis and regularly evaluating the effects of water efficiency campaigns that involve social norms are a precondition for successful water efficiency strategies and campaigns. Limited data or general statements in WRMPs make it difficult to assess the current situation regarding water efficiency strategies and campaigns, especially with regard to social norms and the public sector. Water companies could elicit information about the value customers attribute to water from their customer focus groups and regularly undertake evaluation studies about the effectiveness of water efficiency campaigns and strategies.

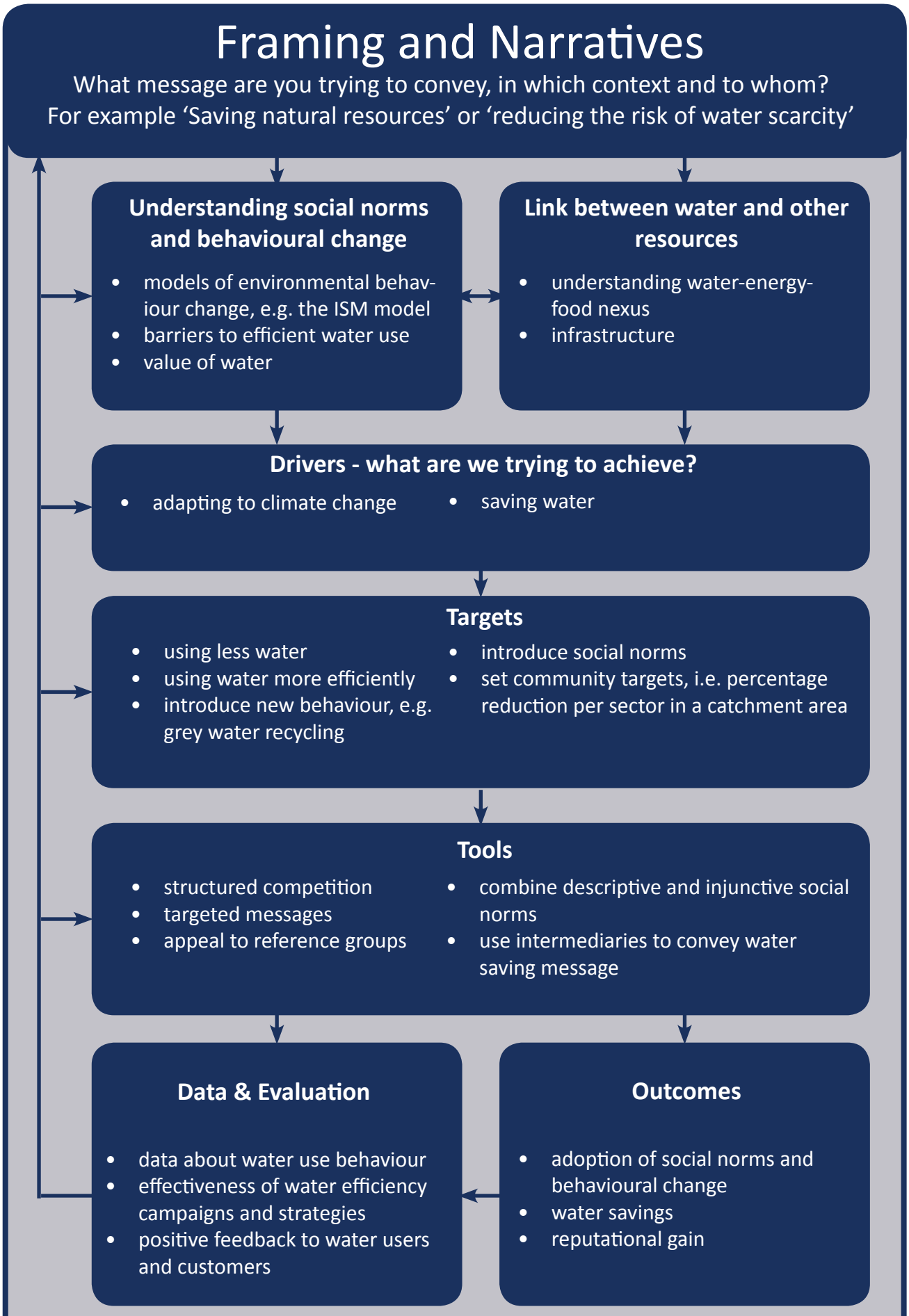


Figure 2: A model for designing water efficiency campaigns involving social norms

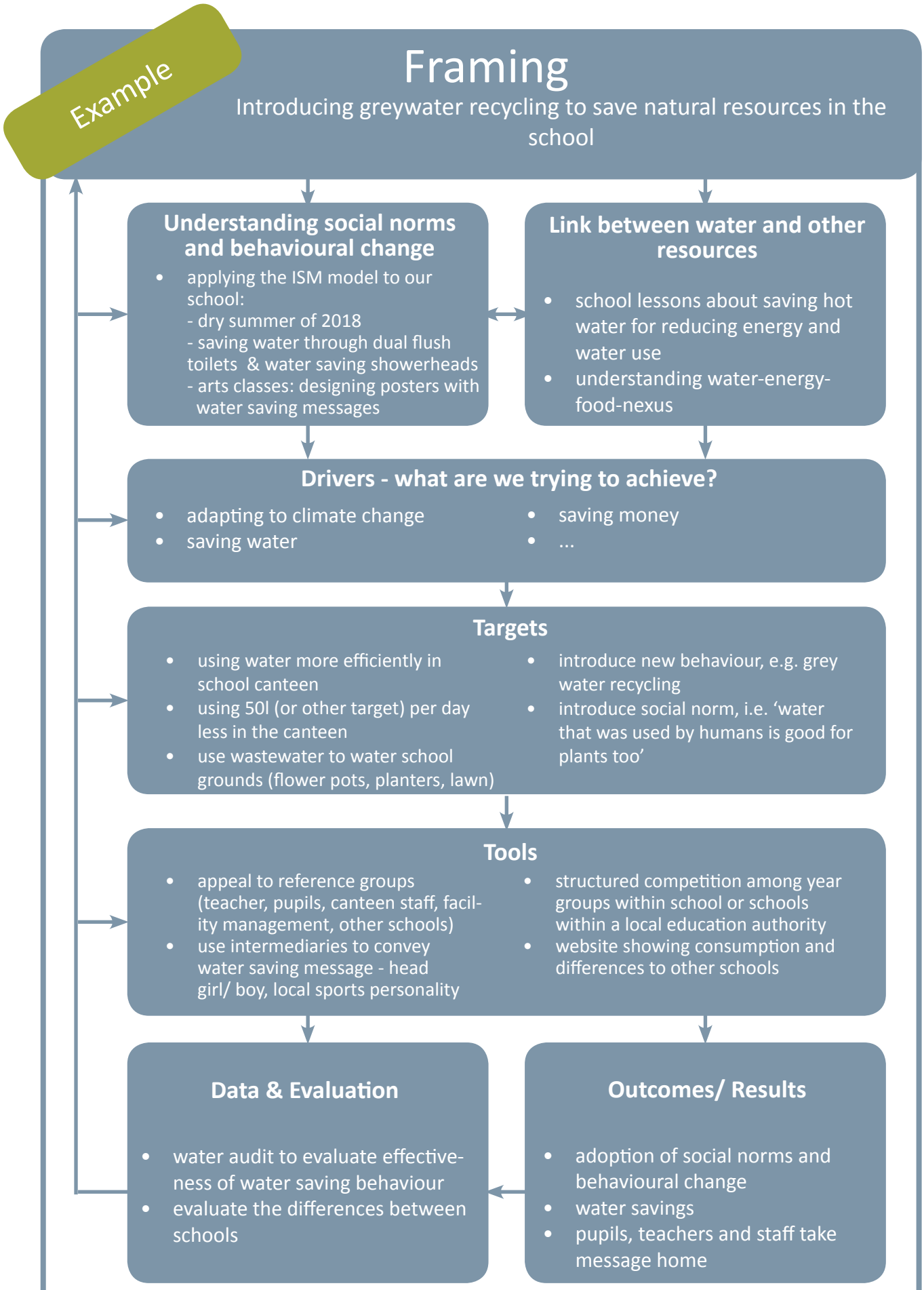


Figure 3: A water efficiency campaign in a school

This water efficiency campaign introduces greywater recycling at school canteens in order to save water and to introduce the social norm 'water that was used by humans is good for plants too'. The idea is to use water that was used in the school canteen for cooking and washing up to water interior plants as well as plants and flowers on the school grounds. Using greywater, i.e. used water is perfectly suitable for this purpose and fresh drinking water from the tap is not necessary to water plants.

This campaign draws on 'understanding the water-energy nexus' and 'understanding social norms and behaviour change'. The former is introduced in lessons to teachers, pupils and staff (canteen, facility management) and should involve the local water company. Here also the advantages and limits of greywater recycling could be discussed.

The next stage is to identify the different contexts, as envisaged by the ISM model, i.e. to capture the individual, social and material factors that influence and guide behaviour in this particular context.

This is followed by identifying barriers to water saving behaviour. Has the canteen staff or School Governors' Board experience with water scarcity or drought? Has the facility management experience with drought and water scarcity and did they have to deal with insufficient water for lawns and plants on school grounds in the past? This step also involves evaluating whether any water using behaviour needs to be de-routinised. For example, people working in the canteen may be used to draining washing up water down the sink.

The drivers describe what the reasons behind the campaign are, i.e. to save water, to save money or in a wider context to adapt to climate change. The more specific targets of the campaign are of great importance. In this case it is using water more efficiently in the school canteen, changing existing behaviour, using wastewater to water school grounds (lawn, flowers) and introducing a new social norm – 'water that was used by humans is good for plants too'.

The tools are to first of all appeal to all reference groups, i.e. pupils, teachers, canteen staff, facilities management and to use intermediaries (for example head girls/boys, famous alumni of the school) to convey the message. Since all schools within a local education authority are involved, a structured competition between all schools could be a powerful tool. This way, schools can compare themselves against other schools in their water saving efforts.

The outcomes and results are water savings, the adoption of a new social norm in relation to water use, and that the different groups, pupils, teachers, and facilities staff, take the new behaviour home, i.e. watering their gardens or flowers at home using dishwashing water or used bathing water, for example.

The last step is equally important as it evaluates the results. A water audit, carried out e.g. in conjunction with the water supplier of the school, can verify whether actual savings have been made. The results and the evaluation can then be fed back to the other stages, influencing the design of future water efficiency campaigns, and the exchange of best practice examples in a local authority area.

Box 11

Costs of water efficiency campaigns

The cost of a water efficiency campaign is a crucial factor in shaping whether water efficiency campaigns will be adopted by water companies and public sector organisations.

Waterwise has recently produced a report on 'How much do water companies spend on customer engagement in the UK and internationally?' (Lewis et al. 2018). In comparison to Australia (6%), USA (1%) EU (1%), UK water companies spend >0.2% of total company spend on water efficiency and resources communications (ibid., p. 1). However, the percentage of annual spend on engagement and communications of water efficiency and water resources was far higher in drought years for several UK water companies, around 1% for some companies (ibid., p. 10).

The engagement and communication channels vary from company to company, however:

> *"One UK water company explained that whilst there are various other topics and projects that also need communicating simultaneously, water efficiency certainly has the lion's share of airtime and as a topic, has one of the biggest communications spends and investment"(ibid., p. 13).*

The cost of a water efficiency campaign is difficult to ascertain and depends on the types of communications and engagement: leaflets, direct mail, educations via schools, home audits, outdoor media (billboards), website, print advertising, social media, digital media, radio as well as other factors such as the length of the campaign and the number of targeted people. In its survey, Waterwise asked water companies about the specific costs of communications and engagement activities (ibid., p.20/21). Unfortunately, the results are not presented in the report though.

4.3 Water efficiency campaigns in other drought prone countries

The focus of this Primer is on England and Wales and we have provided some information about water efficiency and the public sector in Scotland and Northern Ireland (see textbox in Section 1). Here we offer a glimpse into other countries, states and cities, such as California, Las Vegas in Nevada, Australia, in particular Perth, and South Africa with reference to Cape Town. The particular focus is on what public sector organisations such as municipalities are doing, the potential for creative public-private partnerships, and large employers to promote water efficiency, as well as specific campaigns developed by schools and universities.

4.3.1 USA

Here drought management and water saving measures often focus on private households, larger industries and draw in particular on the tool of water education, especially in schools, following the idea that learned behaviour in schools will then transfer to life at home, impacting the water use of children's parents as well.

In the following text we are highlighting in particular the contribution that creative public-private partnerships can make to developing effective water efficiency campaigns.

California

Between December 2011 and March 2017 California suffered a major drought event, lasting for 376 weeks and leading to further restrictions on water use, new regulations and regional water saving campaigns.

Mandatory restrictions enforced from 2015 onwards reduced California's water use by 24.5 per cent. These water savings dropped back to 11 per cent compared to 2013 when the restrictions became voluntary again. This illustrates the importance of a social norm approach in order to increase voluntary water savings, also in light of the political cost of enforced water savings.

Governor Edmund G. Brown Jr. ended the drought state of emergency in April 2017, after "unprecedented water conservation and plentiful winter rain and

snow (…) while maintaining water reporting requirements and prohibitions on wasteful practices, such as watering during or right after rainfall" (State of California, 2017).

More specifically, California aimed to make 'Water Conservation a Way of Life' (California Department of Water Resources, 2017) in order to:

1. use water more wisely
2. eliminate water waste
3. strengthen local drought resilience
4. improve agricultural water use efficiency and drought planning

All water saving campaigns in Californian municipalities have to be seen in this context. There is no specific reference to behavioural changes or social norms in those four key elements, instead a lot of it describes technological innovations or command and control type regulation. However, issues such as collaboration between state water agencies, cities, counties and stakeholders are mentioned. The first key element, use water more wisely, includes emergency conservation regulations, new water use targets and permanent monthly reporting on water usage, amount of conservation achieved and any enforcement efforts. The second key element, eliminate water waste, is comprised of water use prohibitions, minimizing water loss, including reducing leaks and accelerating data collection and innovative water loss and control technologies, including investments into research and funding programmes for water saving devices and technologies. The third key element, strengthen local drought resilience, involves water shortage contingency plans and drought planning for small water suppliers and rural communities. The former includes 5-year drought risk assessments and annual water budgets, the latter would include the development of more specific and functional recommendations in collaborating cities, counties and stakeholders. The fourth key element, improve agricultural water use efficiency and drought planning means strengthening agricultural water management plan requirements. This encompasses annual water budgets, quantifying measures to increase water use efficiency and the development of adequate drought plans for periods of limited supply.

Communities and municipalities

Public authorities like municipalities are active in California in promoting water saving: for instance, the town of Hillsborough in California has a multifaceted water conservation programme: 'Be a Saving Hero' is a regional conservation campaign reminding residents to conserve water in their private households

(Town of Hillsborough, 2019). Gardening plays an important role as well: not only refers the town's website to free Water-Wise gardening web resources (Bay Area Water Supply & Conservation Authority, 2019) but the town has also established a town water conservation garden to demonstrate low water landscaping concepts. In an educational approach the town has made available 'Water Wise Education kits through the Hillsborough City School District in the 2013/2014 school year' (Town of Hillsborough, 2019).

Education campaigns are important also in light of the fact that larger cities in California attract people from other regions in the United States that have a higher rainfall and climate. People take their learned behaviour with them, which makes education about water saving even more important – not only in schools, but also for adults.

'Save the Drop' is a water conservation campaign sponsored by the Mayor's Fund for Los Angeles during the drought period. The educational campaign for example crowned the top drought defenders, who are named on the website (City of Los Angeles, 2017) and offers a calculator to determine one's own water footprint (City of Los Angeles, 2017a). Los Angeles combined this with a drought awareness contest in schools: school teams (with students in grades 1-12) participating could win project funds by showing creative ways to save water (Los Angeles Unified School District, 2017b).

Water Tariffs

Tiered prices for water consumption as used in other states for households and businesses – see for example Las Vegas, Nevada – are a problem in California. According to Proposition 218, an addition to the California constitution specifies that government agencies are not allowed to charge more for a service than the costs for providing it. The Orange County Appeal Court ruled that San Juan Capistrano's tiered water rates were therefore unconstitutional. The implications are as of yet unclear, but it has made water agencies fearful of adopting tiered payment systems (Roth, 2015).

Schools as promoters of social norms?

Many communities and municipalities in California focus on school campaigns. There is, however, no direct reference to the use of social norms as an approach. The different programmes offer a variety of activities for schoolchildren of all ages and include testing water for its chemical elements or writing essays about water conservation (Rowland Water District, 2019). Other

campaigns focus on gardens that feature drought tolerant plants and help to educate children, their families, school staff and community members about wise water use (Monte Vista Water District, 2019). Another feature of water saving campaigns in California are innovative public sector co-operations. In 2015, the California Arts Council partnered with the California Department of Water Resources, to raise awareness through a student poster contest, the 'Conservation Creativity Challenge' (California Arts Council, 2015a, California Arts Council, 2015b).

Box 12

Grades of Green

'Grades of Green' (Grades of Green, 2019) is an interesting campaign that started as a parents' initiative and, though again not mentioning it explicitly, seems to take an approach targeting behaviour change by, for example changing habits. The initiative was founded in 2008 by four mothers at Grand View Elementary in California. After receiving an award from the Environmental Protection Agency (EPA) it was turned into a non-profit organisation that supplies other schools with tools and information for environmental education. 'Grades of Green' has a wider approach, but water is one of the topics covered. In 2017 for instance the Rogers Middle School in Long Beach, California, participated at the Grades of Green's Fall 2017 Global Water Challenge: this included changes of personal habits (turning off the tap, bringing reusable water bottles to school) and creating research based water-related posters (Stewart, 2017).

Universities

Especially during the drought period between 2011 and 2017 the pressure had been very high on universities and colleges in California to save water as well. Both have therefore taken on water saving campaigns and measures, which could be as simple as reducing the amount of water used for washing their motor pools, installing dual flush toilets, re-using grey or rain water or landscaping with drought-tolerant plants.

Others took a wider approach: private Stanford University for example established an award winning water conservation plan (Stanford University, 2019) that included various actions, such as installing water misers on steam

sterilisers after pilots reduced water consumption significantly. The university replaced more than 13,000 academic and student housing bathroom fixtures with water-efficient alternatives. The university also installed a Water Wise Demonstration Garden and weather-based irrigation controllers on campus grounds. The strategy also included an educational approach: in 2009 the format for water bills for campus residents was re-designed: “providing a graphic display to encourage customer review of their water use and consumption trends” (ibid.).

The University of California, Berkeley has set itself the goal to reduce potable water use to ten per cent below 2008 levels by 2020. By 2017 the university already managed to use almost 25 per cent less water, meeting the campus goal twice over. A closer look reveals, that the individual water use per person dropped by 24 per cent between 2007 and 2016, half of the water consumed on campus is for domestic use, i.e. showers, toilets etc. One quarter is used by lab buildings. The university also reduced leakage and focused on water changing behaviour, but also on technology: “Over 90% of irrigation systems are automated and connected to a weather station. Approximately 24,000 gallons of rainwater are reused each year for irrigation at the Boalt Law School, and there is a stormwater capture and reuse system at Eshleman Hall and Chou Hall” (Berkeley, 2019).

The San Diego County Water Authority in 2015 took its water conservation campaign to colleges as part of their regional campaign “When in Drought: Save every day, every way.” College students across San Diego County could win free food and other prizes while contributing to regional water conservation efforts.

Box 13

San Diego Water Authority

The San Diego County Water Authority has delivered thousands of refrigerator magnets with indoor water conservation tips to campuses and invited students to promote water conservation by posting “selfies” with the magnets as part of a social media campaign (San Diego County Water Authority, 2016). The magnets were distributed to housing units and university functions at Alliant International University, California State University at San Marcos, Point Loma Nazarene University, San Diego State University, the University of California at San Diego, and the University of San Diego. College students could request magnets via tweet or email. “Easy ways college students can save water include: taking shorter showers; washing only full loads of clothes; turning off the faucet when brushing teeth or shaving; and alerting their landlords or apartment managers about leaks, runoff or other potential water waste on their properties” (ibid.).

Water restrictions for universities

At the height of the California drought universities also faced water restrictions: the University of the Pacific’s water supplier mandated that the university had to reduce water consumption by 20 per cent at the Sacramento Campus and the Stockton Campus. “Here Pacific has already reduced its potable water use by 25 percent since 2013, and 48 percent since 2011” (Pacific Gas & Electric Company, 2019). Measures at the Stockton Campus included mostly technological fixes - for instance, replacing sprinklers with drip irrigation and compost, more than 1,500 new water faucets with low-flow aerators and 700 low-flow showerheads and a water recycling system in the greenhouse. Under discussions were also an education campaign for the campus community, low flow toilets and drought-tolerant landscaping (ibid.).

Partnerships between non-profit organisations and public authorities

CoolCalifornia focuses on climate protection. Among the founding partners are State Government Agencies, like the State of California Energy Commission and the Governor’s Office of Planning and Research, University institutions like Berkeley Lab and the non-profit organisation Next10 (Cool California, 2019a). The mission is to provide Californians with the necessary tools to protect the climate, among the topics is also water.

No-cost-steps to save water include the improvement of water conservation awareness in businesses, including employee awareness, and a water conservation programme: “Provide water efficiency information to employees so they can incorporate water efficient retrofits and landscaping into business practices and homes and schools” (Cool California, 2019b). The website provides a checklist. An interesting and important aspect is the idea to “promote employee participation”. These ideas could be adapted to and built upon in a number of organisations in a range of jurisdictions:

- initiate your awareness program with a letter directed to each employee from the head of your business. The letter should describe the established conservation policies, identify the water efficiency coordinator, express full support for your business’s conservation plan, and invite feedback.

- continually emphasize the need for individual responsibility as part of a team effort to reduce water consumption.

- establish a ‘water-saving idea’ box or listserv and encourage all employees to submit ideas. Respond to each suggestion offered.

- water conservation policies could also be incorporated in training programs.

- use office communications (staff meetings, e-mail, newsletters, paycheck stuffers) to transmit ideas, policies, progress reports and achievement announcements.

- post water conservation stickers, signs and posters in bathrooms, kitchens, cafeterias, conference rooms and other places where employees congregate.

CoolCalifornia also suggests establishing employee incentives (ibid.):

- recognize and reward those employees who submit water-saving ideas.

- potentially include water consumption measures in employee’s job performance reviews.

- consider motivating employees by rewarding them with a percentage of the first year’s direct savings.

- allocate water and sewer costs to each individual department to create responsibility for water efficiency.

- organize and promote water conservation competition between divisions or teams.

A designated water coordinator could educate employees to e.g. turn off water while washing hands and dishes. The initiative also discusses low-cost (detecting and repairing leaks, installing faucet aerators or low flow showerheads) and avoiding unnecessary water use outside (for instance drought-resistant landscaping). Long-term investments include recycling facilities for the reuse of water.

Las Vegas, Nevada

Cities and public water authorities are active in various ways in promoting water saving in Nevada: Las Vegas' approach to water saving combines rigorous enforcement of regulation, generous grass removal campaigns and education campaigns. Developers, for example, are no longer allowed to build new homes with a lawn in their front yard, grass is limited to common areas and backyards. Golf courses around the city pay heavy fees, if they exceed their water budget. Steeply tiered prices for water supply for households and business owners should also encourage water saving (Roth, 2015).

The Southern Nevada Water Authority convinced homeowners, small businesses, golf courses and the gaming industry to take water conservation seriously. To get people on board a wide-ranging citizens' committee was formed to help develop and promote new rules. Moreover, committee members became advocates and spokespeople in the community (Southern Nevada Water Authority, 2019a). A Water Conservation Coalition was established in 1995 as a public-private partnership to encourage water efficient business-practices (Southern Nevada Water Authority, 2019b).

In the case of Las Vegas, it helped that drought conditions were clearly visible: drought could be seen as declining water levels of Lake Mead, one of the Colorado river's primary water reservoirs. Southern Nevada relies on the Colorado River for 90 per cent of its water supply. Since 2000 the water level here has dropped by 130 feet (Southern Nevada Water Authority, 2019).

4.3.2 Australia

The picture of water efficiency campaigns in Australia is complex also because of variation in who supplies water in the different states.

In Western Australia, South Australia and the Northern Territory water is provided by state-owned companies, while local providers are responsible for water supplies in Queensland and Tasmania. The situation in New South Wales, Victoria and Southeast Queensland is again different: Here state-owned utilities provide bulk-water, which is then distributed by utilities owned by either local or state governments. Because the situation differs from state to state, it is impossible to give an overall picture, but some examples will show the different approaches to water saving campaigns in drought prone areas like Perth, one of the driest cities in Australia.

Perth

According to an estimation of Australia's Climate Council the water flow from rainfall into Perth's dams has slumped by 80% since the 1970s. And the situation could get worse: The precipitation in this corner of Australia could drop by up to 40 % by the end of the century (Milman, 2015). Already Perth's dams cannot fulfil the water demand of its population. The city therefore relies on an additional desalination plant, which was built to reduce groundwater extraction, which until the early 2000s was the city's second main water source (Morgan, 2018). Above that technological and behavioural changes are necessary to fight the on-going water crisis.

The Water Efficiency Management Plan of the Western Australia's Water Corporation

The Western Australia's Water Corporation therefore introduced a Water Efficiency Management Plan, as part of a range of mandatory water efficiency measures and in this context works with companies that use more than 20 megalitres of water each year (Milman, 2015). This includes: free training sessions, free data loggers transmitting water consumption data, access to studies on water saving, a certification for companies to promote themselves as water-conscious and other measures (Water Corporation, 2019a; Water Corporation 2019d).

The Western Australia Water Corporation launched other campaigns as well to reduce water usage for example a Waterwise Irrigation Controller Rebate (Water Corporation, 2019e), shower head swaps (Water Corporation, 2019c), plumbing retrofits (Water Corporation, 2019b) and a Waterwise Towns Program (Water Corporation, 2019f). The latter is aimed at communities across Western Australia: “Each year we work closely with households to help them save water in their homes and gardens. Included in our water saving programs is a series of letters containing personalised water use information. They are created to help you understand your water use habits, find new ways to save water and even identify leaks” (ibid.).

A colonial past promoting water use

In order to understand the situation, and urban water use in Perth better it is worth looking into the city’s past (Morgan, 2018). Since its foundation water supply had been an issue in Perth as a growing city. Originally provided with water from the Darling Range until the early 20th century, periodic water famines in poorer suburbs had been quite common. In the early 1920s voters finally convinced the state government to invest in a more reliable water supply system. But the new systems soon proved inadequate – not least because of changed and deeply entrenched water use: “personal and household cleanliness was associated with white civilisation, morality, and feminine domesticity. Green lawns and English-style gardens upheld the perceived values of a cultivated and ordered streetscape, while also cooling the home and keeping dust at bay” (ibid.).

Increasing accessibility of water helped to meet these standards even in dry summers. Water use was here closely related to a colonial narrative that shaped a standard way of living influenced by western culture and European climate, without adjusting to local circumstances. The Western Australian government met these new demands by building additional dams and from the 1960s onward, when the city experienced an economic boom, also by exploiting the groundwater reserves beneath the suburbs. With growing pressure on water resources the government finally introduced voluntary water restrictions, which later were became more severe, for example by regulating when people could water their gardens.

4.3.3 South Africa

Cape Town is one of the most prominent examples of drought problems that made it into international media coverage in 2018. The city – even though water use restrictions were already in place – was nearing Day Zero, the day the city would run out of water completely. Even though the worst was avoided, restrictions still have to be kept in place and from 1 March 2019 onwards, Capetonians should not use more than 105 litres per person per day, check and fix leaks, irrigate only at allocated times, use drippers for micro-irrigation and wash vehicles using only a bucket (City of Cape Town, 2019b).

A new water management plan for the city of Cape Town

Since the urgent drought situation, a new water management plan has been developed, which is currently in the public consultation phase (City of Cape Town, 2019a).

The draft plan makes no direct reference to further actions by the public sector but mentions behavioural changes as part of the city's communication strategy. It also acknowledges that "while demand can be influenced by City actions, the behavioural choices of users are outside of the direct control of the City (…)" (City of Cape Town, 2019a). This again illustrates the significance of a social norm approach, i.e. the embedding of wise water use values in citizen-consumers' attitudes and understandings in order to promote efficient water use in an enduring manner and thus for the longterm.

The roadmap set out in the draft water management plan "takes into account the important yet complex relationships between water, people, the economy and the environment to set out five commitments which support its realisation", as stated in the executive summary (City of Cape Town, 2019a). The plan contains five key strategies:

- safe access to water and sanitation;
- wise use, including pricing, provisions for free water to those who cannot afford water, new by-laws and incentives to support water efficiency;
- sufficient, reliable water from diverse sources (groundwater, water re-use and desalinated water);

- shared benefits from regional water resources, i.e. collaborating with agricultural water users;

- a water-sensitive city, for example by using stormwater and urban waterways for the purposes of flood control, aquifer recharge, water re-use and recreation.

Box 14

Further reading

USA

New York Times (2015). A culture of nagging helps California save water

Washington Post (2015). Here is how California expects its citizens to save 400 billion gallons of water

Los Angeles Times (2015). Students, campuses in state add saving water to college life

Regional Water Authority. Building Alliances in Northern California: Program Activities and Accomplishments

Australia

Campaign Brief (2018). Nature urges humans to save water in new Water Corporation campaign

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC)

4.4 Social Learning

So far, this Primer has suggested that social norms are an important 'missing link' for achieving water efficient behaviour change also in public sector organisations. Yet, we may ask why would public sector organisations want to promote social norms geared towards water efficient behaviour? We suggest that this is important for two reasons. First, there is currently a lot of focus on private water companies in the UK as key organisations for dealing with environmental and societal challenges such as climate change. But public sector and large organisations who use water have an important role to play, too. Second, understanding and changing behaviour in relation to water use can be part of wider organisational learning processes that may be of significant benefit to organisations beyond the specific context of being resource efficient. An interesting strand of academic literature suggests that the adoption of social norms can form part of the wider social and organisational learning processes that organisations engage in:

Box 15

Social learning (1 of 3)

Sustainable development plays an ever increasing role not just for private companies but also for public sector organisations such as schools, universities, hospitals, local councils and government departments. On a practical level this involves e.g. green procurement but it also relates to the sustainable behaviour of organisations and their members, i.e. their workforce. More than five million people are employed in the UK's public sector. Hence, the sector has a huge influence and power over the use of resources, and consumption patterns. It also means the public sector carries has a great opportunity for dealing with economic, ecological and social challenges, including climate change

A number of academic disciplines discuss learning but often focus on the individual. Here we are more interested in collective learning processes and their dynamics, for instance the diffusion of new knowledge in groups. Organisational learning is discussed in particular by two academic disciplines, business management and social psychology. Business management literature defines social learning as:

> "Social learning is more than the sum of individual learning, it is a collective process; organisational learning is about collective learning processes as well and is based on knowledge exchange among its members" (Argyris & Schön, 1996).

Social psychology emphasises behaviour change as a result of knowledge change through learning:

> " (…) social learning can be understood a process of change on a society level that is based on newly acquired knowledge, a change in predominant value structures, or of social norms which results in practical outcomes" (Luks & Siebenhüner, 2007).

Three types of organisational learning can be distinguished (Argyris & Schön, 1996; Pahl-Wostl, 2009):

Single-loop learning: people, organisations or groups modify their actions according to the difference between expected and reached outcomes ('removing symptoms').

Box 15

Social learning (2 of 3)

Double-loop learning: in addition to single-loop learning, double-loop learning corrects or changes the underlying causes behind the problematic action.

Triple-loop learning: also called 'deutero learning' reflects on how we learn in the first place: "learning how to learn".
In practical terms, a single-loop learning process with regard to water efficiency would involve to install water saving devices, without user patterns changing. A double-loop learning process would trigger a behavioural change, i.e. altered user patterns (for example: turning off the tap while washing the dishes in the office kitchen). **Triple-loop learning would then reflect upon the learning process, i.e. why people were open to particular learning opportunities in the previous steps thereby improving the internal organisational learning process.**

For the purposes of water efficiency campaigns and strategies with public sector organisations, double-loop learning is certainly the more interesting one and it can lead to incremental or radical changes. Important for instigating change are 'change agents' and collaborations (e.g. self-organised learning groups, projects and internal communication channels (intranet, Slack)) across all hierarchical levels of an organisation. Change agents are able to initiate specific learning processes and are typically recruited from the management level. They exercise their influence via internal platforms and workshops using participative leadership. Change agents can communicate behavioural change interventions (Byerly et al., 2018).

Triple-loop learning, very interestingly, involves structural changes in the governance regime:
Translated to water efficiency or water saving in general this could mean changing factors that determine the frame of reference of policymakers and the governance structure. In other words, it requires fundamental changes in the perceptions and mind-sets of actors as well as changes to norms and values and the governance structure (ibid., p.4591). A third-loop change may be to accept that some areas in the UK will be scarce in water resources during some times of the year, and to focus here social norm campaigns leading to behaviour change, instead of focusing on increasing supply.

Box 15

Social learning (3 of 3)

> "Like policy making, coping with uncertainties is an iterative and stepwise process during which constraints and boundaries are met. When changing actions and frames is no longer sufficient, large-scale governance changes (referred to as "transformations") are required to effectively cope with the uncertainties" (Warmink et al., 2017).

"We need to integrate drought into the greater environmental story."

Fiona Lobley, Environment Agency

Chapter 5

Conclusion and Recommendations

Current water efficiency campaigns and strategies in England & Wales focus on individual households and private businesses. Water efficiency in public sector and large organisations, with a more 'public' dimension than private individual households, such as workplaces is only discussed in a handful of studies. The main tools currently used in England & Wales by water companies are water saving devices and messages to reduce bills. While these approaches may be helpful when a financial decision precedes the behaviour, "voluntary approaches offer an alternative avenue to encourage climate resilient water behaviors, including those not underpinned by financial considerations" (Lede & Meleady, 2019).

> "Importantly, these approaches do not require wide-sweeping legislative or infrastructural change or financial incentives" (ibid., p.2).

But water saving behaviour is influenced not just by individual decisions, but social and psychological drivers such as social norms, values, group behaviour and external factors (culture, family behaviour, infrastructure and regulations). This is reflected in current theoretical approaches and we introduced, in particular, the ISM model that enables to systematically capture this in specific circumstances.

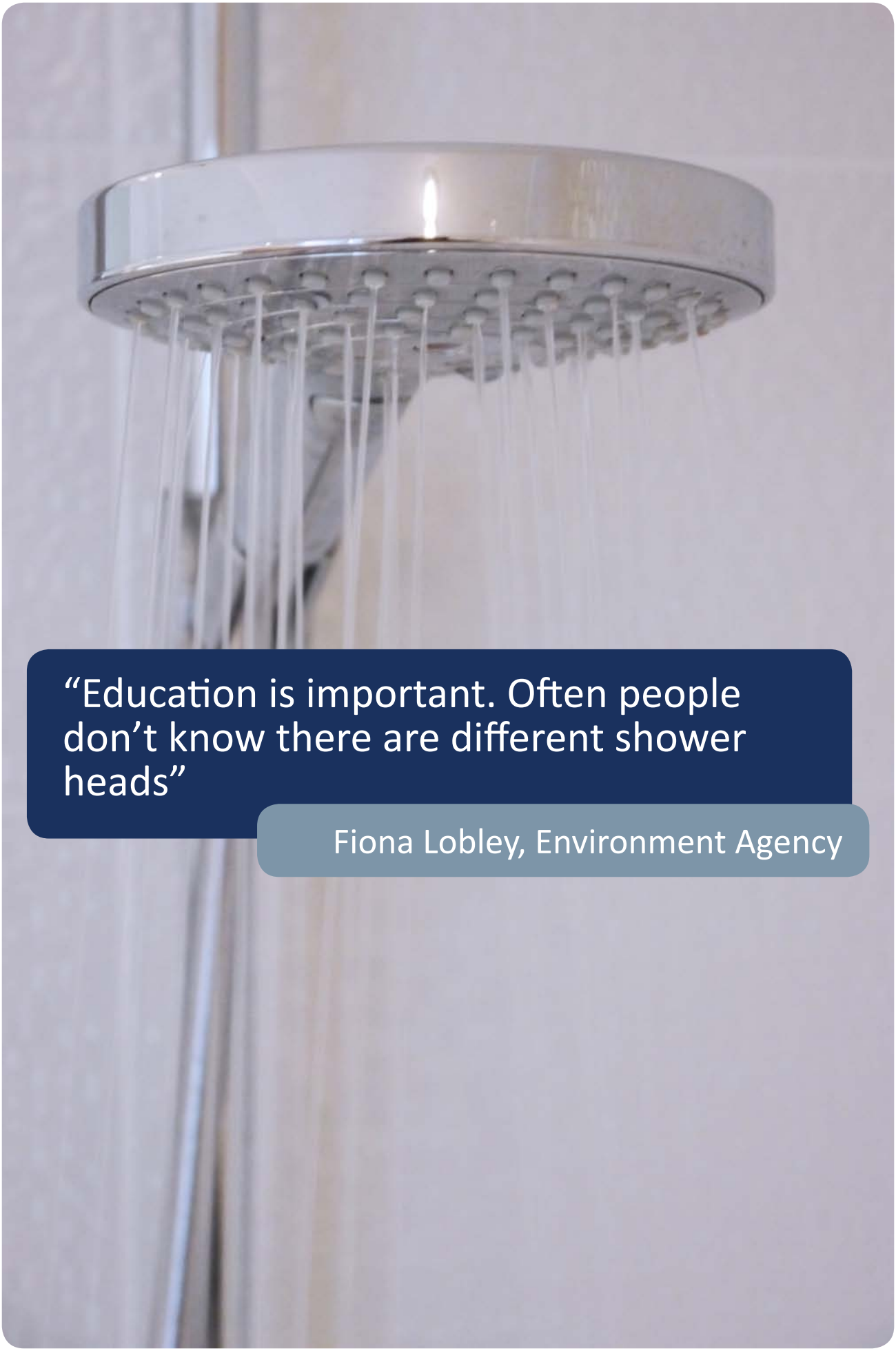
How behaviour change is framed and communicated is another important factor. Telling the bigger story and embedding water efficiency into the wider discussion about environmental change, yet at the same time resonating with peoples' existing values could be the way forward. We have highlighted here studies that show that e.g. water saving competitions can increase water saving behaviour, for example in schools or various work departments.
Hence, we suggest:

- there is an opportunity for the public sector to act as a role model for other sectors, such as the third sector and private households. A large majority

of the workforce spends their days at workplaces where they use water for washing hands, in the office kitchen, water is used in the canteen, and for showering, the latter in particular if there is an increase in cycling to work.

- there is an opportunity for the public sector to carry out a 'multiplier' function. If water saving behaviour is implemented e.g. at work, this behaviour may also be applied at home, but also vice versa (Darnton & Horne, 2013). People who engage privately in water saving behaviour may have an influence upon their peers in larger organisations in which they may work.

Water saving is both a public-private sector task. Public sector organisations are well placed to start water saving behaviour initiatives themselves, for example as a competition among departments or in the context of staff engagement weeks, or by including water efficient appliances in their procurement activities. There is scope for water companies and the public sector to increase their cooperation on this issue.



“Education is important. Often people don’t know there are different shower heads”

Fiona Lobley, Environment Agency

Appendix 1

Overview of non-household demand (1 of 8)

This table presents an overview of non-household demand with a focus on public sector organisations per water company based on WRMPs 2014-2019

Water Company	Non-household demand with focus on public sector	Comments
Water Company 1	non-household demand (2011/12): public administration and defence, compulsory social security: 3.4%; education: 3.43%; health and social work: 4.21%; other community, social and personal service activities: 9.48%	
Water Company 2	growth in non-household demand in the Upper Rissington supply zone after that a forecast of stable non-household demand	no specific data
Water Company 3	non-household demand dominated by agriculture, forestry and fishing; manufacturing, wholesale retail trade, food, accommodation and others non-household demand projected to decrease from 275 Ml/d to 273 Ml/d between 2017-8 to 2045 non-household demand forecast to constitute by 2045 about 22% of total demand	

Appendix 1

Overview of non-household demand (2 of 8)

Water Company	Non-household demand with focus on public sector	Comments
Water Company 4	most non-household demand is in business services, agriculture, public administration and hotels and the leisure sector, which do not comprise a large portion of overall demand	no numbers, increase in non-household demand expected due to higher economic growth in the region
Water Company 5	non-household demand accounts for 23% of the total amount of water put into the distribution system the forecast by industry code anticipates an increase in non-household demand from 2019/20 of 59.5 Ml/d to 67.5 Ml/d by 2044/45	no sectoral breakdown
Water Company 6	metered non-household consumption is 21.3 Ml/d, this is about 23% of total demand unmetered non-household consumption is an insignificant component of the overall water balance general increase in non-household demand forecast	no sectoral breakdown

Appendix 1

Overview of non-household demand (3 of 8)

Water Company	Non-household demand with focus on public sector	Comments
Water Company 7	by 2040 the annual demand for water from commercial users is forecast to be 10,090m^3, that is ca. 5.8% of the total demand for water in the area supplied by Water Company 7. a particular estate, the largest agricultural and commercial user of water, uses 21% of overall demand in a dry year	limited data
Water Company 8	non-household consumption (2011/2012) listed for other, shops, pub/hotel/club, farm/ small holdings and industrial but no public sector slight increase in non-household demand mainly due to climate change	difficult to interpret figures no definition of category 'other'
Water Company 9	2019 WRMP this water company's figures differentiate for measuring non-household demand: 'Health': ca. 10 Ml/d, ca 6.3% of total demand 'Public Administration and Defence': ca. 2 Ml/d, ca 1.3% of total demand 'Education': ca. 10 Ml/d, ca 6.3% of total demand. total non-household demand constituted about 21% of distribution input in 2015/6	

Appendix 1

Overview of non-household demand (4 of 8)

Water Company	Non-household demand with focus on public sector	Comments
Water Company 10	non-household demand (2011/12): WRZ 1: public sector: 4%; WRZ 2: public sector: 2.1%	definition of public sector: organisations which are mostly funded by government and will be affected by public finances examples: hospitals, schools, councils, prisons, police, fire services, etc.
Water Company 11		see Water Company 3
Water Company 12	non-household demand (2011/12): Northeast WRZ: public sector: 7.5%; public sector Northeast including Teeside: 9.6%	same company as Water Company 10
Water Company 13	metred non-household consumption: 0.0172 Ml/d (2012/13) forecast to raise to 0.4845 in 2039-40 the 2012/3 metered non-household consumption constituted 71% of the total consumption	only four non-household consumers

Appendix 1

Overview of non-household demand (5 of 8)

Water Company	Non-household demand with focus on public sector	Comments
Water Company 14	decline in overall non-household demand (transition to service economy, efficiency and leakage reduction) Public administration, education, health: 18.5%	
Water Company 15	This water company's Business Plan refers to non-household customer demand remaining stable for the period of 2015-21	no specific data found
Water Company 16	non-household demand (2012/13): Actual consumption public administration and defence: 14.9 Ml/d; ca. 1% of total distribution input education: 28.4 Ml/d; ca 2% of total distribution input health and social care: 22.6 Ml/d: ca. 1.5% of total distibution input	
Water Company 17	non-household demand (2012): education: 9%; public administration, national defence, compulsory social security: 6%; medical services: 6%	

Appendix 1

Overview of non-household demand (6 of 8)

Water Company	Non-household demand with focus on public sector	Comments
Water Company 18	non-household demand (2012/13): education: 3.16 Ml/d; ca. 1% of distribution input commercial public services: 1.57 Ml/d; ca. 0.5% of distribution input hospitals: 1.63 Ml/d; ca. 0.5% of distribution input sport and recreation: 1.30 Ml/d, ca. 0.43% of distribution input	
Water Company 19	non-household demand (forecast consumption 2014/15): education and health: 10.08 Ml/d in a normal year (2.52% of the total demand forecast) and 10.32 Ml/d in dry year (2.58% of the total demand forecast)	table also lists 'other services' and 'other non-services' without specifying what the categories are constituted of
Water Company 20	non-household demand (2011/2012): government & other services: 24.9%	
Water Company 21		no data found

Appendix 1

Overview of non-household demand (7 of 8)

Water Company	Non-household demand with focus on public sector	Comments
Water Company 22	non-household demand (2011/12): residential healthcare: 10%; non-boarding school/college: 7%; sports facilities: 5%; boarding school/college: 5%; other services (emergency services, healthcare, etc.): 2%	
Water Company 23	non-household demand is about 18% of total demand forecast for non-household demand is fairly flat	further data in Appendix G of the water company's WRMP 2014
Water Company 24	for 2017 ca. 62% of demand for water is non-household demand	no sectoral breakdown
Water Company 25	supply to 120 commercial properties and to Ministry of Defence premises, non-household demand was about 64% in the water-balance 2016/7	no further sectoral breakdown
Water Company 26	non-household demand forecast for 2044-45: government: ca. 18 Ml/d, i.e. ca. 4.6% of total forecast demand	

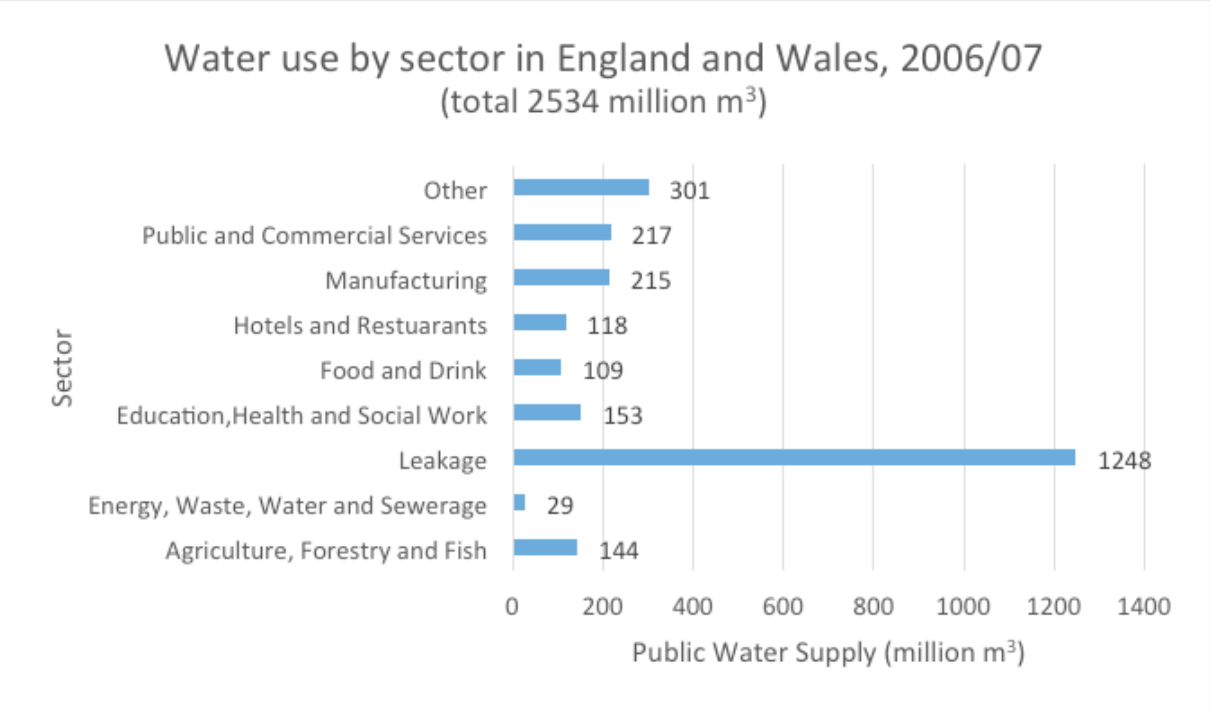
Appendix 1

Overview of non-household demand (8 of 8)

Water Company	Non-household demand with focus on public sector	Comments
Water Company 27	non-household demand (2011/12) with potential impact by dry weather: sport, recreation and other personal services: 10.8 Ml/d (11.7%) In the revised draft WRMP September 2018 non-household demand is forecast to be slowly declining to 18 Ml/d, constituting ca. 1.4% of total forecast demand by 2043/44	no further sectoral breakdown
Water Company 28	hospital, schools and public sector offices: 22.09% (percentage of demand)	

Appendix 1

Water use by sector in England and Wales



Source: Defra (2012) Note that the numbers and sectors are not further specified, e.g. there is no definition or information of what is, for example, subsumed under public and commercial services.

Appendix 2

Water efficiency in Wales, Northern Ireland and Scotland

Wales (1 of 4)

Welsh Government: Water strategy for Wales

The Water Strategy for Wales contains a general commitment to help both domestic and business customers of water supplies in Wales to become more efficient in their use of water. 'Resource Efficient Wales' (http://www.resourceefficiencywales.co.uk/) already provides advice and training in relation to environmental management issues to communities, households and public sector organisations.

There are legal provisions that further specify the preparation of Water Resource Management and Drought Plans in Wales:

The Water Resources Management Plan (Wales): Directions 2016

This Direction of the Welsh Ministers addresses water undertakers whose area is wholly or mainly in Wales. It imposes various requirements upon undertakers, including:

- to set out specifically in their Water Resources Management Plan how often they expect restrictions of water supply to occur through drought orders and emergency drought orders.
- to set out what specific methodologies water undertakers have employed in order to develop measures for ensuring the supply of water.
- to assess the amount of greenhouse gas emissions resulting from the water resources management options chosen by the water undertaker.
- how the implications of climate change have been taken into account in the demand and supply forecasts set out in the Water Resources Management Plan.

Wales (2 of 4)

Similar matters are covered by The Water Resources Management Plan (England) Direction 2017. But the English Direction explicitly requires water undertakers wholly or mainly operating in England also to:

- set out demand from non-household premises where the water undertaker supplies such premises itself or where the water undertaker sells water to new licenced suppliers who provide water for non-household premises, which includes public sector organizations.

- set out programmes for managing and reducing leakage.

The Drought Plan (Wales): Direction 2017

This Direction from the Welsh Ministers requires water undertakers whose area of operation is wholly or mainly in Wales to address specific issues in their five yearly Drought Plans. Among these are:

- the magnitude and duration of droughts for which the Drought Plan has been tested.

- an account of the management structure that the water undertaker will put into place during a drought.

- the permits and approvals that the water undertaker might need, and what discussions have occurred between the water undertaker and the relevant statutory bodies in order to prepare for obtaining such permits and approvals.

- the mitigation measures that may be required in order to address adverse environmental effects of drought management measures, as well as potential compensation that may need to be paid in order to implement drought management measures.

Wales (3 of 4)

Very similar matters are covered in the Drought Plan (England) Direction 2016.
Welsh Government guiding principles for WRMPs and Drought Plans applicable to Wales:

Welsh Government guiding principles for WRMPs

Welsh Government guiding principles for Drought Plans

Detailed Guidance by Natural Resources Wales for writing Drought Plans: Drought plan guidance

Technical Guidance issued jointly by Natural Resources Wales and the Environment Agency for writing Water Resource Management Plans:
NRW, EA, 'The Water Resources Planning Guideline: Interim update', July 2018

Note that the power to declare water areas as stressed only applies to England, not Wales and there is therefore no compulsory metering of water supply in Wales.

Welsh public sector organizations have to 'carry out sustainable development' – a springboard for water efficiency campaigns

Public sector organizations in Wales are under a legal duty to promote the well-being of future generations. More specifically, section 3 (1) of the Well-being of Future Generations (Wales) Act 2015 requires public bodies to 'carry out sustainable development'. To that end public bodies must publish well-being objectives. These well-being objectives, in turn, should contribute to achieving the well-being goals, which are set out in section 4 of the Act. Water efficiency campaigns could contribute to the realization of in particular the first 3 goals: 'a prosperous Wales', 'a resilient Wales' and 'a healthier Wales'. 'A Resilient Wales' is further described as entailing functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to climate change.

Wales (4 of 4)

The following are some of the Welsh public sector organizations upon whom the legal duty to 'carry out sustainable development' is imposed and which could make a significant difference to water use patterns:

- Local Authorities
- Local Health Board
- Public Health Wales NHS Trust
- Velindre NHS Trust
- National Park Authorities
- Fire and Rescue Authorities
- Natural Resources Wales
- The Higher Education Funding Council for Wales
- Sports Council of Wales

Public Services Boards in Wales can be an important channel for further developing policy and communicating water efficiency messages.
Further information: Well-being of Future Generations (Wales) Act 2015

Northern Ireland

The water undertaker for Northern Ireland, Northern Ireland Water, provides on its website a range of water saving tips for business and other organisations:

This includes an indication of what constitutes 'normal' water consumption for e.g. wash/toilet facilities, canteens and cleaning.

Scotland

Under the Pollution Prevention and Control (Scotland) Regulations 2012/360 (PPC) (as amended) (e.g. Reg. 23) SEPA requires large industrial installations that need a permit to operate to carry out a systematic assessment of resource use and efficiency.

This also covers efficient water use:

- More specifically, SEPA encourages the routine monitoring and recording of water inputs and outflows, including to pinpoint where water losses occur in the internal plumbing infrastructure of the organization.
- SEPA recommends using grey or harvested water and/or reusing water discharges with / without treatment where appropriate.
- A water efficiency campaign that would include water audits along these lines would also be valuable for public sector and large organizations that do not need a permit to operate.

Documents:

- SEPA: Scotlands National Water Scarcity Plan
- Further information about water scarcity, including updated reports about water levels, can be found on SEPA's website

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