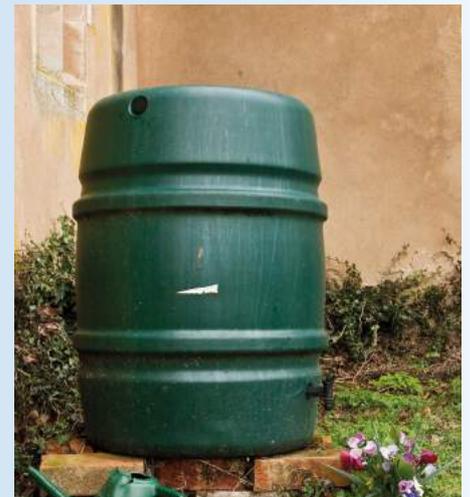
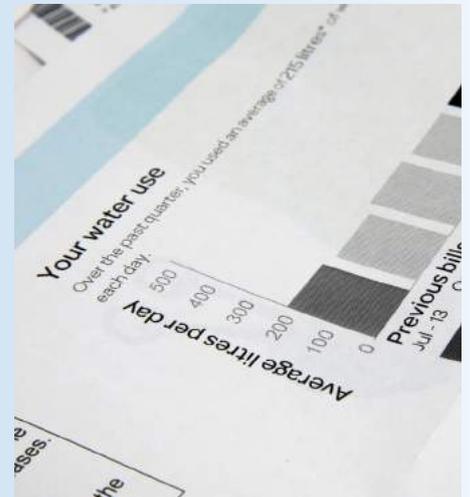


# Water Efficiency

*helping customers to use less water in their homes*



# Water efficiency

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## Purpose

Despite being regarded as a country of fairly inclement weather, the UK has less water available per person than most European nations. Using water more efficiently will help ensure that bills remain affordable and water supplies are reliable now and in the future.

Water professionals have a responsibility to encourage water efficiency to ensure an appropriate balance between society's demand for water and environmental requirements to support valuable habitats and species.

The purpose of this report is to identify actions that are recommended by a wide range of stakeholders to encourage greater water efficiency in the UK. It is largely focused on long-term, sustainable water efficiency in households and how water companies can work with stakeholders to achieve this. The efficiency of water use in other sectors is also an issue but beyond the scope of this report.

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## Executive summary

Reducing pressure on water resources is necessary, not only by developing new resources, but also in tackling the inefficient use of water. Being water efficient means taking simple steps to reduce water use and employing water-saving technologies which will also save both energy and money.

Encouraging customers to use less water and therefore save on their bills, raises challenges for an industry which is in a large part focused on selling water by volume. Market forces alone are unlikely to achieve efficiency aims and therefore the industry is regulated and incentivised to be able to influence such behaviour by its customers.

There are a range of measures that will be needed to establish greater water efficiency, such as metering and smart metering, the use of well-designed tariffs, water efficient labelling, retrofitting water saving products, standards for new homes and water neutral developments. All these mechanisms will help drive down average water use by the population providing a significant contribution to reducing overall demand. The Government, regulators, local authorities and the water industry must work collaboratively with all stakeholders to deliver meaningful, measurable and impactful change in these areas.

### *Partnerships*

There are many different groups who have an important role to play in delivering water efficiency, including manufacturers, retailers (from national organisations to smaller local businesses), social landlords, local authorities, consultants and contractors, community groups, charities and academics. Partnership between these kinds of organisations will be critical to enable real change in how we use water. We recommend that:

- A water saving forum should be established, with a clear mission to develop credible and technically robust approaches to determine the most effective ways of reducing consumption. It should be held to account by Ofwat to achieve its stated aims.

### *Providing incentives – metering, tariffs and charging*

Payment based on consumption is the fairest way to charge for water services. It will encourage households to achieve real reductions in household water use whilst encouraging society to place a greater value on water, and offering customers the opportunity to reduce their bills by being more efficient. We recommend that:

- Water metering should be compulsory in areas where water resources are under stress to encourage reductions in consumption. It should be implemented as soon as practical to encourage water efficiency, alongside appropriate tariffs and measures to protect those on low incomes.
- Smart metering and charging can deliver additional water efficiency and other benefits beyond basic metering. Water companies should investigate how best to provide water use information to customers, taking account of the latest technological opportunities.
- Relevant UK Government departments, agencies and regulators should consider how incentives such as progressive tariffs and pricing could

encourage greater levels of water efficiency. Further evaluation of practical, technical, economic and social issues associated with household water tariffs needs to be undertaken and used to inform charging structures as soon as possible.

### *Understanding water use*

There is now a greater understanding of average household water consumption levels but there is still a relatively poor understanding of how and why this varies from property to property. We recommend that:

- The water industry, Waterwise and other stakeholders should develop and implement projects to improve our understanding of household water use, with a particular focus on water using behaviour across the population and in times and places of low water resources availability.
- Water companies, the Government and regulators should also do more to understand how to influence water use behaviour through the application of appropriate incentives, 'nudges' and awareness.

### *Improving the water efficiency of existing properties*

There needs to be more efficient use and management of water in buildings to reduce demand. We recommend that:

- The European Water Label for new water-using products is welcome and the programme sponsors should extend the scheme beyond bathroom products to all water using devices.
- Water efficiency measures that reduce hot water use should be available as part of the Government's future energy efficiency incentive scheme.

### *Raising standards in new homes*

A significant amount of new housing is required in the UK in order to match housing demand forecasts. It is important that new housing is designed and built to high water efficiency standards and water use standards will be needed to deliver water efficiency as part of this. We recommend that:

- Product-level standards rather than property-level standards should be adopted and implemented for new homes. This will overcome the criticism of calculations used to determine property-level standards and enable planners and developers to fit more proven water saving devices.
- More stringent standards should be made mandatory for all new homes in areas of designated water stress.
- Exemplars for water efficiency should be developed and the practicalities of delivering water neutrality around new developments should be tested further.

## Why be water efficient?

Growing national demand for water, as a result of a growing population and the requirements of agriculture and industry is driving the need to use water resources more efficiently. There is also strong political pressure on the water industry to constrain any price inflation in water bills and legislative requirements to retain enough water in the environment to protect important aquatic flora and fauna. This situation is more challenging than many appreciate because the UK has less available water per person than most other European countries, with areas such as the south east being particularly water stressed.

By being water efficient, less water needs to be taken from the environment, treated and transported to homes, customers can save on their bills and the water industry can effectively plan for the future (Figure 1).

*“Supplying water to our homes now accounts for over fifty percent of the total water abstracted from the environment.”*

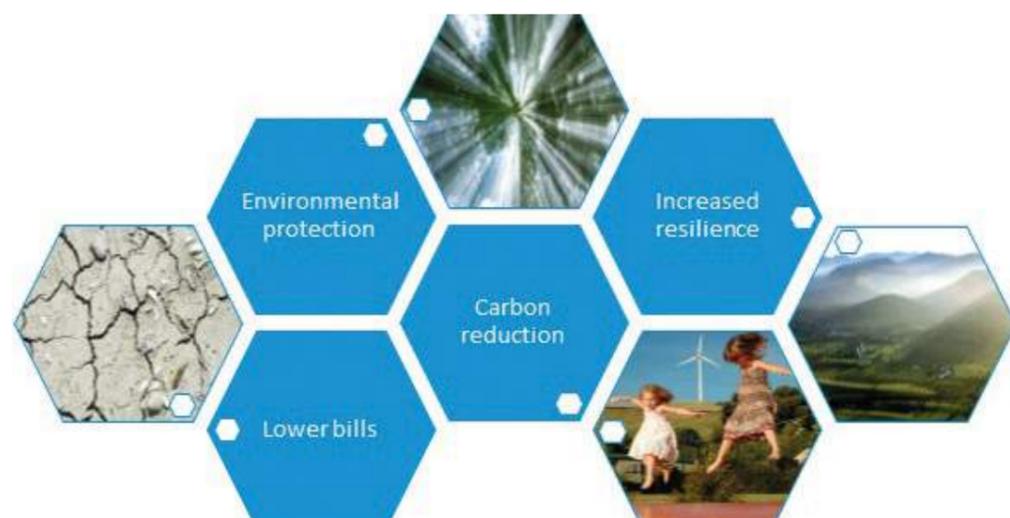


Figure 1. Benefits of water efficiency

Supplying water to our homes now accounts for over fifty percent of the total water abstracted from the environment. More than is used for agriculture and energy supply<sup>1</sup>. The UK population is projected to increase from 64.1 million in 2014 to 68.6 million by 2025, and 73.9 million by 2040<sup>2</sup>. This increase will have a significant impact on the amount of water we take from the environment. Population growth is also not uniform across the UK leading to particular challenges in growth areas such as the south east of England and in planning for new towns.

Treatment of water, both for drinking and before sewage effluent is discharged back into the environment is energy intensive. Two thirds of the energy use in the water industry is associated with the treatment and pumping of drinking and wastewater<sup>3</sup>. Awareness of a growing range of pollutants is requiring more technologically advanced treatment which adds to this energy requirement and associated costs. Reducing the amount of water that needs to be treated can bring carbon emissions and costs down.

1. Defra. 2015. Water abstraction from non-tidal surface water and groundwater

2. ONS. 2014. *UK population estimates*, Accessed 20 June 2014.

3. See CIWEM. 2013. A blueprint for carbon emissions reduction in the UK Water industry

Climate change will also put a strain on water supplies. The latest climate projections (UKCP09) suggest that on average the UK will experience warming temperatures and changes in seasonal precipitation patterns, while extreme weather events will be more common and more intense in the coming decades<sup>4</sup>. Water required for agriculture and food supply will add further to the pressure on water resources.

Water companies' latest plans forecast an 11 per cent reduction in average consumption rates over the next 25 years, but this is insufficient to offset the effect of increasing population on total customer demand, across England and Wales<sup>5</sup>. Domestic water efficiency to reduce per capita consumption is a vital part of the solution. It will need to be delivered by a combination of behavioural change and technological innovation by society, but it must be underpinned by appropriate policy and regulatory measures, all of which are outlined in this report.

## Legislative and regulatory context driving water efficiency

### European

In European Union Member States, Article 9 of the European Water Framework Directive<sup>6</sup> requires the implementation of pricing policies that provide an incentive to use water efficiently. It also requires that environmental and resource costs are included in line with the 'polluter pays principle' so that the true value of water is reflected<sup>7</sup>. In theory this requires everyone who places a demand on the water environment, including household customers, to pay for the full cost of these services to contribute to the long-term sustainable management of water resources.

### UK

Water undertakers have a statutory duty under the *Water Industry Act 1991*<sup>8</sup> to promote the efficient use of water by their customers. The *Water Resources Planning Guideline*<sup>9</sup> sets the framework for water companies in England and Wales to manage their supply and demand over a 25-year period. This guideline requires water companies to demonstrate they have thoroughly explored and tested all demand management options, as part of a 'twin-track' approach. A twin-track approach involves both developing new water resources and utilising a full range of options for reducing water demand. The government owned water companies in Scotland and Northern Ireland have adopted the same general principles of water resources planning from England and Wales.

4. HM Government. 2011. *Water for Life*. HMSO

5. Based on a review of Water Resource Management Plan Final Plans, though per capita consumption and total demand data were not published for several water companies.

6. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

7. European Commission. 2012. Communication from the Commission to the European Parliament, the Council and the Committee of the Regions. A Blueprint to Safeguard Europe's Water Resources (COM/2012/673)

8. Section 93A *Water Industry Act*, 1991 as amended

9. Environment Agency, Ofwat, Defra and Welsh Government. 2012. *Water resources planning guideline – the technical methods and instructions*

## England and Wales

The *Water Act 2014*<sup>10</sup> places a new primary duty of resilience on the financial regulator Ofwat<sup>11</sup> which requires it to “*promote measures to manage water sustainably and reduce demand so as to reduce pressure on water resources*”. Ofwat’s approach to setting water prices and incentives for water companies has also been recently revised.

Water Company Asset Management Programmes for the period of 2015 to 2020 (AMP6) have been assessed under Ofwat’s new ‘Totex’ approach. Totex is total expenditure, which includes both capital and operational expenditure. It is particularly relevant to water efficiency as it removes the incentive for companies to favour capital solutions to develop new water resources, over operational approaches that might reduce demand.

Ofwat has also shifted towards outcome-based regulation for AMP6 and has asked companies to propose outcome delivery incentives (ODIs) as a way to measure their performance. Companies have set the outcomes they aim to achieve based on customer research, which in many cases has resulted in a focus on reducing demand, including leakage and customer water use. Failure to meet ODIs will result in either financial or reputational penalties, for example, having to report that they have failed to meet their ODI targets.

Several companies, including Thames Water, United Utilities, Anglian Water, South West Water, Southern Water, Bristol Water and Wessex Water have ODIs to reduce household consumption. These consumption targets all aim to reduce household water use over the next five years, so they are in effect water efficiency targets. Regulated funding of ‘baseline’ water efficiency activity will continue in AMP6 as a part of the retail component of water companies<sup>12</sup>.

The Welsh Government recently published the *Water Strategy for Wales*<sup>13</sup> and will assess and consult on options for encouraging reduction in water consumption and carry out further investigation into the costs and benefits of metering. The Welsh Government also recognises that any approach to metering would need to be delivered in conjunction with innovative charging structures, including social tariffs, in order to ensure that households with affordability issues are protected.

10. *Water Act 2014*.

11. Ofwat (The Water Services Regulation Authority) is the economic regulator of the water sector in England and Wales.

12. ‘Baseline’ activities are those that should be considered across England and Wales as opposed to ‘water stressed’ activities are those that should be considered in areas of water stress, such as the south east of England

13. Welsh Government. 2015. *Water Strategy for Wales*



# Increasing water efficiency

## Issues and challenges for the water industry

### Understanding water using behaviour

The adage that you can only manage what you measure is true for water consumption. Water companies undertake ongoing monitoring programmes to quantify consumption by metered and unmetered household customers, and there have been numerous studies to assess the effectiveness of various water efficiency devices and initiatives, and to better understand water use in the home. Under guidance from regulators, the demand projections produced by water companies over the last two planning periods have however become scenario projections rather than true demand forecasts.

- There is now greater confidence in average per capita consumption (PCC), in differences between metered and unmetered customers and the general breakdown of how water is consumed in the home.
- There is also increasing confidence in the effectiveness of water efficiency interventions<sup>1</sup>, but more work is needed to assess the effect of metering on consumption.
- There is still a relatively poor understanding of why water use varies across the population, and what influences water using behaviour.

Ongoing work by the water industry and academics with a particular focus on why water use varies across the population (by different property types, socio-economic groups and by regions) will improve our understanding of household water use.

### Household water metering

Historically, most households in the UK have paid a flat rate for their water services (based on 'rateable value', a proxy for property value), regardless of their actual consumption. The number of household customers who pay for their water services based on the volume of water consumed is increasing, and approaching fifty per cent of all household customers<sup>2</sup>. This would mean that the majority of households will be paying for what they consume by 2020, and by being efficient they can reduce their water bills.

Increased metering rates are a result of more customers choosing to opt for a meter, in order to reduce their water bill; and from the universal metering schemes increasingly being implemented by water companies. These include Southern Water's universal metering scheme, and a number of compulsory or change of occupier metering schemes that have been funded in AMP6. Southern Water's universal metering scheme has shown an initial reduction in consumption of around 16.5 per cent<sup>3</sup>.

1. For example Lawson, R., Marshallsay, D., Ashton, V., Ponsonby, K. (2015), Water Efficiency Evidence Base Statistical Analysis, Memon, F. (Ed.), Proceedings of the Water Efficiency Conference 2015, 5-7 August 2015, Exeter, UK: WATEF Network/University of Brighton.

2. Utility Week. 2014. *A smart move for water*. Accessed 01 July 2014

3. Ornaghi, C. and Tonin, M. 2015. The effect of metering on water consumption policy note. University of Southampton.

Payment based on consumption is the fairest way to charge for water services and will encourage society to place a greater value on water. Coupled with appropriate tariffs, metering can signal where and when water is scarce, and show when actions need to be taken to conserve a resource under stress.

The *Water Industry Act 1999* and subordinate regulations include the power for water companies to universally meter households if the water company's area has been determined to be an area of serious water stress (see box 1).

### Box 1. Classifying water stress

The Environment Agency and Natural Resources Wales produce a water stress classification which is used to determine whether water companies can universally meter properties in their area. This was updated at a water body and water company level for England and Wales in 2013<sup>4</sup>. Under the new methodology, even in areas designated as "not in serious water stress", there should be some activity to ensure that water is used more efficiently and effectively.

Whilst the methodology behind this updated classification is an improvement upon the original 2007 method, it is concerning that there has been a reduction in the number of companies classified as being under water stress. The number of companies classed as seriously water stressed has fallen from 11 in 2007 to nine in the July 2013 final report, after 15 companies were identified as seriously water stressed in the 2012 draft for consultation. This trend downplays current and future risks to water resources, at a time when the need for greater awareness of the risks to water availability is growing.

Data licensing restrictions have limited the transparency of the water stress analysis and as a result it is difficult to understand the reasons for the changes that have been made to water stress classification. Greater clarity could be achieved by publishing sensitivity analyses around the weightings used, and if necessary a review undertaken of the water stress classification rules. A further review of the methods for assessment and presentation of water stress should be undertaken, to better reflect the range of risks faced across the country, and to support the promotion of appropriate demand management measures to address those risks.

4. Environment Agency/ Natural Resources Wales. 2013. *Water stressed areas, final classification*

***“Payment based on consumption is the fairest way to charge for water services and will encourage society to place a greater value on water.”***

*“Metering should be compulsory in areas where water resources are stressed, and are at risk of becoming stressed.”*

Metering will improve companies’ understanding of customer demand. Universal metering in a wide area (e.g. in a district metered area or a wider part of a water resource zone) will eliminate the need to estimate consumption and will enable companies to understand other parts of the water balance, notably leakage.

Household meters that are installed in the road or pavement will register leaks that occur on customer’s supply pipes. Leaks on these pipes are judged to account for around one third of total leakage across England and Wales. Therefore metering external to the property will not only encourage increased levels of water efficiency, but will also help to reduce leakage<sup>5</sup>.

Metering will also reduce water lost via internal plumbing. An investigation carried out in 2010/11 concluded that approximately ten per cent of toilets leaked, and estimated that in the UK every day about 1.8 billion litres of treated water could be wasted because of wastage from toilets.<sup>6</sup> Other types of internal losses will arise from dripping taps and showers and small unnoticed pipe leaks.

CIWEM considers that metering should be compulsory in areas where water resources are stressed, and are at risk of becoming stressed. This should be implemented as soon as practical, alongside improved tariffs and measures to protect those with low incomes. Compulsory metering should also be an option that water companies are able to implement outside areas of serious water stress, if their customers support it.

It is important to note that metering will not always result in a household becoming more water efficient, mainly because water consumption tends to be relatively price inelastic (prices have to increase significantly before price has an effect on consumption). Hence for most consistent effect, universal metering needs to be accompanied by socially acceptable tariffs that encourage water efficiency and protect low income households.

### Smart metering

Smart metering means that near real-time consumption data is available from household revenue meters. These data can be accessed by customers, using a range of devices and applications, to enable them to understand and monitor their water use. Water companies should investigate how best to provide water use information to customers, taking account of the latest technological opportunities such as smart phones, tablets and interactive TVs.

Smart metering is thought to result in greater reductions in household consumption, compared to conventional metering methods, but this remains unproven in UK households because of a lack of trial data. Data from smart meters can also be used by water companies to significantly improve their understanding of network operations and leakage. Smart metering also provides the basis for more sophisticated tariff structures, which have the potential to reduce consumption further.

Smart energy metering is preceding the roll-out of smart water metering and it is important that the water industry learns from the energy sector. There will also be synergies from smart water and energy metering, for example in understanding, managing and reducing energy used for heating water in the home.

5. See also CIWEM’s [Policy Position Statements](#) on Supply Pipes and [Leakage in the UK](#)

6. Artesia Consulting Ltd. 2012. Final report on leaky toilets projects for a consortium of eight water companies AR1053.

### Smart metering

A 20 year smart metering programme has been initiated by Thames Water, starting in its London water resource zone. It aims to meter all 3.3 million properties in its area by 2030, up from its current 30 per cent level<sup>7</sup>. Other water companies are exploring detailed implementation plans for smart metering.

7. More details at <https://www.thameswater.co.uk/>

### Tariffs

Water companies in England and Wales develop a tariff basket across all their customers, which means that charging structures are broadly the same within each of the main customer groups<sup>8</sup>. The tariff basket is set to achieve an agreed level of income approved by the regulator, and attempts to balance out the actual differences in supply costs (for example, between urban and rural customers) within each of these groups.

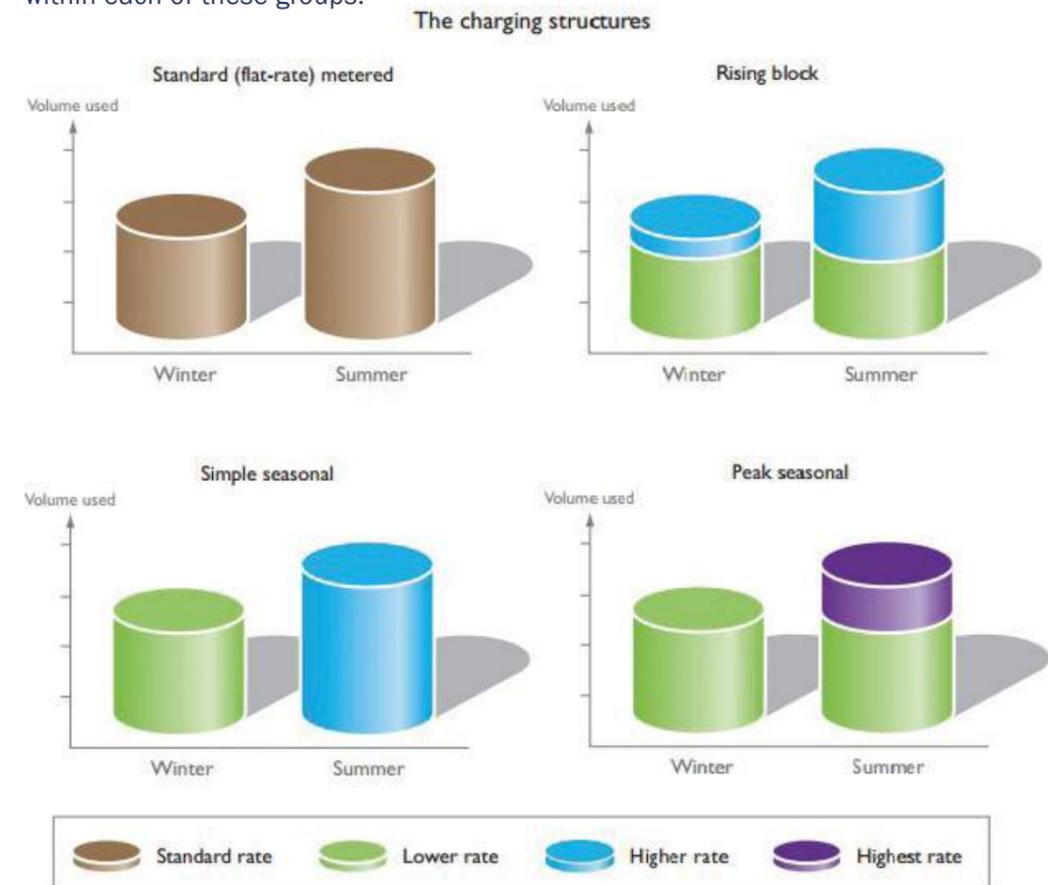


Figure 2. Tariff trials

8. The tariff basket is the set of regulated charges to which Ofwat’s overall price limits apply. The charges are grouped under five main headings: unmetered water, unmetered sewerage, metered water, metered sewerage, trade effluent. The tariff basket formula allows the companies to increase or decrease individual charges by different amounts, as long as the overall average change does not exceed the overall price limit.

*“Smart metering also provides the basis for more sophisticated tariff structures, which have the potential to reduce consumption further.”*

*“Appropriate tariffs need to be developed, to achieve the right balance between affordability and resource efficiency.”*

Current unmeasured household tariffs are based loosely on a fixed charge plus a charge per property rateable value. Metered household tariffs include a fixed charge and a fixed cost per cubic metre of water. A significant number of households will be charged for their water services on a metered or smart metered basis in the next 10-15 years, in line with water companies’ plans and according to their assessed water stress status<sup>9</sup>.

Appropriate tariffs need to be developed to accompany this change, to achieve the right balance between affordability and resource efficiency. Affordability is a growing issue in the UK and can be an issue for low income, high occupancy households and people with high water needs.

Tariff trials undertaken to date<sup>10</sup> indicate that rising block tariffs for discretionary water use above a fixed volume for normal use, could provide the necessary protection for low income and special situation households and provide the signal to reduce non-essential water use (Figure 2). Rising block tariffs do not necessarily require occupancy information and could instead be based on ‘baseline consumption’, monitored using smart meters during ‘off-peak’ periods such as October to November and February to March.

However Wessex Water’s trial also found such tariffs to be unpopular with the public, particularly seasonal tariffs, with a perception that the motivation behind them is profit. Approaches where customers are rewarded for water efficiency, by receiving vouchers, rather than penalised may prove to be popular. More trials will be needed to determine the best approach.

Other soft approaches can be used, for example as part of Southern Water’s universal metering scheme customer bills are produced in traffic light colours to show their performance relative to neighbouring properties. Increasing the frequency of bills may also stimulate positive behaviour as consumers are reminded more regularly about the impact of their water use on their bill. Incentives, nudges and awareness are also relevant and tariffs themselves are one way of influencing behaviour.

### Promoting water efficiency

The Government, devolved administrations, local authorities and other stakeholders, such as Waterwise and the Energy Savings Trust, also have a role in promoting water efficiency.

### Improving the water efficiency of existing homes

Existing homes can be made more water efficient through fitting water saving devices and the use of water efficient appliances and products. Fitting water saving devices within existing homes in toilets, taps and showers can save as much as a third of average water use, up to 50 litres per person per day<sup>11</sup>. Many water companies offer advice and supply these products at a discounted rate to customers. As part of Southern Water’s programme 30,000 home audits and retrofits by ‘green doctors’ were undertaken to help customers understand their water use. This type of engagement is essential when undertaking such significant

9. It will not be physically possible, or economically viable to install a water meter at every property.  
 10. For example: Wessex Water. 2012. Towards sustainable water charging: conclusions from Wessex Water’s trial of alternative charging structures and smart metering.  
 11. Southern Water. 2015. Saving water, energy and money

changes to households to ensure acceptance and buy-in.

Labelling water using products with their key performance criteria is an essential part of a market transformation as it provides manufacturers, wholesalers, retailers and purchasers with clear, consistent and simple information. This kind of initiative should be part of a suite of measures to improve water efficiency in existing households, alongside household metering, smart metering and tariffs.

*“Incentives, nudges and awareness are also relevant and tariffs themselves are one way of influencing behaviour.”*

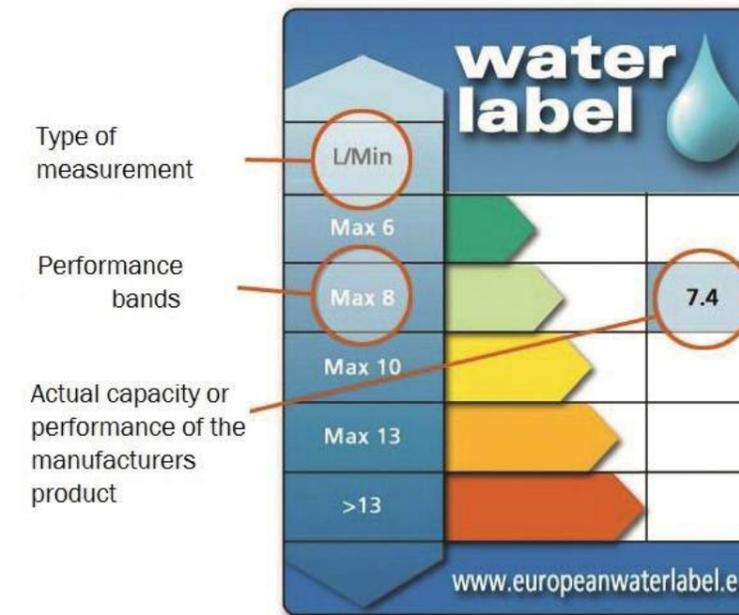


Figure 3. European Water Label

The development of the European Water Label<sup>12</sup> scheme for new products is welcome. It is being developed and implemented by experienced professionals from a range of stakeholder organisations (water companies, bathroom manufacturers and retailers) in a technically robust and commercially viable manner. It should be supported by government, regulators, water companies and others involved in promoting water efficiency. Over time it is hoped that customers will select products based on these ratings as they would with energy efficiency labels (Figure 3). At present the label is only for bathroom products and CIWEM considers there would be great benefit if the scheme were to extend to all water using devices.

The UK Government should put more emphasis on the role that hot water efficiency can play in reducing customer bills. Around 21 per cent of a typical household’s gas bill is from heating the water for showers, baths and hot water from the tap. This is on average about £140 a year<sup>13</sup>. In most homes more than half the water used in the home is hot water (Figure 4). Water efficiency measures that reduce hot water use should be included in the Government’s future energy efficiency incentive scheme to replace the Green Deal to also help achieve statutory carbon reduction targets.

12. European Water Label. <http://www.europeanwaterlabel.eu/>  
 13. Energy Saving Trust. 2014. Saving water

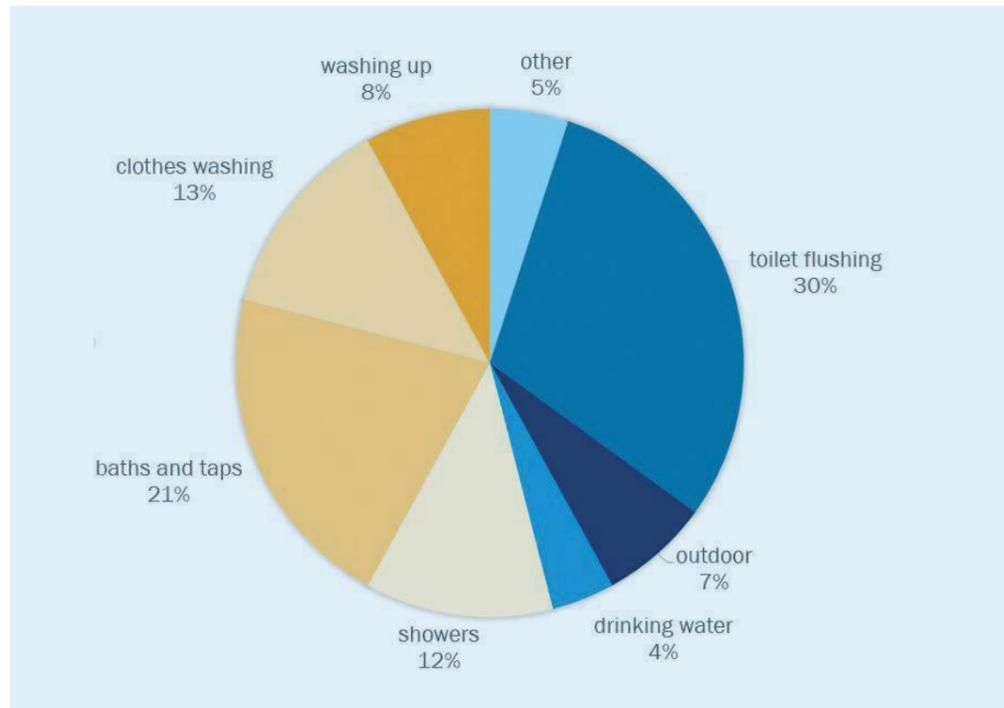


Figure 4. Average water use in the home<sup>14</sup> showing proportion of hot and cold water use.

### New homes

Since 2010 the Government's *Building Regulations* have set a consumption standard for new homes not to exceed 125 litres of water per person per day (lpd). The 2015 revision of Part G<sup>15</sup> contains an additional optional requirement of 110 lpd where required by planning permission. It also replaces a number of disparate requirements for new development including the Code for Sustainable Homes (CSH).

Where possible, product-level standards for water using devices should be encouraged in preference to whole-building standards<sup>16</sup>. Product-level standards could be explicitly linked to the new water efficiency label performance ratings, which would ensure a consistent approach to water efficient products in new homes and in the refurbishment of existing homes. Product-level standards have recently been adopted in Scotland for toilets and taps<sup>17</sup>.

As technology and understanding improve, standards should be continually reviewed. Research has shown that both current whole building standards of 125 lpd and 110 lpd can be achieved at no additional cost, compared to a 'do nothing' scenario<sup>18</sup>. Therefore it should be expected that 110 lpd should be the minimum standard in the next five years. Further research is needed on what more can be achieved and by what means with more stringent standards made mandatory for all

14. Data from Southern water. 2015. Saving customers water, energy and money

15. *The Building Regulations 2010, Part G approved*.

16. This is because property level standards as enshrined in the current water use calculator include assumptions of appliance use rates and allow those using them to 'trade-off' between appliances and thus reduce the overall effectiveness of the property-level standard.

17. *Scottish Building Standards* 2013.

18. Environment Agency: Assessing The Cost Of Compliance With The Code For Sustainable Homes WRc Ref: UC7231

new homes in areas of designated water stress.

The former CSH level 5/6 of 80 lpd is difficult to achieve without rainwater harvesting or greywater recycling, which remain relatively marginal technologies in the UK mass market. Continued research, development and testing of rainwater and greywater systems, in order to understand their cost-effectiveness and address remaining public health concerns is needed to determine whether it is feasible for these systems to become more mainstream. In the meantime product-level standards can, and should be used to drive the installation of more water efficient fittings. Existing guidance, such as that of the AECB<sup>19</sup> could be used by local authorities to set 'good' and 'best' product standards.

The public sector should take the lead in promoting the use of water efficient products when publicly owned buildings are upgraded or refurbished. More support should be provided to ensure water efficiency is included in programmes focused on alleviating fuel poverty and maintaining housing standards (such as RENEW<sup>20</sup> in London and 'Arbed'<sup>21</sup> in Wales).

### Exemplar developments and water neutrality

A significant amount of new housing is required in the UK in order to match housing demand forecasts. Minimum sustainability standards including for water use will be needed to drive efficiency. A small proportion of these developments should be exemplars, which demonstrate how to go beyond these minimum standards, whilst still remaining financially viable for mainstream developers and attractive places to live for new residents.

The amount of new housing and associated non-household development that is required to sustain the UK economy will inevitably place increased demand on the water environment, unless more action is taken to manage this. Water neutrality has been explored, and proven feasible in theory as a way of minimising demand from new development and offsetting this new demand via water efficient activity in the surrounding area<sup>22</sup>.

Local authorities in areas of water stress should consider the feasibility, funding and delivery of water neutrality initiatives as part of their planning requirements. This should also capitalise on the joint benefits of water efficiency, water recycling, water sensitive urban design and effluent reuse.

### Water efficiency in non-households

Non-households include a very diverse range of property types: from hospitals to factories; high street shops to holiday parks; offices to airports, all with an equally diverse range of water use and water use systems. Nearly all non-household properties in England and Wales are metered, which in theory should provide a financial incentive for the bill payer to be water efficient. However, water is often a relatively small part of operational costs (depending on the scale and nature of the business) and even low cost or no cost water efficiency measures can be difficult to implement.

19. AECB. 2009. *AECB Water Standards*.

20. Greater London Authority. 2014. *RE:NEW* - Making London's homes more energy efficient.

21. Welsh Government. 2013. *Arbed* - Strategic energy performance investment programme

22. Environment Agency. 2007. *Delivering water neutrality in the Thames Gateway*.

The *Water Act 2014* will allow retail competition for non-household customers in England (with no volumetric limit) from 2017. This will result in a unified market for water services to non-households across England and Scotland. Retail competition and the addition of new entrants to the market could potentially have an effect on non-household water efficiency, as providers look to add value to their water services.

### **WRAP<sup>23</sup>**

WRAP's Rippleeffect programme is an excellent source of information on business water efficiency. It provides guidance as downloadable information sheets and further support and guidance is available as videos, good practice guides, case studies and online tools.

23. WRAP. *The Rippleeffect - water efficiency for business.*

### **BREEAM**

BREEAM is the world's leading sustainability assessment method for masterplanning projects, infrastructure and buildings. The BREEAM scheme provides an established framework for designing and implementing high levels of sustainability, including water efficiency in new non-household buildings. Rainwater and greywater systems are now common in new non-households as a result of BREEAM.



## Discussion

### Engaging all appropriate stakeholders - Water saving forum

Many different organisations and individuals have a role in water efficiency, from government departments such as Defra, DCLG and DECC to water companies, local government, building control, manufacturers, retailers, plumbers, builders, and universities, to individual businesses and households. This diverse range of stakeholders needs to have a common understanding and shared responsibility if water efficiency is to be delivered effectively and successfully. Each organisation has a role to play within the wider context of reducing water consumption, but at present there is little or no co-ordination.

The successful delivery of large water efficiency implementation programmes requires appropriate input from a wide range of stakeholders. We recommend that stakeholders are identified, consulted and involved in a process in which they all accept a shared role in the delivery of water efficiency. This could be achieved via a water saving forum with a clear mission and set of objectives to achieve its stated aims which could be held to account by Ofwat. It should use existing activities such as the Water UK Demand Forum, Water Efficiency in Buildings group, the Water Efficiency Awards, and relevant publications, conferences and social media to maximise its impact.

An important function of a water saving forum would be to continue the work by the water company collaborative fund, individual water companies, and others to determine the most effective ways of reducing consumption. This will need to consider the existing evidence base, the requirements for further research, the design of this research and how the findings should be shared. This work is likely to involve a diverse range of specialists from water resource planners, and behavioural experts, to builders and plumbers.

### Water resources planning

English and Welsh water companies' Water Resource Management Plans now include a better balance between supply and demand management measures, because regulation has allowed decisions to take more account of the outcomes customers want. It is possible that even greater levels of water efficiency-related activity could be achieved if more regulatory hurdles were removed, or if more incentives were provided. It is unlikely that any new regulatory measures will be implemented before the next water company business planning round (PR19<sup>24</sup>).

In the meantime, Defra and Ofwat should consider how regulatory incentives such as smart but sensitive tariffs and shadow pricing of water could encourage greater levels of water efficiency.

Water companies and regulators are developing methods and guidance for alternative technical approaches to water resources planning. Some of these methods (which may be adopted by some companies in PR19) will take greater account of risk and uncertainty in supply and demand forecasts, to reflect the regulatory drive for greater resilience. Others are aiming to provide alternative approaches to understanding and forecasting consumption. Such approaches could encourage the adoption of greater and better informed water efficiency activity in future Water Resource Management Plans.

24. PR19 – Price review 2019 where prices are set by Ofwat for the period 2020-2025

**Strong leadership is needed from government, regulators and water suppliers, working collaboratively.**

The study, planning and implementation of water efficiency activity, has not always been undertaken to ensure cost-effective and successful outcomes. Water efficiency needs to be approached with the same scientific rigour as other domains of water management, taking account of the complex interactions between the science of estimating and measuring consumption; the engineering of distribution networks; the technological and market drivers that influence plumbing systems and water-using devices; and the behavioural science that can be used to understand individual customer's water use. This is necessary to understand demand and demand management interventions, as companies and other stakeholders look to water conservation as a central part of their water resources plans.

Water efficiency can be improved by applying the right scientific principles to research into water use, and by working effectively with research organisations who have particular skills in these areas. Academic courses (from vocational qualifications, through undergraduate and post-graduate courses) should ensure the necessary technical analysis and intellectual rigour is applied to water efficiency.

#### Influencing water behaviour

The water industry continues to deliver valuable research at a company level, or via collaborative projects delivered through UKWIR or the water efficiency collaborative fund. Work by others including the Environment Agency and WRAP in the non-household sector is also to be applauded. CIWEM recognises the value of this work and in particular the commitment and dedication of key individuals involved.

More research is needed to understand how to influence water using behaviour within the context of companies' role as a service provider. This includes determining the social reasons that reinforce water efficient behaviour, how messages are communicated and how to effectively influence consumers when they purchase new water using devices. The efficient use and management of water within the home and other buildings is an important way to influence per capital consumption through water efficient devices and products. Research on what can be achieved and how, looking at the examples from other countries, should be undertaken.

There are opportunities to use behavioural economics or 'nudge theory' to influence water use behaviour in different parts of the population in different ways. These approaches will need to be linked to future developments in metering, smart metering and tariffs, as well as many of the other areas covered in this report. Metering and tariff setting is one of the strongest ways to influence customer behaviour, regardless of the financial link between water use and bills that metering provides, as it promotes understanding and a dialogue with consumers. As Wessex Water state in their tariff trial report "*we need to consider positive approaches to encourage behaviour change rather than ones that are seen as punitive*"<sup>25</sup>. Tariffs that reward reductions in consumption when and where water is scarce are needed, rather than those that just penalise high discretionary consumption.

Nudging alone is unlikely to be sufficient. For water efficiency gains of

25. Wessex Water. 2012. Towards Sustainable Water Charging

the required magnitude to be achieved, we consider there to be a need for strong leadership from government, regulators and water suppliers, working collaboratively.

#### Continuing water efficiency activities

CIWEM fully supports the extensive work done by water companies to meet their statutory obligations to promote the efficient use of water by their customers, through activities such as school education programmes, water audits, retrofits of water saving devices, online and paper-based advice, water use calculators and engagement in the community. This work needs to continue in the context of (smart) metering and new tariffs, and be guided by better insights into water-using behaviour. We also recognise the significant effort by a wide range of other organisations to promote and progress water efficiency in the UK.

Nevertheless CIWEM believes water companies could do more to promote water efficiency via the activities outlined in this document, and by engaging with a wider range of stakeholders, from manufacturers and retailers to community groups and credible third-sector organisations or well-known brand owners who have more exposure and market influence.



## Conclusions and recommendations

### *Partnerships*

Partnership will be critical to enable real change in how we use water.

- ◆ A water saving forum should be established, with a clear mission to develop credible and technically robust approaches to determine the most effective ways of reducing consumption. It should be held to account by Ofwat to achieve its stated aims.

### *Providing incentives – metering, tariffs and charging*

Payment based on consumption is the fairest way to charge for water services. It will encourage households to deliver real reductions in household water use whilst encouraging society to place a greater value on water, whilst offering customers the opportunity to reduce their bills by being more efficient.

- ◆ Water metering should be compulsory in areas where water resources are under stress to encourage reductions in consumption. It should be implemented as soon as practical to encourage water efficiency, alongside appropriate tariffs and measures to protect those on low incomes.
- ◆ Smart metering and charging can deliver additional water efficiency and other benefits beyond basic metering. Water companies should investigate how best to provide water use information to customers, taking account of the latest technological opportunities.
- ◆ Relevant UK Government departments, agencies and regulators should consider how regulatory incentives such as progressive tariffs and pricing could encourage greater levels of water efficiency. Further evaluation of practical, technical, economic and social issues associated with household water tariffs need to be undertaken and used to inform charging structures as soon as possible.

### *Understanding water use*

There is now a greater understanding of average household consumption but there is still a relatively poor understanding of how and why this varies from property to property.

- ◆ The water industry, Waterwise and other stakeholders should develop and implement projects to improve our understanding of household water use, with a particular focus on water using behaviour across the population and in times and places of low water resources availability.
- ◆ Water companies, the Government and regulators should also do more to understand how to influence water use behaviour through the application of appropriate incentives, ‘nudges’ and awareness.

### *Improving the water efficiency of existing properties*

There needs to be a more efficient use and management of water in buildings to reduce demand.

- ◆ The European Water Label for new water-using products is welcome and the programme sponsors should extend the scheme beyond bathroom products to all water using devices.
- ◆ Water efficiency measures that reduce hot water use should be available as part of the Government’s future energy efficiency incentive scheme.

### *Standards in new homes*

A significant amount of new housing is required in the UK in order to match housing demand forecasts and water use standards will be needed to deliver water efficiency.

- ◆ Product-level standards rather than property-level standards should be adopted and implemented for new homes. This will overcome the criticism of calculations used to determine property-level standards and enable planners and developers to fit more proven water saving devices.
- ◆ More stringent standards should be made mandatory for all new homes in areas of designated water stress.
- ◆ Exemplars for water efficiency should be developed and the practicalities of delivering water neutrality around new developments should be tested further.



