The biggest ever review of domestic water use in Great Britain

energy saving trust

at home with water

Department for Environment Food & Rural Affairs

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savewater savemoney how flush do you feel?

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The insight, analysis, opinions and conclusions produced in this report were solely decided by the Energy Saving Trust.

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Foreword

At Home with Water presents analysis from the Energy Saving Trust's Water Energy Calculator.

The Water Energy Calculator is Great Britain's most successful online tool to help households to understand their water use and identify potential savings. More than 100,000 households have benefitted from it, creating Britain's biggest information resource on domestic water devices and behaviour. The analysis in this report provides a vivid picture of how we use water in our homes.

At Home with Water sheds new light on the nation's water consumption: what devices we use, how we use them, and where they impact on our bills. It explores differences in water-using behaviour between metered and unmetered homes, and how progressive improvements such as dual-flush lavatories and eco-showerheads can reduce water consumption with little or no impact on the 'bathroom experience'.

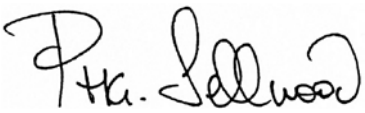
At Home with Water can reveal that showers are now the largest user of water in the home. Across Britain, we use in the order of 840 billion litres each year, and spend around £2.3 billion on heating water for showers. We can report that, every year, more than 740 billion litres – enough to fill 300,000 Olympic-sized swimming pools – is flushed down the loo. And our dishwashers and washing machines use 360 billion litres each year, costing households £1.6 billion in electricity bills.

A great many households are already making savings and making a difference – engaging in water saving behaviour, cutting their bills and conserving resources. But since the average home uses nearly 350 litres of water every day, there is still astonishing potential to save water, energy and utility bills through further change.

The simplest actions can mean the biggest savings. If every household in the UK took just one minute off one shower every day, it would save £215 million in energy bills a year nationwide. If everyone in a four-person metered household with a power shower did this, it could save £60 on energy bills, and a further £60 on water bills, every year. And if those who still wash their clothes in hot water turned the dial down to 30°C, they would save £13 per house per year. That could add up to a massive £250 million a year across all UK homes. And the list goes on.

Utility companies will be able to use these findings to improve their engagement with customers, helping to reduce household bills and reduce the risk of water stress. The key to success is to ramp up consumer engagement, educate families more about water and energy, and offer household-specific solutions for reducing bills.

Energy and water bills are on the rise, and there is increasing pressure on our natural resources. A new approach is needed to help people get control of water and energy use in the home. So rather than preach from the pulpit, we will continue this work by undertaking a 'rethink' about domestic water use. This report sets the scene on Britain's water use in the home. Watch this space, as we work with leading organisations to help real people, in real homes, to conceive the best possible real life solutions.



Philip Sellwood
Chief Executive, Energy Saving Trust

1. At Home with Water – the journey

The Energy Saving Trust investigates, evaluates and advises on domestic energy and water consumption. Last year, we published Powering the Nation, which reviewed the way people use electrical devices, and how much it costs the UK. The research allows government to form new policies to help people change how they think about and use electricity. At Home with Water continues the essential need to rethink our relationship with energy and water.

At Home with Water will analyse real-life water use in homes, and develop consumer-led water efficiency solutions, through a two-phase approach.

- Phase 1: This report. Direct analysis of more than 86,000 households' self-reported water use information.
- Phase 2: Starts mid-2013. Spending time with families in their homes, 'rethinking' water savings' potential, from a householder's perspective.

The findings presented in this report – Phase 1 – are generated from self-reported information, captured from British households through the online Water Energy Calculator. Put simply, people told us what water devices they have and how they use them. More than 86,000 individual responses contribute to this report and they are evaluated against current knowledge and industry estimates. Appendix A provides a fuller description of the data processing and analytical stages.

The findings of At Home with Water can be used to complement measured water usage information within the water sector.

We now seek to test our findings in Phase 2, by spending time in the home and engaging with households. We will look at real-time water consumption, enabling each household to understand how it uses water. And we will 'rethink' the ways in which households and the wider water sector can better engage with water efficiency, to find more practical and effective ways to save water and energy.

The Water Energy Calculator

Launched in 2010, the Water Energy Calculator is an online self-completion tool that takes respondents through a series of questions about their household water consumption habits: how many times they bathe or shower, wash the car, boil the kettle and so on. Over two years, more than 100,000 households completed the Calculator, providing one of the largest data sets on Great Britain's domestic water consumption.

The Calculator lets people assess their water usage in and around their homes. When they complete the journey they receive an assessment of their annual water usage and the associated energy consumption. It provides estimated costs of using specific appliances and advice for reducing water bills and energy bills. Many water companies across Great Britain already use the Water Energy Calculator to provide much needed support for their own customers to save money and do a bit more for the environment.

A full set of Water Energy Calculator questions is included in Appendix B.

Be a part of At Home with Water
Contact foundation@est.org.uk

2. Headline findings

Analysis of responses to the Energy Saving Trust's Water Energy Calculator reveals that:

- Each person uses about 142 litres of water each day.
- The average household uses 349 litres of water each day[1].
- The average annual metered water bill is £427[2].
- Hot water use contributes £228 to the average annual combined energy bill and emits 875kg of CO_2 per household per year.
- 43% of respondents have a water meter[3] in their homes. These properties used around 3% less water than unmetered properties.
- Showers are the biggest water user in the house (25%), followed by lavatories (22%).
- On average, each individual takes 4.4 showers and 1.3 baths each week.
- People generally spend seven-and-a-half minutes in the shower. 87% of people do not exceed ten minutes on their daily shower.
- 41% of homes have a dual-flush toilet.
- We use the washing machine on average 4.7 times each week, but only about a quarter of us select a 30°C degree wash.
- Most people fill the washing machine (82%) and dishwasher (77%) to capacity before turning it on.
- About 86% of people use a bowl when washing dishes by hand.
- 40% of households boil the kettle four times or more a day – and most (75%) say they boil more water than they need.

Who uses the Water Energy Calculator?

There are 2.3 residents in the average UK home[4], which is lower than the average occupancy in our sample (2.5 persons). Our respondents included every type of household; however, greater numbers of dual and higher occupancy families undertook the Water Energy Calculator journey.

We can also compare the split of primary fuel used to heat respondents' homes with the expected national picture. The typical UK home uses gas central heating for space and water[5], and this is also by far the most common response in our sample.

Comparison of household occupancy and primary heating fuel in WEC sample and UK

Occupancy	WEC	UK
1 person	18%	31%
2 person	44%	34%
3 person	16%	16%
4 person	15%	13%
5 or more persons	7%	7%

Heating	WEC	UK
Gas	77%	81%
Electricity	16%	12%
Oil	5%	5%
LPG	1%	1%
Solid	0%	1%
Biomass	0%	0%

1 Using an average household size of 2.52, which includes all metered and unmetered households. Water Energy Calculator.
2 Using an average household size of 2.53, which only includes metered households. Water Energy Calculator.
3 WEC results are in line with Ofwat meter coverage of 42%, as for March 2012. https://www.ofwat.gov.uk/consumerissues/chargesbills/prs_lft_charges2011-12.pdf
4 Number of people in UK households from 2011 Census: Population and Household Estimates for the United Kingdom, March 2011, ONS, available at www.ons.gov.uk
5 UK Household main heating fuel type estimated from English Housing Survey 2009, Scottish House Condition Survey 2009, Living in Wales 2008, and Northern Ireland House Condition Survey 2009.

3. Why the focus on water?

Water is a precious resource. Sometimes it may not feel like it – especially after one of the wettest winters on record.

The UK public does not often relate to news stories on water shortages. It seems to rain much of the time. When we turn on the tap there is plenty of water. What is there to worry about? The dangers – shortages of supply, expensive utility bills and harmful carbon emissions – lurk out of sight and out of mind.

In the early months of 2012, water companies placed restrictions on customers in many regions. There was lower than average precipitation that winter – a time when water reserves (both underground to feed rivers and in the big reservoirs across the country) are usually replenished. By the end of 2012, the UK had experienced its second wettest year on record. But too much precipitation in too short a period brings its own problems. People may be forgiven for being confused about why they should be concerned about water use on a day-to-day basis.

It's not just a question of supply. When we take a shower, wash our clothes or make a cup of tea, we underestimate or ignore the environmental and financial impact. Every time we turn on a tap or run an appliance that uses water, we spend money, create carbon emissions and draw on our water reserves. Since most of our water bills are quarterly, and more and more of us pay by direct debit, the cost can often go unnoticed. Water bills also tend to be significantly lower than fuel bills. Yet water has a significant, hidden impact on those costly fuel bills. Heating water is the second largest source of energy use in the home (next to heating our homes)[6]. When asked, only 8% of people in the UK knew this[7].

Energy bills and carbon emissions can be cut simply by being more aware of how we use water: use less, reduce energy bills, reduce emissions.

Of all the CO_2 emissions in the UK, 6% are from water use. A massive 89% of this comes from heating water in our homes[8]. The remaining 11% comes from pumping and treating water as part of the supply and sewage network. If we use less water, it will reduce the volume of water pumped, heated at home, and treated. Energy bills and carbon emissions can be cut simply by being more aware of how we use water: use less, reduce energy bills, reduce emissions.

Utility bills in the UK are rising. In the next few years we are likely to place a greater strain on our energy supply and on our water reserves. We all use water and energy resources in the same rooms and at the same time, but there is a disconnect between the agendas at the policy, regulation and delivery levels. This is a lost opportunity.

Reducing water consumption is not an uncomfortable burden. We don't have to be noticeably more frugal – we only have to be aware of the impact of our decisions and make some very simple changes. The Water Energy Calculator shows people how to make a few changes and also the impact these would have on their combined utility bills. By using water in a different way (taking a shorter shower with an eco-showerhead, and making sure the washing machine is full before using it, for example) and making informed choices about appliances (replacing a broken washing machine with an A-rated machine), water and energy costs can be easily reduced.

Embedding water efficiency in our hearts and minds will become more and more important. Our first task is to find our starting point.

6 Department of Energy and Climate Change (2012); Energy Consumption in the UK 2012; Chapter 3: Domestic; available at www.gov.uk
7 http://www.energysavingtrust.org.uk/Publications2/Corporate/Projects/EU-Life-Energy-and-Water-Project-Report
8 Environment Agency (2008): Greenhouse gas emissions of water supply and demand management options, Science Report – SC070010

4. Consuming water

The water industry collects, treats and supplies more than 16 billion litres of water every day for domestic and commercial customers[9] in the UK. The Environment Agency estimates per capita consumption to be around 150 litres per day[10]. From the Water Energy Calculator, we estimate that the average home consumes 349 litres each day and individuals use an average of 142 litres a day.

When cooking, washing, watering the garden and so on are shared across the household, average water consumption per person falls (Figure 2).

We can also look at responses in finer detail to better understand where water is used in the home. Showers use the most water in the average home, followed by lavatories and cold water from taps – for brushing teeth, cooking, cleaning and drinking (Figure 1).

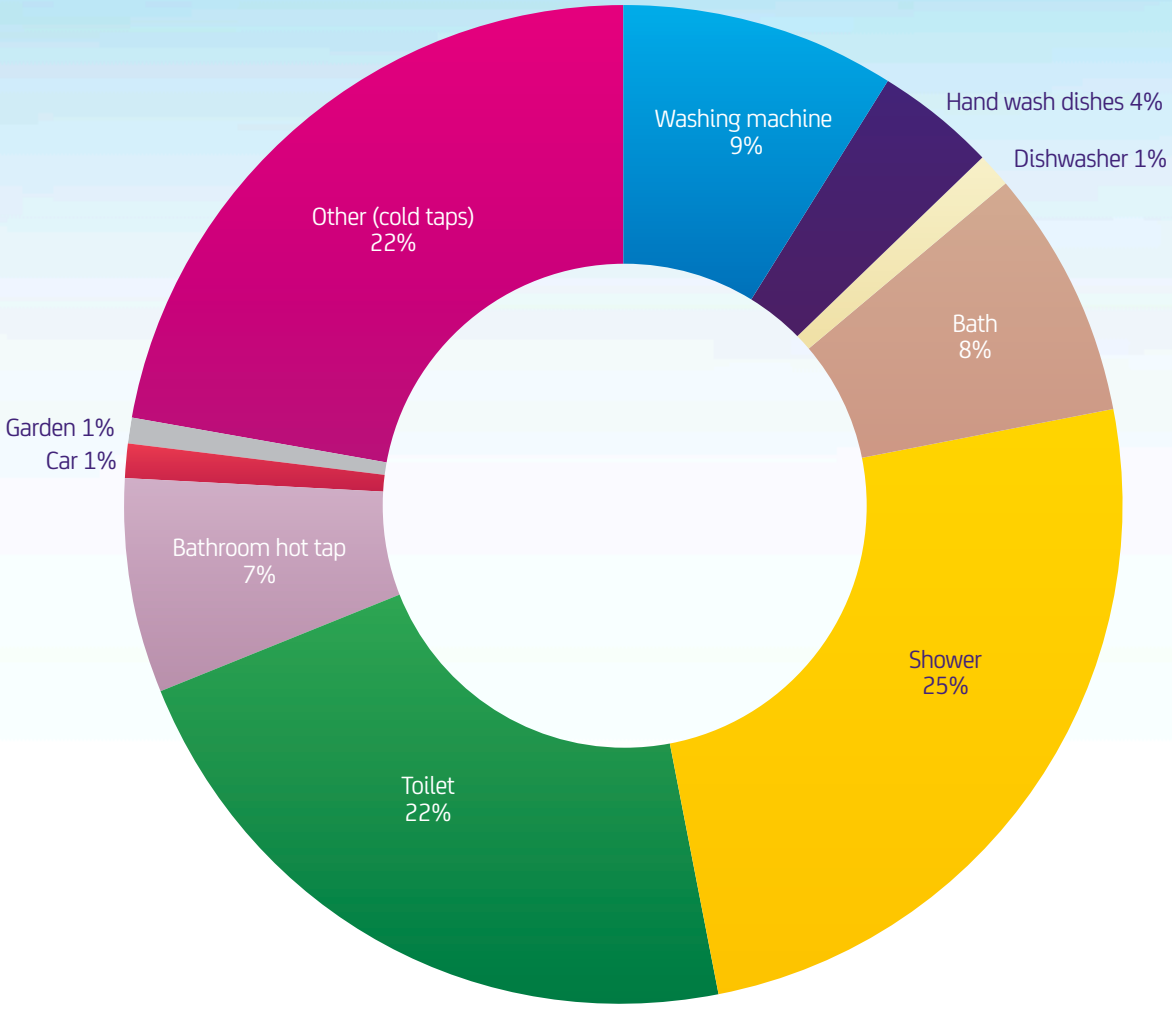
Just over two-fifths (43%[11]) of our respondents' properties had a water meter installed (Figure 3). We estimate that these homes use 3% less water than unmetered households – equating to approximately 72 litres per week, or about 3,700 litres a year.

This difference between metered and unmetered homes, which is calculated from self-reported input on water usage, is lower than a water saving of 10% often used in the water sector as a notional average saving for metered households[12]. Water use in homes, with or without meters, varies to a great extent. It depends on occupancy and differences in daily water use practices. An element of self-selection may also be at play for those households that use the Water Energy Calculator. It is likely that water meters will help typical British households to be more aware of how much water they use (discussed further in Appendix A). Metering has an important role to play in improving water efficiency, leakage detection and giving customers control of their bills, as part of a wider range of demand management interventions. We now look forward to investigating effective solutions for water efficiency and consumer engagement in Phase 2.

9 Water UK, Water Resources, available at: http://www.water.org.uk/home/resources-and-links/uk-water-industry/resources accessed: 01/04/2013
10 Environment Agency (2009) http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/geho0309bpkx-e-e.pdf
11 Ofwat proportion of properties with a meter is 42%, as at March 2012. https://www.ofwat.gov.uk/consumerissues/chargesbills/prs_lft_charges2011-12.pdf
12 Ofwat, Water meters, your questions answered. https://www.ofwat.gov.uk/mediacentre/leaflets/prs_lft_101117meters.pdf

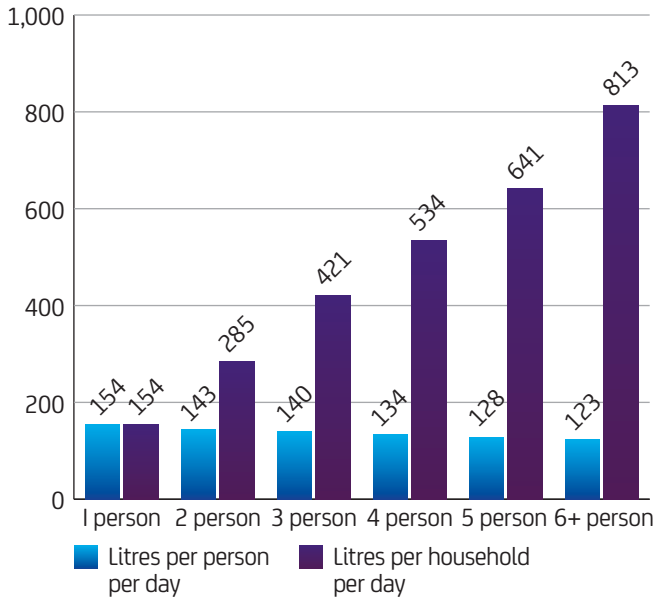
Water consumption by use

Figure 1



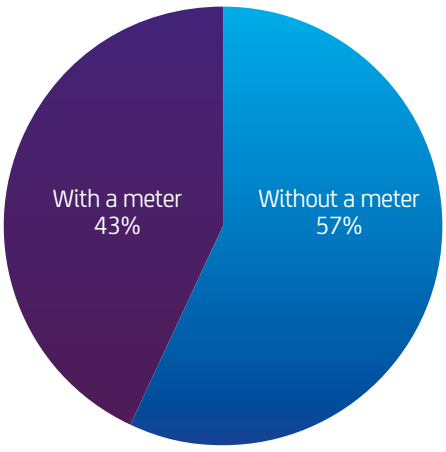
Average water consumption per head and per household

Figure 2



Proportion of Water Energy Calculator properties with a water meter

Figure 3



5. The bills

Our water use in the home also contributes to our rising energy bills. Water saving should be core business for energy efficiency and fuel poverty agendas.

Water charges

Households with water meters pay bills charged proportionately with their usage, based on a per litre tariff on top of a fixed standing charge. Modelled estimates from the Water Energy Calculator find that the average metered household uses 343 litres of water a day.

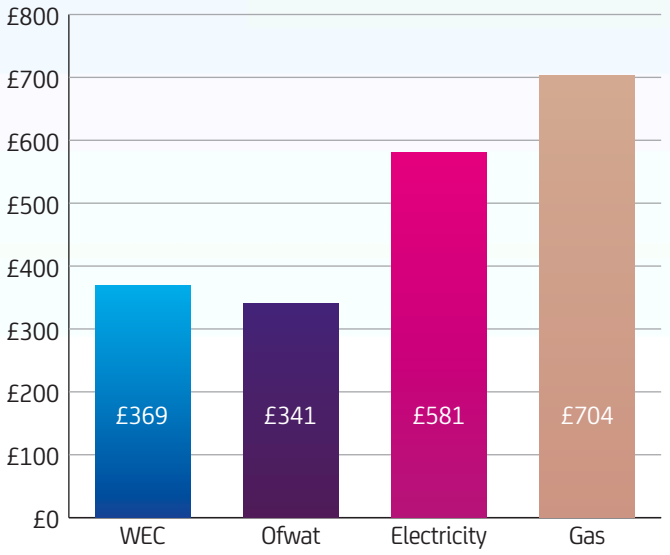
On average, metered users of the Calculator have slightly higher household occupancy (2.53 persons per household) than the average British home as reported by the water regulator Ofwat (2.1 persons per household[13]). If we make an adjustment to match Ofwat's occupancy figure, we see a more consistent comparison[14].

Following this adjustment, the average water bill in a metered home is £369[15], aligning it more closely to Ofwat's 2012/13 estimate of £341[16]. For unmetered homes, Ofwat's 2012/13 estimate for the average water bill is £404.

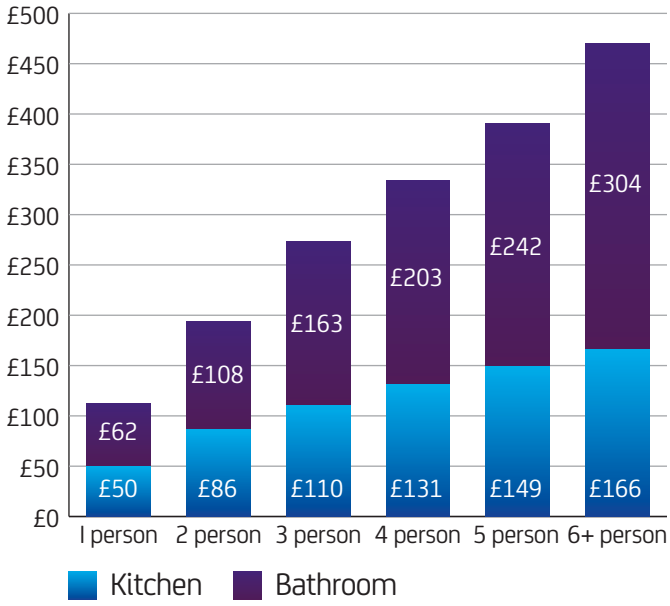
A water bill of £369 is 29% of the average combined household energy bill (gas + electricity) for a gas heated house, (£1,285 a year, Figure 4).

These figures provide households with a good indication of average water charges. They also demonstrate that the Water Energy Calculator can help households to establish their personal usage and their savings potential.

Breakdown and comparison of average household energy and water bills Figure 4



Annual energy bills from heating water in the kitchen and bathroom Figure 5



Energy charge

On average, 16% of a household's energy bill is from water-using activities, split across both gas and electricity usage. This equates to around £228 of the typical respondent's combined energy bill. Heated water (for activities such as baths, showers, washing up and water-using electrical appliances) contributes a lot to energy bills. But this link, and its implications, often goes unnoticed by householders.

The Energy Saving Trust recommends that water efficiency should be a core part of energy efficiency, fuel poverty, carbon reduction agendas and advice provided by those engaging with domestic customers.

13 Ofwat (2010), Service and delivery – performance of the water companies in England and Wales 2009-10: Supporting information.
14 Calculated by normalising estimates based on average occupancy of the sample; 2.53 persons per metered household (Water Energy Calculator) to 2.10 (Ofwat). Unadjusted figures show that the average water bill in a metered property is £427 a year.
15 The Water Energy Calculator numbers in this graph based on an average water supply and sewage charge of £2.73/m^3, and also includes an average Standing Charge value.
16 Ofwat – Average metered and unmetered bills; available at http://www.ofwat.gov.uk/regulating/charges/prs_web_charges2012-13; accessed 01/04/2013.

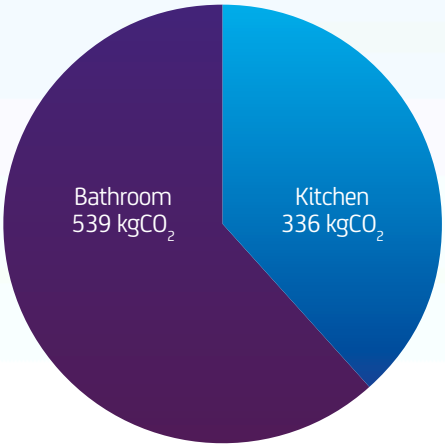
6. Carbon emissions

Improving water efficiency in the home could significantly reduce our carbon emissions.

We examined the carbon emissions from the Water Energy Calculator responses.

The energy used to heat water for devices and appliances emits an average of 875kg of CO_2 per household per year. This is equivalent to the CO_2 emissions from driving more than 1,700 miles in an average family car[17]. The bathroom uses the most hot water in the home, and so it is the room responsible for the most water-related carbon emissions (Figure 6).

Carbon emissions from water heating and water-using electrical devices in the home Figure 6



The energy used to heat water for devices and appliances emits an average of 875kg of CO_2 per household per year.

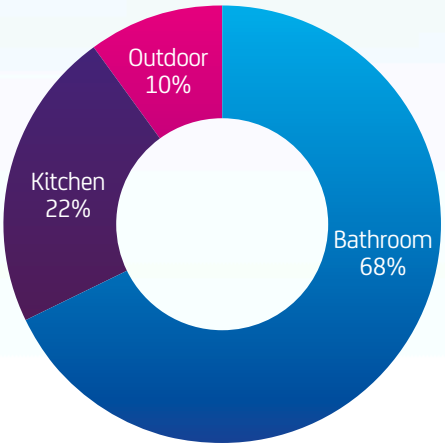
17 An average passenger car (any fuel) emits 0.311 $kgCO_2$ per mile. Source: 2012 Guidelines to Defra/ DECC's GHG Conversion Factors for Company Reporting.

7. At Home with Water – the tour

We use water in three main areas of the home: the bathroom, the kitchen and the garden.

Showers, lavatories, baths and bathroom sinks consume more than two-thirds (68%) of household water (Figure 7).

Proportion of water use in the home by area Figure 7



The greatest opportunities for saving water can be found in the bathroom.

The bathroom

Our bathroom habits have changed dramatically over the years. Showering is now the largest water user in the home.

Some older readers may remember a time when they didn't have a bathroom. It's unthinkable to most people today that a home should come without a bath or shower. At the time of the 1951 Census[18], about four in ten (38%) homes didn't have a basic facility such as a fixed bath or shower, and one in seven didn't have an internal or external flushing lavatory. By 1961, the position had improved, but even then one in five homes lacked a fixed bath or shower (22%), and the same proportion didn't have a running hot water tap. Even as late as the 1960s, 7% of homes lacked a flushing toilet indoors or out.

Changes in housing standards have led to much greater access to bathing facilities and flushing toilets. This has inevitably led to an increase in cold water consumption and a more dramatic rise in heated water use. Although water use per person over the past two decades has been fairly consistent, the breakdown of how and where we are using water has changed.

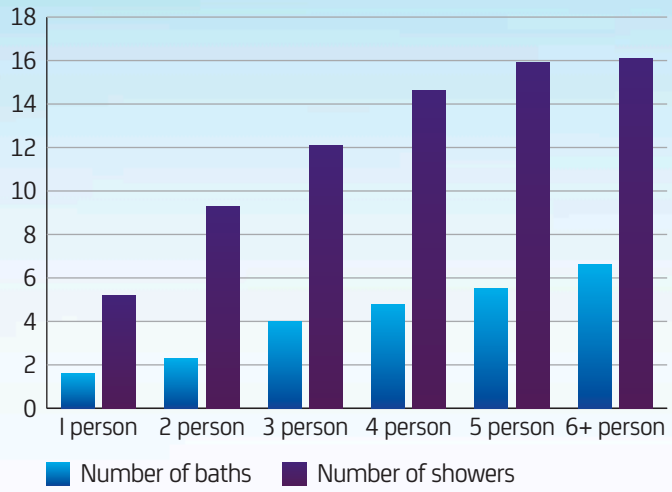
Analysis of the Water Energy Calculator's self-reported data shows that showers have overtaken lavatories as the biggest water user in the home. The rise in shower use is likely to be a function of increasing national wealth, better and changing housing specifications, and consumer preference. Water performance standards in new homes, and the ongoing refurbishment of our existing bathrooms, have also driven a change in water use devices and practices, through new product availability, more en-suite bathrooms, power showers and wet rooms.

To bathe or shower?

We estimate that each day Britain 'showers away' more than two billion litres of water. On average, respondents reported that each person takes 4.4 showers and 1.3 baths each week. But not every household uses or owns a bath or shower. For those that use the shower, the average was around five each week. In households that used their bath, each person took an average of two baths a week. However, two-fifths of respondents (42%) reported not using the bath at all. Figure 8 shows the breakdown of showering and bathing frequencies according to household size.

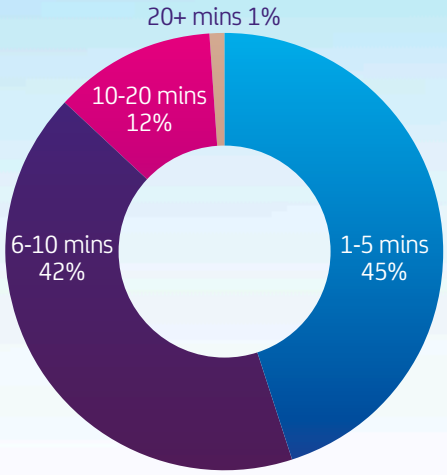
Number of showers and baths taken per household per week

Figure 8



Average time spent in the shower

Figure 9

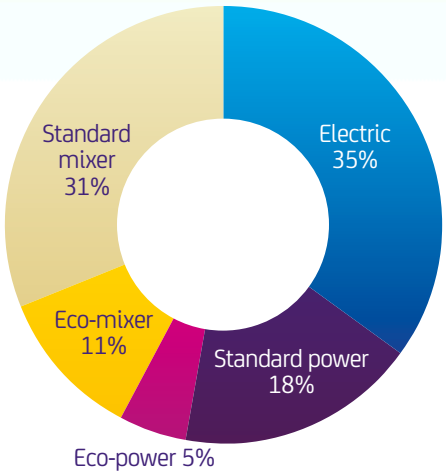


Water use from showers is a factor of showerhead flow rate and how long we spend in the shower. The average reported shower was seven and a half minutes. Although this might not seem too excessive, households reported a wide range of durations. 13% of showers took longer than ten minutes; some of these were for more than 20 minutes (see Figure 9). If every household in the UK took just one minute off one shower every day, it would save £215 million on our collective energy bills a year. If everyone in a four-person metered household with a power shower did this, it could save them £60 on energy bills and a further £60 on water bills every year.

Taking an average length shower, with a standard mixer showerhead (approximately eight litres/min), still uses less water (60 litres) than a typical bath (80 litres). There is a rule of thumb – taking shorter showers and installing lower flow or eco-showerheads can lead to the greatest water and energy savings that come from simple water efficiency changes. 45% said they shower for five minutes or less (see Figure 9), and just 25% of suitable households reported already using efficient eco-showerheads[19] (see Figure 10 for a breakdown by all shower types).

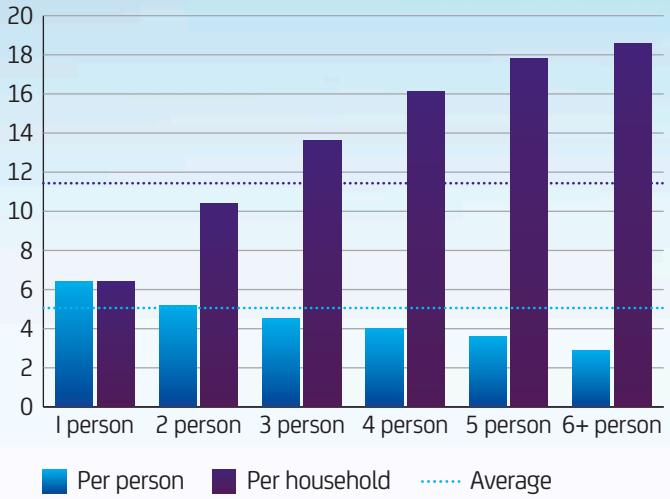
Household shower type

Figure 10



18 Office of National Statistics (2000): Social Trends No. 30, 2000 Edition, Chapter 10 Housing, London, TSO.
19 Eco-showerheads can be installed only on mixer or power showers.

Number of showers taken per household and per person per week Figure 11



Household size also makes a difference to showering and bathing habits. People in larger households report taking fewer showers each week, possibly due to increased pressures on time and access to the bathroom (see Figure 11). However, they seem to make the most of it when the opportunity arises: the larger the household, the longer the average shower. For example, occupants of five-person households reported spending an average of nearly nine minutes in the shower, whereas in one- or two-person households occupants shower for less than seven minutes each.

Energy efficient showering

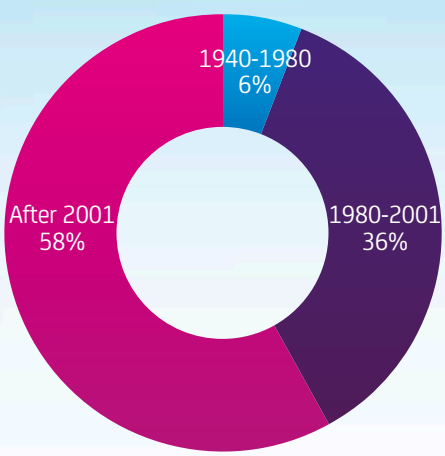
It is possible to enjoy a regular shower while using less hot water. Water-efficient showerheads that regulate water flow to six to eight litres per minute can be easily fitted to existing standard mixer or power showers (but they don't need to be fitted to electric showers, which are already low-flow). Aerated showerheads that draw air into the flowing water also cut consumption.

Today, only 25% of households with suitable showers say they have an efficient showerhead installed. There is still a long way to go before every shower is fitted. In the meantime, cutting the time we spend in the shower can save water and energy. It's a simple and effective solution.

Showers that use water heated by a gas boiler are generally kinder to energy bills – and cause fewer emissions than electric showers. This is despite the lower flow rate of electric showers (as little as 3.5 litres per minute). The lower flow rate of electric showers will save money on water bills for metered households. But, for an unmetered household with gas central heating, using a standard mixer shower instead of an electric shower (electric showers account for about one third of shower appliances in the UK; Figure 10), could save more than £50 and cut emissions by more than 100kg carbon dioxide a year.

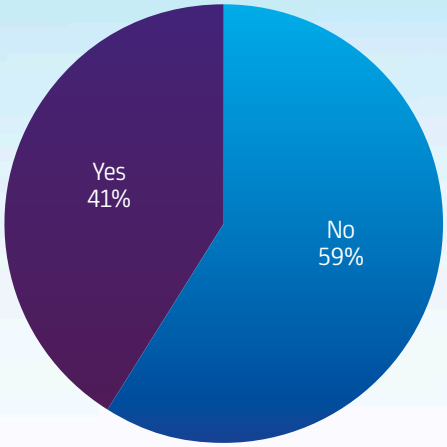
A typical British household with a high-flow power shower could save £55 a year on energy bills by switching to an efficient eco-showerhead. They could also save £65 if they have metered water. The UK could save as much as £360 million on annual energy bills if every power shower were retrofitted.

Period of manufacture of household lavatories Figure 12



* Before 1940: 0%

Do you have a dual-flush lavatory? Figure 13



Flushing money away

Toilets are the second highest domestic water-using device after showers. They account for one-fifth (22%) of a British household's water consumption. In a year, the average household flushes the toilet about 4,600 times. That's about 28,000 litres of water – enough to fill 350 standard baths.

Flushing the toilet is an unavoidable fact of life. But there are opportunities here for substantial savings. In recent years, technical changes have improved their efficiency. Yet 42% of toilets in British homes were manufactured before 2001 (see Figure 12). This means that their larger flush volumes could be reduced through simple changes, offering considerable water and financial savings.

The Water Supply (Water Fitting Regulations) 1999 prohibited the installation of new toilets that used more than six litres of water in a single flush. Some older lavatories flush more than 13 litres. Although the commencement of this regulation slightly predates the question about toilet age used in the Water Energy Calculator, it is evident that a sizeable proportion of the nation's WCs flush larger quantities of water than modern units. Significant savings could be made through simple retrofitting initiatives or replacement schemes. Manufacturers have a vital role to play – efficient devices can stimulate demand.

Displacing, retrofitting and replacing

Some water companies offer their customers free water displacement devices that can be placed in cisterns that currently flush between six and nine litres. These can reduce a flush by one or two litres. Even greater savings can be made by converting an existing toilet cistern to a dual-flush system, or installing a new water efficient lavatory that either uses less water in a single flush, or has a dual-flush function.

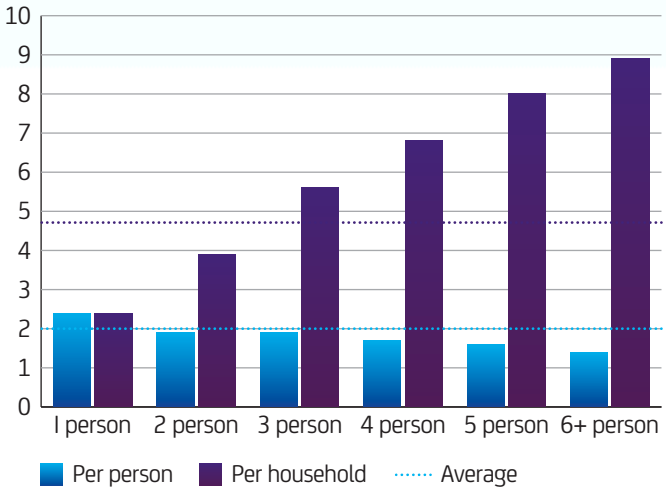
Upgrading a standard toilet to a dual-flush mechanism could save more than 7,000 litres per person per year, cutting a four-person metered household's annual water bill by around £80. Four out of ten homes (41%) have a dual-flush toilet. Only 17% of households with pre-2001 toilets, reported having a cistern displacement device. From the response sample we estimate that up to 48% of homes could still make some efficiency improvements to their toilets.

The kitchen

Kitchens consume over a fifth (22%) of a household's water. Washing dishes, washing clothes, general cleaning and cooking all put the plumbing to work.

White goods account for much of the water consumption in the kitchen and ownership of white goods has risen rapidly. Almost every household in our sample reported using a washing machine at home (97%), and four in 10 a dishwasher (41%)[20]. But it is not simply the ownership of these devices that is important for water and energy consumption. It is how we use them (for example, choosing efficient settings, or fully loading) and how often we use them.

Washing machine uses per week Figure 14



Washing machines

It is more efficient, in terms of both water and heating, to use a fully loaded washing machine than it is to wash by hand.

A modern automatic washing machine uses about 50 litres of water per wash. Whilst that is still a lot of water, the good news is that families say that they use the washing machine less often than previously thought. Data from the Water Energy Calculator reports that households use the washing machine on average 4.7 times each week (Figure 14), lower than previously used data (5.5 times per week) [21].

Getting cooler!

There is more good news. Households are using their washing machines at lower temperatures. The vast majority (95%) say that they wash clothes at 30°C or 40°C (Figure 15), showing that a shift to cooler temperatures is happening. But there is potential for further savings: only 24% opt for programmes that wash at 30°C or below.

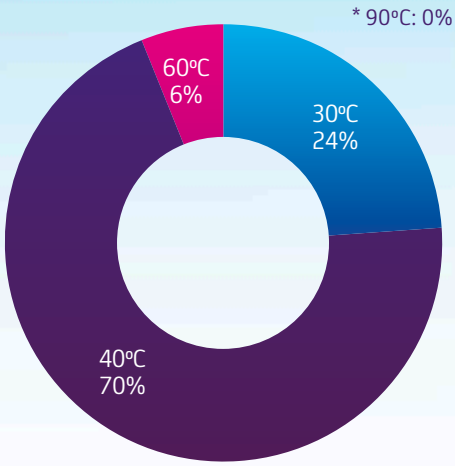
Most respondents said they fully loaded their washing machine (Figure 16). Manufacturers advise that machines should not be overloaded; but many now say that because of better technology, fuller is better. This is certainly the case from an energy saving point of view. The increasing choice of washing powders and detergents that wash clothes at lower temperatures, coupled with more water efficient appliances, is further driving markets and behaviours to deliver greater sustainability savings.

Washing machine rating

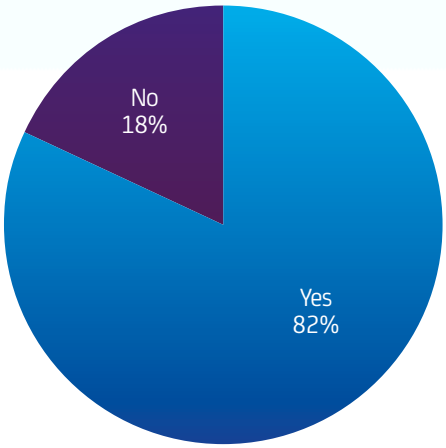
One third of respondents (33%) did not know the efficiency rating of their washing machines. Of those that did: 22% were A+, 35% were A, and 10% were B or lower. It is difficult to quantify how many washing machines offer an 'eco' setting or performance rating, but the more we can encourage consumers to think about the efficiency of their domestic appliances the more likely they are to make beneficial choices when they come to replace them.

20 Office for National Statistics, Family Spending 2011, Table B5 Characteristics of households, 2011, United Kingdom.
21 Powering the Nation. http://www.energysavingtrust.org.uk/Publications2/Corporate/Research-and-insights/Powering-the-nation-household-electricity-using-habits-revealed See also www.energysavingtrust.org.uk/Energy-Saving-Trust/Our-calculations for further information on the standard assumptions used by the Energy Saving Trust.

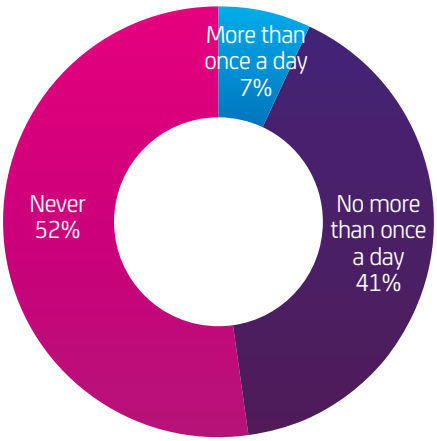
Typical washing machine temperature selected Figure 15



Proportion of households fully loading the washing machine before use Figure 16



How often do you use a dishwasher? Figure 17



Manufacturers and retailers have a significant role to play in improving water and energy efficiency, both in advancing device performance and driving better water use practices.

Washing up

Every home-cooked meal leaves a pile of washing up. Washing the dishes – whether in a dishwasher or by hand – accounts for around 5% of domestic water use.

Whilst a full dishwasher can be more water and energy efficient than washing by hand, more than half of respondents (52%; see Figure 17) never use a dishwasher. The majority of those that do use it make sure they fill it fully (77%), but only half say they use an eco-setting designed to save water and save money.

The average household washes dishes by hand ten times a week, but only three times in a dishwasher (possibly because dishwashers can cope with the dishes of several meals before it is fully loaded).

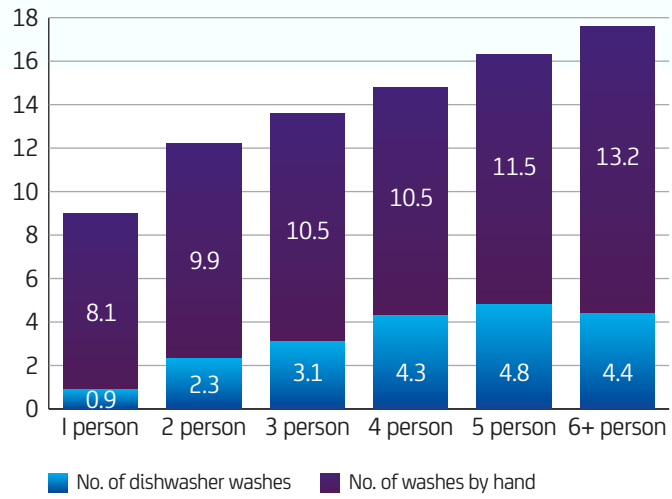
In most households, washing up usually entails someone sticking their hands in the suds and scrubbing the dishes. This is particularly true of single-person households. They are less likely than a larger household to use a dishwasher (see Figure 18), perhaps because fewer of them own a dishwasher and because it takes longer for them to fill one. The larger the occupancy the more a dishwasher is used, but manual dishwashing is still common.

For those who still wash dishes by hand, two bowls are better than one (and far preferable to no bowl at all). A separate bowl for rinsing, rather than washing off the suds under a flowing tap, cuts water consumption considerably. Nearly nine in ten (86%) respondents say they use a bowl when they wash up by hand (Figure 19). This indicates an awareness of saving water even among those who cannot afford or do not desire a dishwasher.

Dishwashers are becoming more energy and water efficient (and may offer savings over using the hot tap and sink), led in part by initiatives such as the 'Energy Saving Trust Recommended' labelling scheme, which has helped to improve the energy performance of the appliances included in the scheme. Manufacturers have seen market opportunities in improving energy and water efficiency. An investment in a dishwasher can repay itself over time because less water and less energy may be used. But dishwashers do differ. Consumers should choose wisely, taking note of appliance labels when they buy.

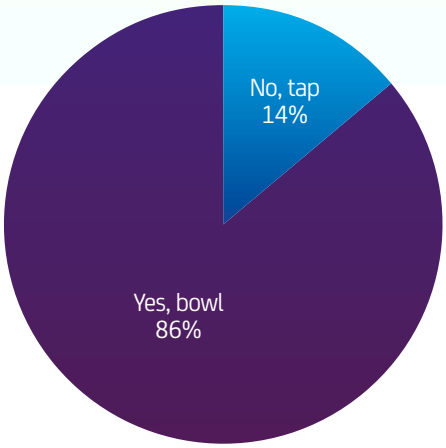
Split between washing up manually and using a dishwasher

Figure 18

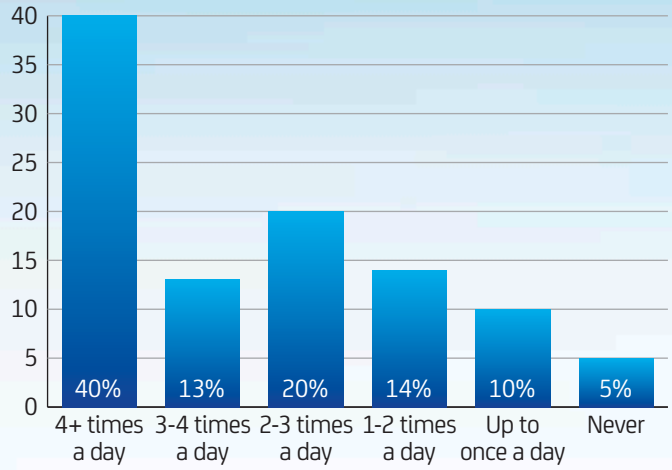


Do you use a bowl when you wash up?

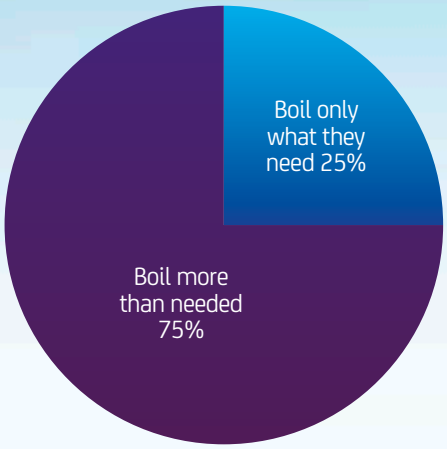
Figure 19



Number of times the kettle is boiled per household per day Figure 20



Do you boil more water than you need? Figure 21



Put the kettle on

It remains a staple of life in the UK. Day in, day out just about every household in the country sticks on the kettle at some point: 85% of respondents boil the kettle every day. On average, the kettle is brought to the boil in each household 24 times every week. 40% of households boil the kettle five times a day or more, but only one in 20 say they never boil a kettle (Figure 20).

The bad news is that three out of four respondents say they boil more water in the kettle than they need (Figure 21). Boiling water (in a kettle or on a stove for cooking) requires energy – and therefore costs money. Real savings come from boiling only what is needed. We estimate that overfilling costs British households £68 million on energy bills a year. If only one person is having a hot drink, it makes no sense to fill or even half-fill the kettle. A half-full 1.8 litre kettle is enough for three cups of tea. All the energy used to heat the water you don't use will be wasted.

The great outdoors

Outdoor water use accounts for less than 10% of our respondents' household water consumption. It is split between two main activities – watering the garden and washing the car.

Hoses and sprinklers typically use about 1,000 litres of water an hour – the equivalent of more than twelve baths. Consequently, they are the first items restricted by water companies in the event of drought. Although outdoor water use usually constitutes a relatively small proportion of total household consumption, water companies can experience a more problematic proportional effect in times of drought, when households water their gardens during the summer. Enacting a hosepipe ban during droughts is designed to reduce some peak water consumption whilst preserving water for other essential uses such as drinking, personal washing and flushing toilets.

Four out of five (81%) Water Energy Calculator users have a garden; and when it comes to watering it, 42% of these households use a hosepipe.

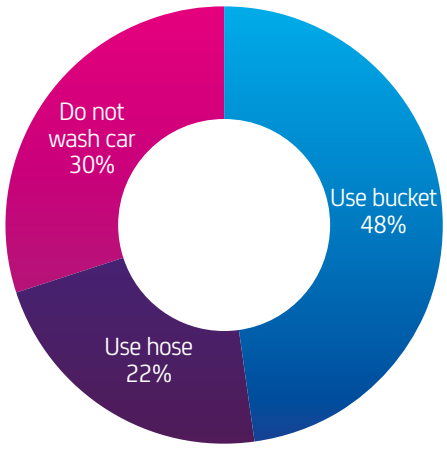
Water butts

A water butt can be used to harvest rainwater for use outdoors, which can save money all year round. Hosepipes that use rainwater are also not subject to the standard ban on hosepipes connected to the tap. 42% of households report owning a water butt, but only 60% of these claim to use it. This is an easy opportunity missed.

The car

About 70% of car owners reported washing their vehicles at home, rather than with a car wash at a garage or not at all (Figure 22). On average, we wash our cars just under once a month (ten times a year). Since 22% of households still use a hose to wash the car, we could make further water savings by switching to using a bucket.

How cars are washed Figure 22



8. Towards improved water efficiency

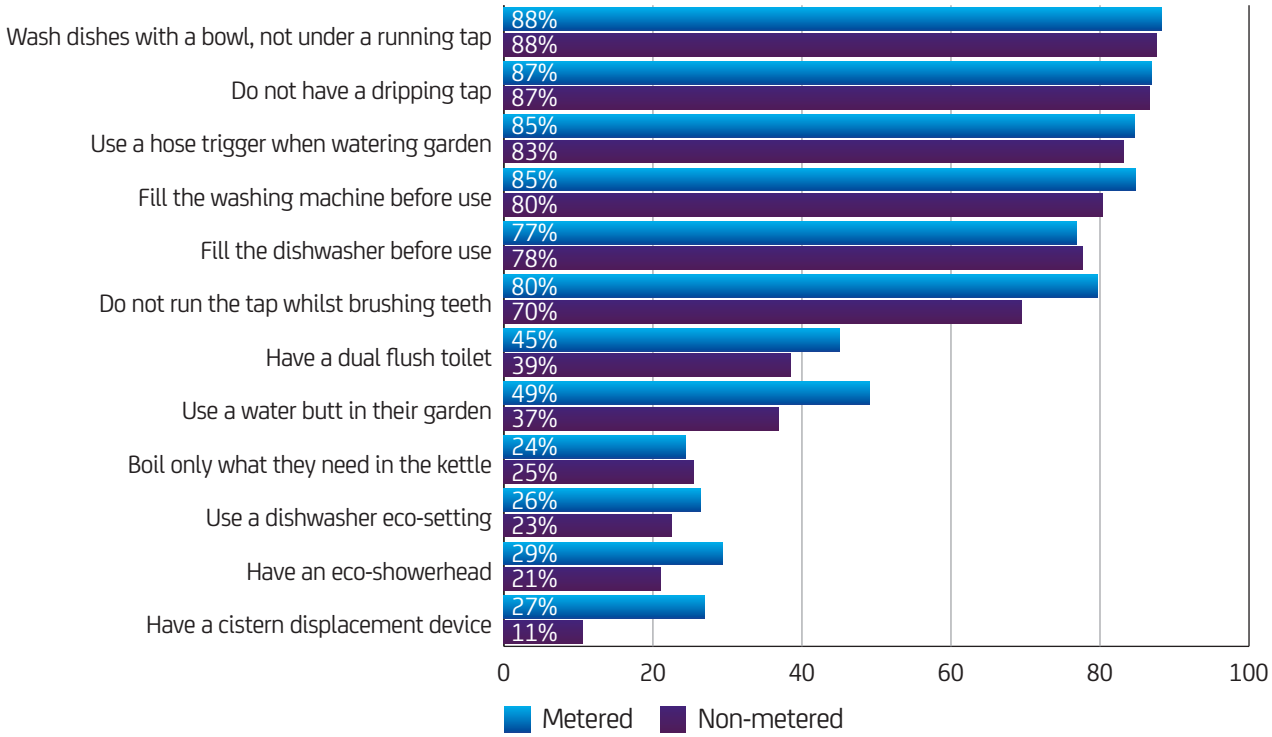
Many households are taking steps to improve water efficiency and save money, but there is still a lot more we can do.

This includes using a number of devices and modifying their behaviour, such as those highlighted in this report (for example, installing eco-showerheads or dual-flush lavatories). In almost every case, households fitted with water meters were more likely than those homes that receive flat-rate water bills to report that they were already undertaking eco-efficient water measures (Figure 23). They can see the benefit of making the changes.

A significant proportion of households with water meters asked for it to be installed, generally because it is the financially astute option. Not all properties, such as some older housing stock and flats, can be fitted with meters. It is clear that having a meter installed can encourage households to be more water efficient and therefore more energy efficient too.

Water-related eco measures in metered and unmetered households

Figure 23



9. Our water efficiency priorities

The Water Energy Calculator has provided a vivid picture of where and how householders are currently using water.

It has identified the devices and water consumption behaviours across Great Britain, shows there is more that can be done, and that there is more help and support required.

To help us prioritise the opportunities for future water, energy and money saving potential, the Energy Saving Trust recommends the following simple actions that can be undertaken either by UK households or the relevant stakeholders.

- Aim to replace all remaining old or high-flow showerheads with water efficient showerheads (with flow rates of eight litres per minute or fewer).
- Increase efforts on water efficiency education, specifically to promote the benefits of shorter showers.
- Aim to either retrofit and/or replace all high-volume flush toilets.
- Ensure that the most energy and water efficient machines available are promoted and incentivised.
- When purchasing or replacing water-using appliances, choose the most energy and water efficient model.
- Increase the penetration of water meters in GB housing stock. Reported uptake of water efficient devices and behaviours was found to be greater in metered properties. The rollout of water metering can also provide a key opportunity for householder engagement and education on household-specific water saving opportunities.
- Seek to combine water and energy saving education and delivery schemes for the benefit of the consumer.
- Support and promote the Water Label by linking with built environment, procurement and water efficiency initiatives.

10. What next?

The Big Energy Rethink will ask the questions that have to be asked, and will generate solutions across the sustainability spectrum – energy efficiency, smart technologies, smarter driving and more.

At Home with Water will continue to investigate household water consumption. Better understanding will help us to develop practical ways to save water and energy. The real success will be up to families and individuals. Therefore, we need solutions that suit them. We will soon continue this journey by spending time with families, in their homes. We will completely 'rethink' the nation's potential to save water and energy.

We will work with leading organisations to get real people in real homes to conceive the best real life solutions. Watch this space.

Appendix A – A note about methodology

The Water Energy Calculator is a self-completion online tool on the Energy Saving Trust's website (www.est.org.uk). More than 100,000 respondents used the Calculator from June 2010 to December 2012. The data has been cleansed to resolve missing, inconsistent or irregular responses, generating a total sample size of 86,171 responses for analysis. For the total water and energy consumption calculations, a sub-set of 38,839 responses were used, to include only respondents that were fully explicit in their answers. Those removed at this stage include 30% that did not know the rating of their washing machine, 10% that did not know the age of their toilet, and 2% that did not know the age of their dishwasher. Where these responses were unavailable calculations could not be made without interpolation of data based on additional assumptions. Removing these nonetheless retained a large data-set.

The data points collected were self-reported answers to closed questions, and we recognise that there are a number of potential biases present in this type of approach. Where possible we have sought to evaluate our results against recognised benchmarks and this has revealed strong validity. These are aspects which we hope to explore further in Phase 2.

Assumptions

The following are used in our modelling and calculations [22]:

Shower
13 litres/min power shower, 8 litres/min mixer shower, 5 litres/min electric shower

Bath
80 litres per full bath

Toilet
5 flushes/day/occupant; dual-flush 5 litres/flush, post-2001 5 litres/flush, 1980-2001 7.5 litres/flush, 1940-1980 9 litres per flush, pre-1940 12 litres per flush

Washing Machine
50 litres/cycle

Dishwasher
pre-2000 25 litres/cycle, post-2000 14 litres/cycle, Eco setting 10 litres/cycle

Hand Washing
8 litres per bowl wash, 30 litres per running tap wash

Car Washing
250 litres per hose use, 30 litres per bucket use

Water temperatures	Temperature (°C)	Temperature Rise (°C)
Mains	13.4	-
Shower	41.0	27.6
Basin hot	55.0	41.6
Kitchen sink hot	55.0	41.6
Bath	44.0	30.6
specific heat capacity (kWh / L / K)		0.00116

Cost and Carbon Factors	p/kWh	$kgCO_2$/kWh
Gas	4.64	0.185
Oil	6.02	0.246
LPG	8.77	0.214
Electricity E7 (for heating)	9.08	0.517
Solid Fuel	3.69	0.296
Biomass	4.20	0.000
Electricity Standard (for non-heating)	15.32	0.517

Water heating efficiency	Standard	A-Rated
Gas	65%	73%
Oil	68%	73%
LPG	65%	73%
Electricity E7 (for heating)	100%	-
Solid Fuel	50%	-

22 See also www.energysavingtrust.org.uk/Energy-Saving-Trust/Our-calculations for further information on the standard assumptions used by the Energy Saving Trust.

Appendix B – Water Energy Calculator questions

1. How many people live in your home?
2. How do you heat your water?
3. Do you have an A-rated boiler?
4. Do you have a water meter?
5. Which water company are you with?
6. How many times do you use your washing machine per week?
7. What temperature do you generally wash your clothes at?
8. What is the energy rating of your washing machine?
9. Do you fully load the washing machine before using it?
10. How many times does your household use the kettle each week?
11. Do you boil more water than you need?
12. How many times does your household wash up by hand each week?
13. Do you use a bowl for washing up?
14. How many times do you use your dishwasher per week?
15. How old is your dishwasher (bought before or after 2000)?
16. Do you use the eco setting (if dishwasher is post 2000)?
17. Do you fully load the dishwasher before using it?
18. How many baths does your household take per week?
19. Do you fill the bath up every time you use it?
20. What kind of shower do you have?
21. Do you have a low-flow or eco-shower head (not suitable for electric showers)?
22. How many showers does your household take per week?
23. How many minutes, on average, does one shower last?
24. Do you leave the tap running when you clean your teeth?
25. Do you ensure taps are fully turned off to prevent drips?
26. When was your toilet manufactured?
27. Does your toilet have a dual flush mechanism?
28. Do you use a toilet displacement device (water hippo etc.)?
29. Do you have a car?
30. Do you use a hose to clean your car?
31. How many times do you wash your car at home each year?
32. Do you have a garden?
33. Do you use the hose to water the garden?
34. Do you have a trigger operated spray gun for your hose?
35. Do you own a water butt?
36. Do you use the water collected in your butt in the garden, to wash the car etc?

About the Energy Saving Trust Charitable Foundation

We give evidence-based insight and advice to empower millions to lead affordable, low-energy lifestyles.

We are the leading UK organisation in developing evidenced-based insight, research and advice to engage households and communities on their energy and water use. We are a social enterprise with a charitable Foundation. Profits from our green enterprise activities go to our Foundation, to allow us to promote and advance the education of the public in the conservation, protection and improvement of the physical and natural environment.

We do this to help protect the world's climate systems. Our focus is on reducing and making sustainable the UK's use of energy and water, and ensuring the prudent use of non-renewable resources for public benefit.

There are three very good reasons to promote affordable, low-energy lifestyles:

1. **Leading scientists are united in the belief that climate change is real and that action is required now**
2. **Household fuel bills continue to rise**
3. **Our reliance on imported energy from abroad is not sustainable**

The most practical and cost-effective way to address these issues is to reduce our energy consumption. Saving energy – or not wasting it – makes total sense.

Our charitable Foundation

- We offer free, independent and impartial online advice for consumers.
- We collaborate to remove the barriers that prevent people from saving energy.
- We drive community action.
- We support the new green economy.
- We undertake new research to inform future thinking as part of the Big Energy Rethink.

About Big Energy Rethink

By joining forces with key business influencers and thought leaders, we intend to transform the way the UK thinks about energy.

We expect fresh insights and ideas to flourish. But we also want to evaluate, challenge and combine the best of existing thinking to better understand behaviour change and to drive action. That's how we'll empower industries, governments, the education sector, communities and charities to create a genuine cultural shift – one that will tap into every part of our society.

From how we visualise carbon, to how we engage with new and emerging technologies on and off-line.

From how we connect our own behaviours to energy usage at home and work, to how those we interact with – and those who are closest to us – influence our idea and actions.

The result will be a radical transformation in how we think about energy, whether it's about reducing energy and water use or creating new economies.

To join us in the Big Energy Rethink, email foundation@est.org.uk

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