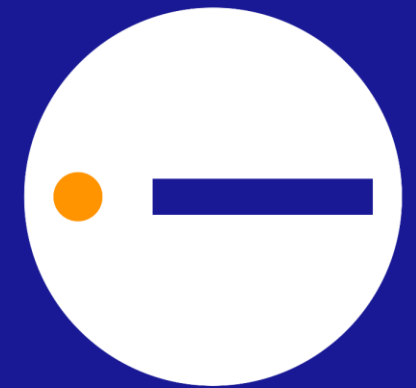


How we could achieve deep reductions in household water use: a long-term view

Rob Lawson

CIWEM conference, 5th December 2018



- Project delivered for Ofwat
- Long-term view of what is possible
- Aim was to provide insight on resilience, infrastructure investment and long-term value for money
- Inform Ofwat, other regulators and government departments
- Work completed and published in May 2018

<https://www.ofwat.gov.uk/publication/long-term-potential-deep-reductions-household-water-demand-report-artesia-consulting/>

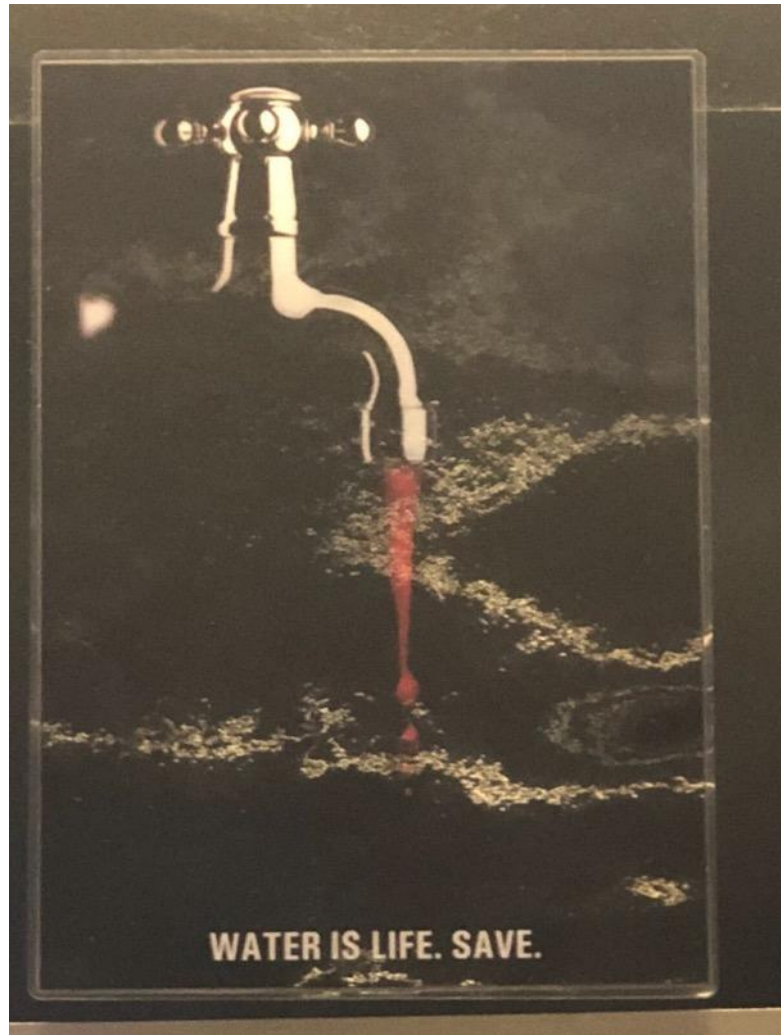
Presentation outline

- Background
- Past, present and current forecasts of demand
- Project methods
- Results
- Recommendations

Acknowledgements

- Ofwat
- Artesia project team
- Bruce Horton
- Stakeholders

Cape Town has raised the profile of deep reductions in water use



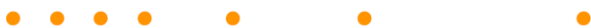
"I brushed teeth, showered, shaved and washed and conditioned my hair, using five litres of water, and caught it all to use to flush the toilet tonight."

For some people 'deep reductions' in household water use conjures images of droughts and 'making do' with less water.



In this study we have sought to take a longer term objective view and investigate how deep reductions in household water demand might look in 50 years time – whilst maintaining a high level of utility and quality of water use.

One of the many posters used in Cape Town to raise awareness of the value of water



Context for taking a 50 year forward look at deep reductions in household water demand

Population growth and climate change pressures

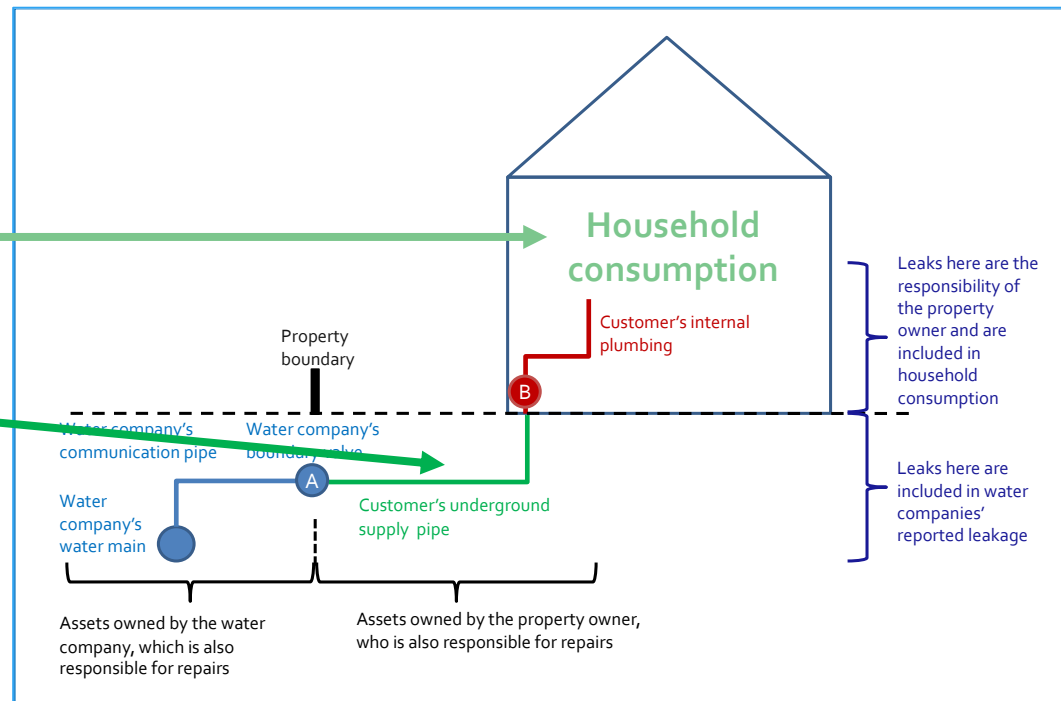
Ofwat PR19 objectives

Waterwise's (2017) strategy for the UK

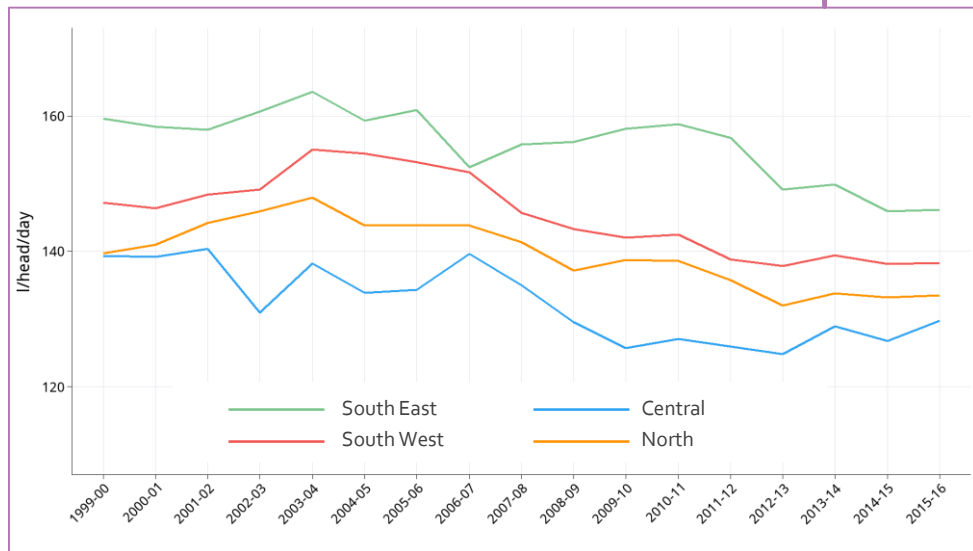
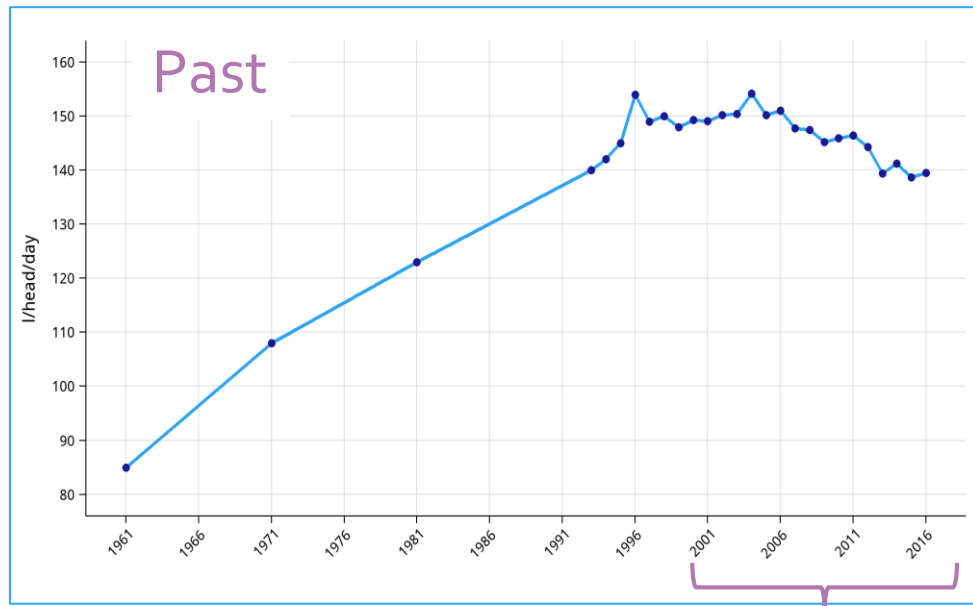
The Water UK Long Term Water Resources Planning report

Prime objectives were:

- reducing household consumption
- managing CSP leakage



Past and present consumption



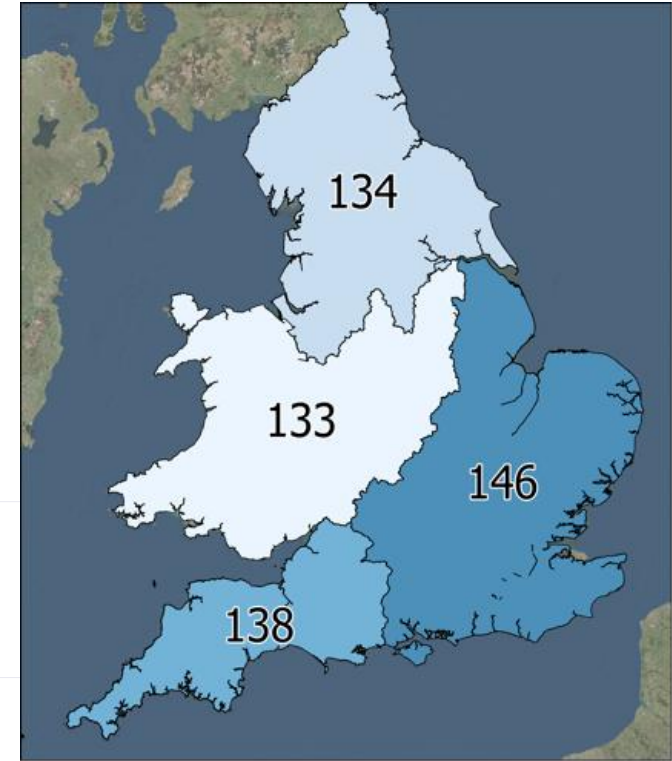
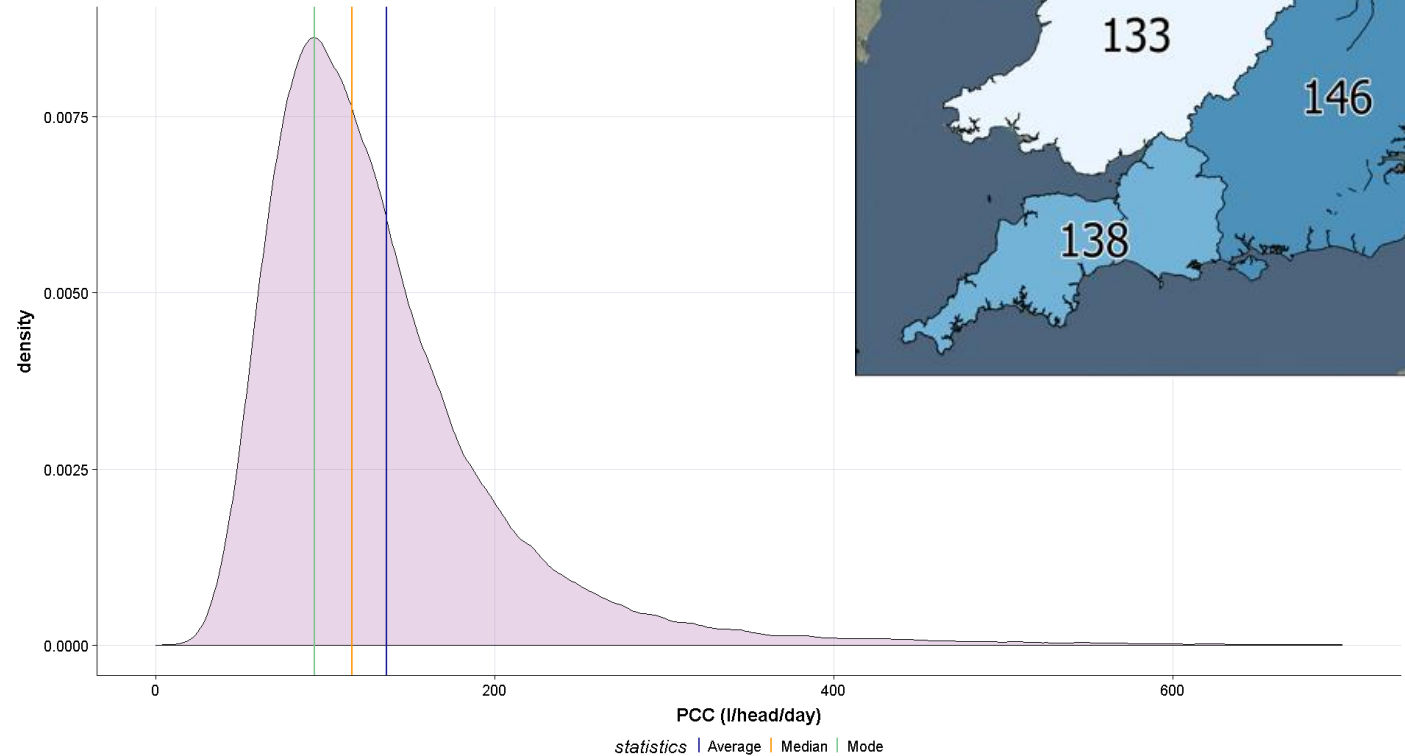
Present

PCC varies by region, and consists of a skewed distribution, England averages:

Mode ~ 94
(l/head/day)

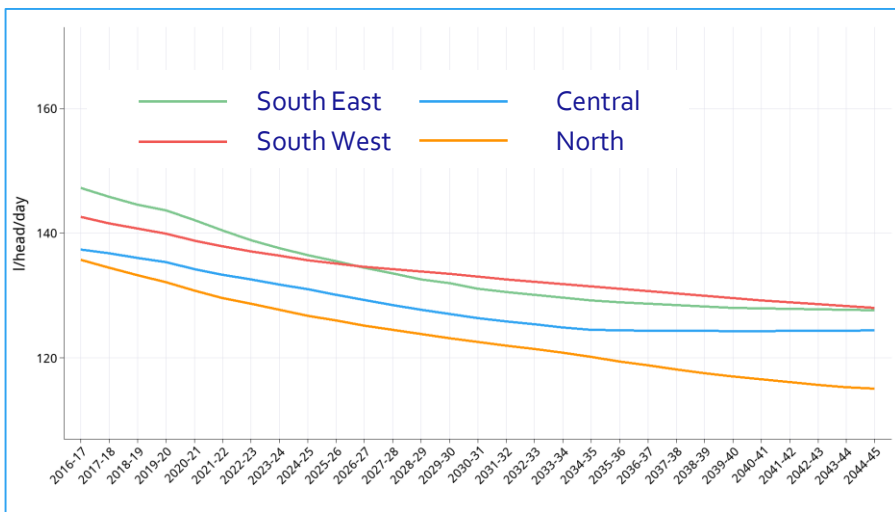
Median ~ 115
(l/head/day)

Mean ~ 140
(l/head/day)



Current forecasts of future consumption (dWRMPs)

Future PCC forecasts by region (dry year annual average)

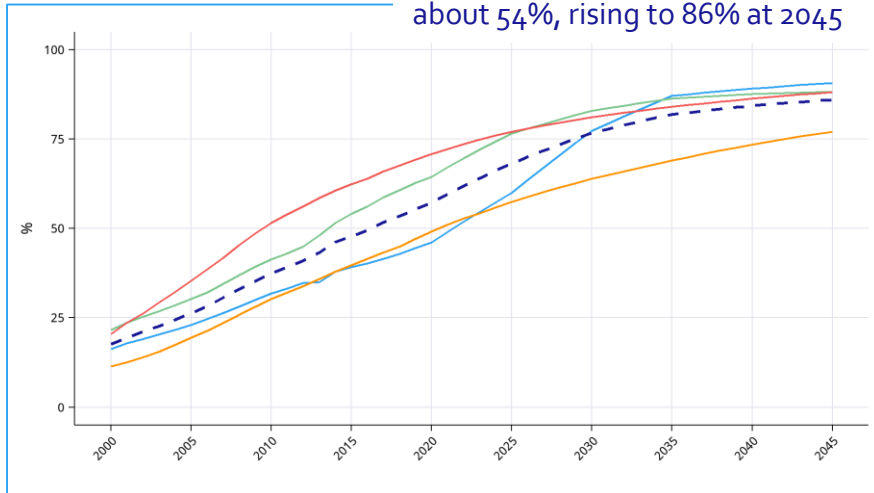


Region	2005 - 2015	2015 - 2025	2025 - 2035	2035 - 2045
England and Wales:	-1.1	-1.2	-0.64	-0.21
South East:	-1.13	-1.37	-0.69	-0.14
South West:	-1.27	-0.88	-0.40	-0.34
Central:	-0.93	-0.82	-0.63	0
North:	-1.15	-1.13	-0.63	-0.49

If the average demand reduction seen in the next 10 years is maintained to 2065, the PCC in 2065 would be about 105 litres/head/day

Metering penetration

Current E&W meter penetration about 54%, rising to 86% at 2045



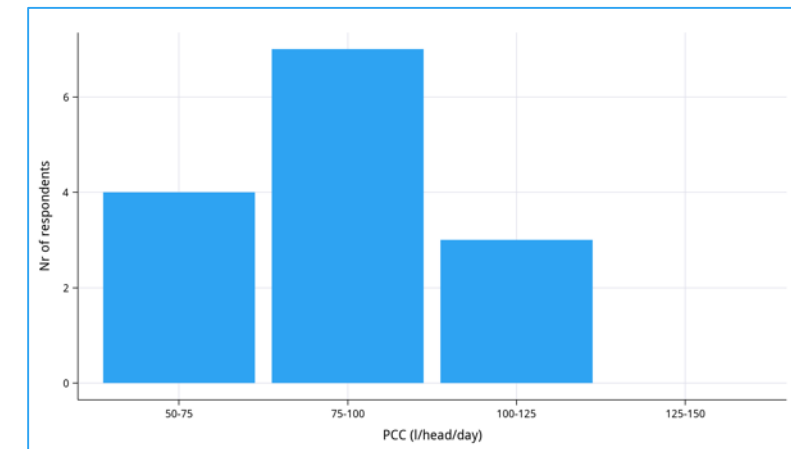
It is interesting to note that the rate of PCC reduction over the last 10 years (2005-2015) is similar in the South East, North and South West regions, despite the greater focus on implementing demand reduction measures to balance supply and demand in the South East regions. This may mean that there is a greater upward pressure on PCC in the South East that is dampening the additional demand reduction measures.

Stakeholder engagement

- We identified 38 stakeholders from water companies, government, regulators, trade bodies, academics and NGOs
- We sent them an email questionnaire with four questions
- We received 25 responses
- We then conducted eight representative follow-up interviews

1. What level of consumption (e.g. per person per day) could be achieved in 50 years' time?
2. What would be your overall vision for making deep reductions in household consumption in the next 50 years?
3. What 'enablers' (which might be legislative/regulatory/policy, technical or behaviour related) would be need to deliver this?
4. What do you think are the barriers to achieving this?

PCC aspirations in 50 years time



"85 l/head/day can be easily achieved in houses with meters and water recycling for toilet flushing."

"...our family of four use 70 litres PCC and by no means are we water martyrs despite my best intentions - there are daily showers and kids occasionally leaving taps on!"

"80-100 litres per person per day and we may not have a choice in 50 years' time if current water quality/availability and energy trends continue."

"the fifty year challenge is to get most people to use a little bit less through pretty rudimentary behaviour change and water efficiency technology, and the key bit is to get those fewer large users to use a lot less."

More stakeholder feedback

...overall vision for making deep reductions in household consumption ...

"Stop water companies being the main point of contact for customers with regards water efficiency – there is a conflict of interest between revenue and water efficiency."

What do you think are the barriers to achieving this?

"Willingness and fully engaged Government/regulatory/community partners is vital for deep reduction in household consumption."

"Focus on wastage – engineer as much unnecessary use out of the system as possible."

"We need a 'plastics' moment so that the penny drops and people understand the value of water."

"Demand management activities often have 'uncertain' outcomes, making them far less appealing to water companies. Much simpler to look for a 'new' supply."

...what enablers are needed to deliver this?

"New building standards from CLG, mandatory water labelling from DEFRA, behavioural incentives from cabinet office, white paper on water efficiency and abstraction reform."

"It is difficult in the UK to walk into a home improvement store and get any information about which shower head is more efficient. How can we expect people to save water if they don't have this information?"

"...unless customers are engaged and understand why they need to reduce their water use, the other enablers are not likely to help to achieve the objective of reducing PCC."

"Mandatory water labelling. This could be the single-most powerful tool to reduce PCC with time. Remove drop-valve WCs from market to eliminate leaking WCs."

Measures for reducing household consumption

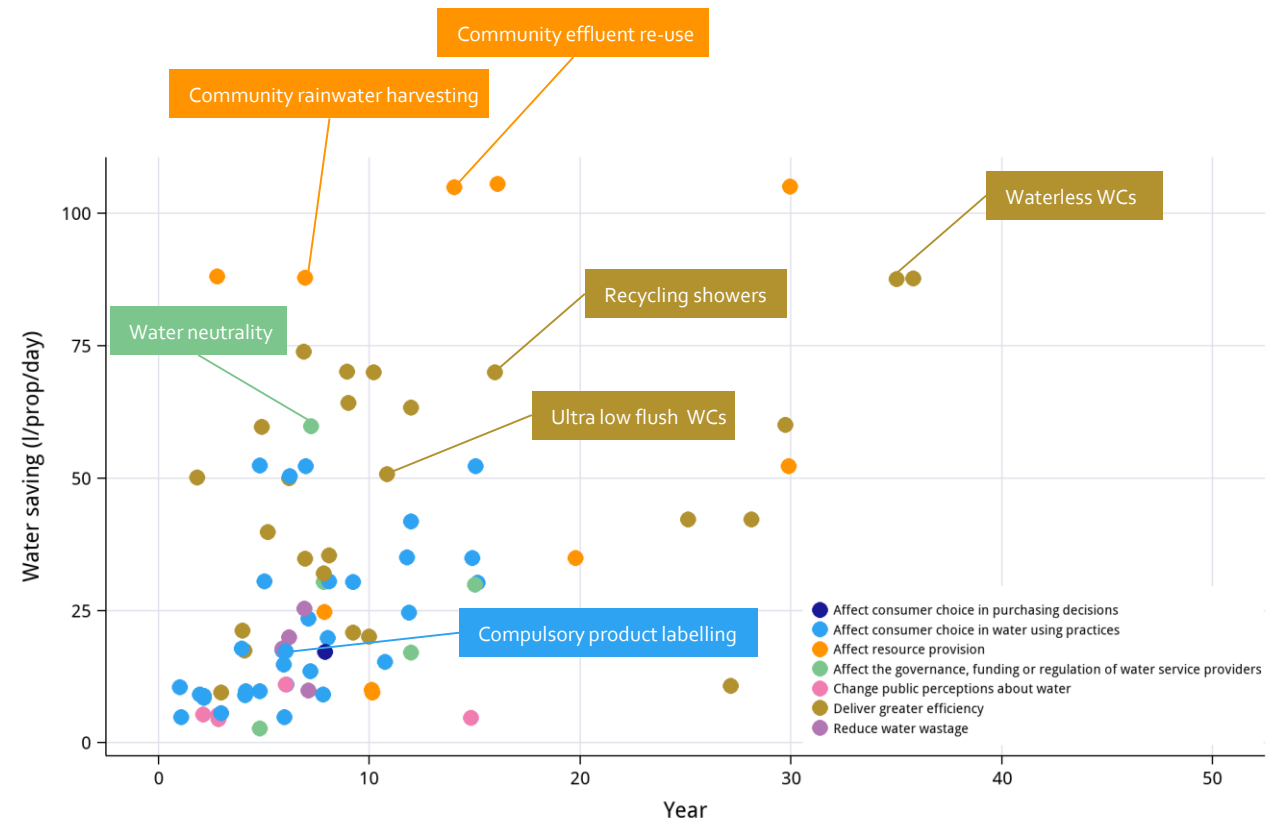
We conducted research which identified approximately 80 different measures for reducing household consumption.

The measures were grouped into 7 response categories.

They were then scored based on an estimate of how many years until they could deliver widespread benefits (even if they exist as a measure now), and the level of potential water saving.

Response category	Examples
Affect consumer choice in water using practices	Smart metering, tariffs, pay-per-use appliances
Deliver greater efficiency	Ultra low flush toilets, recycling showers
Change public perceptions about water	Incentives, home water reports, smart bills, social norms and feedback
Affect consumer choice in purchasing decisions	Compulsory water labelling, rebates, scrappage schemes
Affect the governance, funding or regulation of water service providers	Water neutrality, supply pipe ownership, natural capital accounting, utility bundling
Affect resource provision	Community rainwater harvesting, Reduce amount of water available for public water supply
Reduce water wastage	Fix leaky loos, ban sale of drop valve toilets, leak detectors, smart water using devices

Some of these options are available and being delivered now...



Examples of measures available, being delivered or developed now

Flushing less water down the drain with ultra low flush WCs



Propelair toilet

Enabling customers to choose to use less



Watersmart customer engagement and data analytics

Innovative purchasing options that encourage less water use



Miele bundles

Community options that use recycled water for some end-uses



NW Cambridge development, and Albion Water

Innovative shower technology that recycles 90% of shower water



90% WATER SAVINGS
80% ENERGY SAVINGS
SUSTAINABILITY STRATEGY

Orbital Systems recycling showers

Rewarding customers when they use less



Green Redeem

Commitments to reduce PCC across regions



Southern Water

Showcasing innovative houses with low use (40 PCC)



Anglian Water

Scenario development and description

S-0. Current ambition

There is progress regarding public awareness of future water scarcity issues (via planning control) and there is also reasonable progress to increase the efficiency of water using devices and deliver behaviour change via increased metering, voluntary water labels, and stricter product regulation.

S-1. Unfocused frugality

The public do not perceive water scarcity as a problem and there is limited regulatory intervention or organisational innovation to limit resource availability or constrain water use. Technology fails to deliver efficiency or reduce wastage and as a result households need to conserve water.

S-3. Technology and service innovation

Market-driven high-tech solutions drive very high levels of water efficiency and reduces water wastage, e.g. through home automation and waterless fixtures and fittings. A new focus blurs the lines between regulated utilities and home services, including smarter tariffs and pay-per-use.

We developed five scenarios to show how different response measures could affect consumption and the long term drivers of customer service, resilience, innovation and affordability in the context of climate change and population growth pressures in 2065. Scenario zero is effectively 'business as usual'. The other four scenarios then deliver deeper reductions in PCC over the next 50 years.

S-2. Localised sustainability

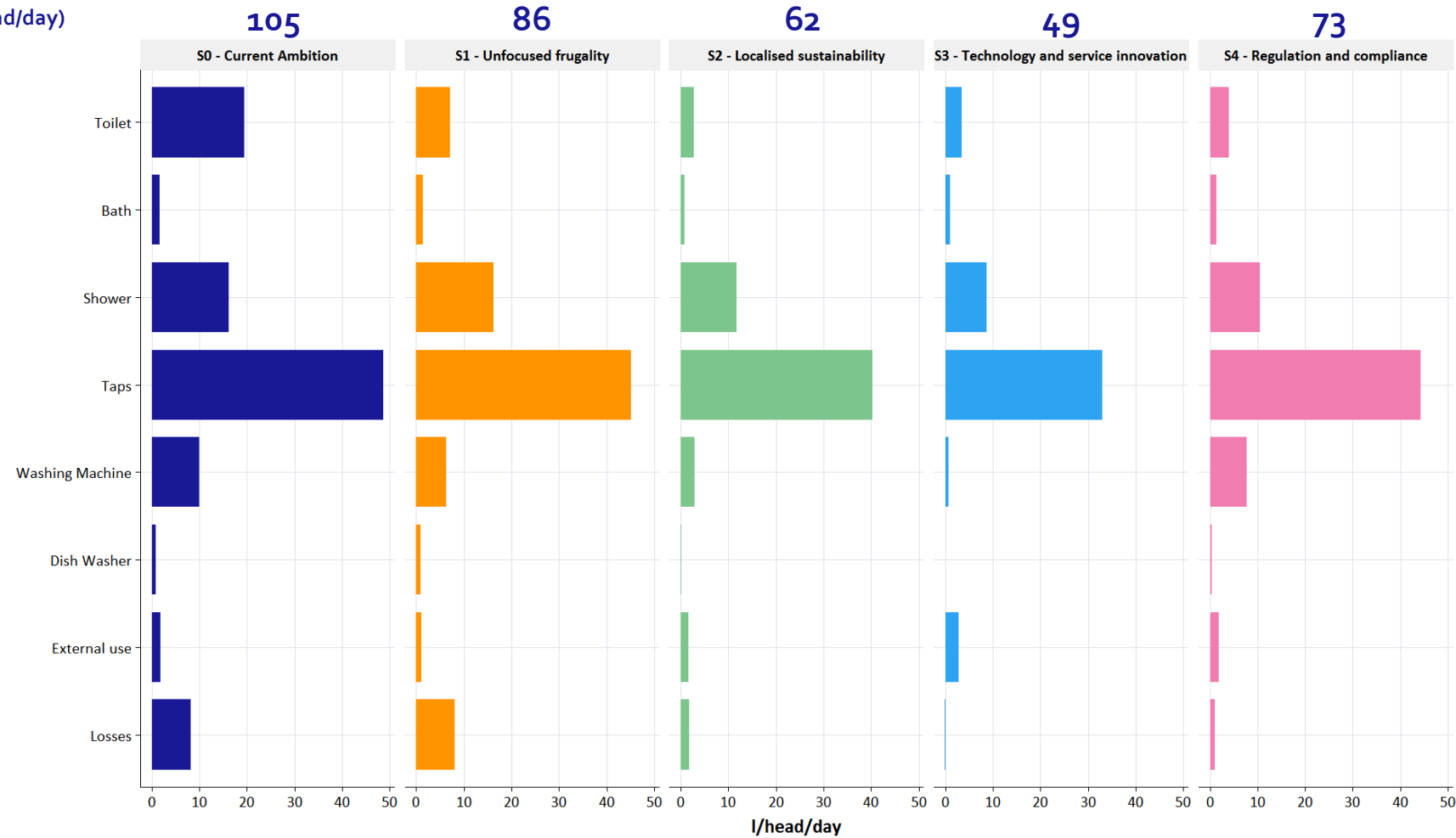
Water scarcity is widely recognised as an important issue. Markets in water resources and water services results in widespread competition and local providers delivering integrated water services. This positively influences consumer behaviour in purchasing and use of water using devices.

S-4. Regulation and compliance

Water service providers do not adapt to water scarcity, despite increased public awareness of the issue. Regulators apply strict controls on water availability and usage via punitive controls for companies. Sophisticated tariffs and other behavioural measures are used to limit water use.

Scenario modelling outputs – micro-components

PCC (l/head/day)



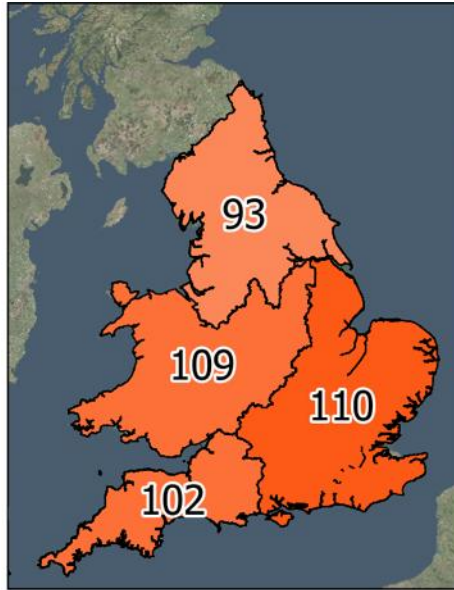
Modelled micro-components of household water use for England and Wales in 50 years for each of the five scenarios

Consumption varies according to distributions of occupancy, and O, V and F for each micro-component. Models all possibilities for each type of household – e.g. a single occupancy flat with no garden.

Each scenario used 100,000 households (can be scaled up to several million if required).

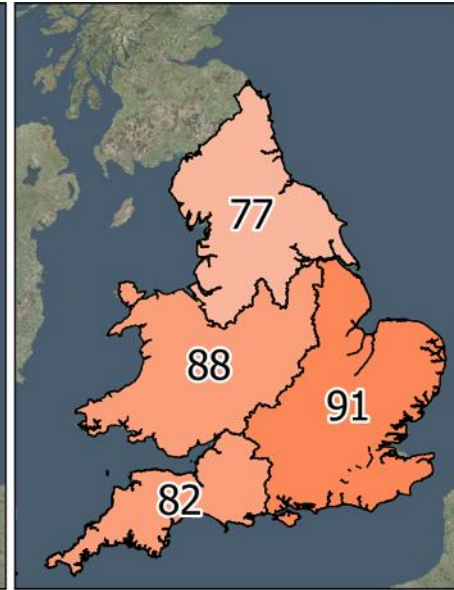
Scenario Outputs

Current ambition



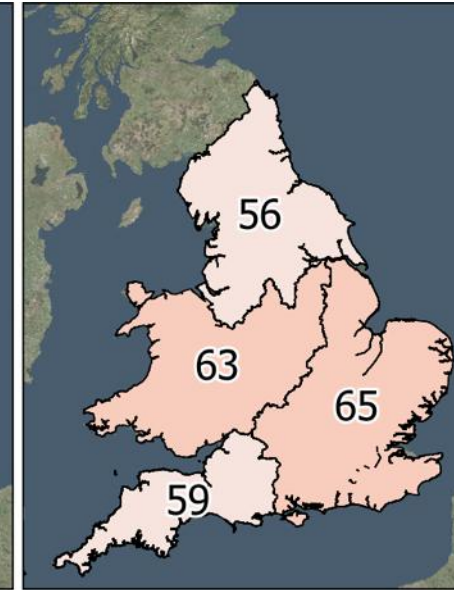
This scenario illustrates how household consumption (expressed as per capita consumption in litres/head/day) will continue to reduce, broadly at the rate seen in recent years. The key question for this scenario is whether this gradual reduction in use is enough.

Unfocused frugality



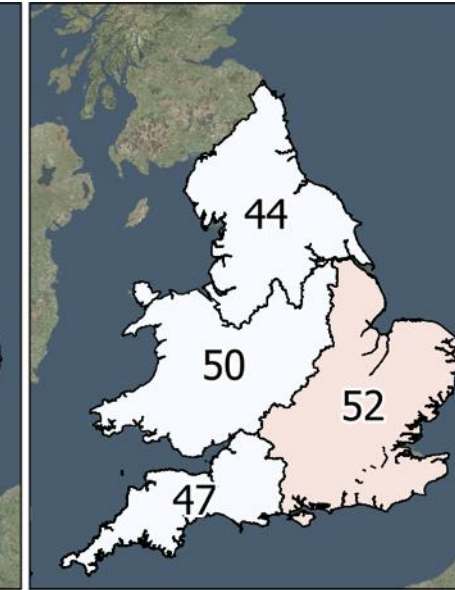
This scenario illustrates the consequences of a relatively disorganised and directionless effort to reduce consumption beyond current ambition. The impacts of this are largely negative in terms of resilience, customer service and other variables and outcomes are relatively uncertain.

Localised sustainability



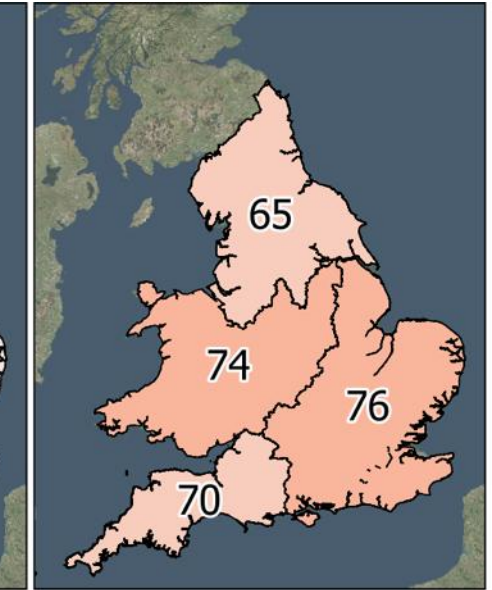
This scenario is achieved via a vibrant and varied market for local water services. Greater use of community water recycling systems. This requires new institutional and funding arrangements, bringing some risk, but overall this is an innovative, affordable and resilient scenario. Outcomes are somewhat uncertain.

Technology and service innovation



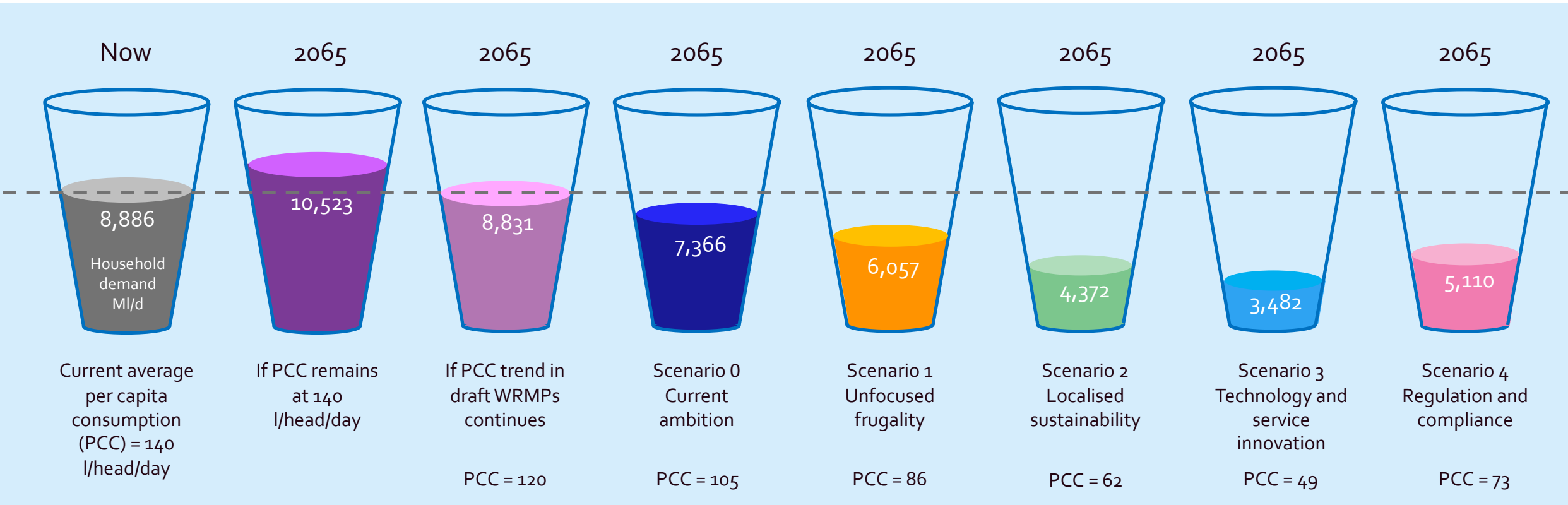
In this scenario demand reductions are delivered via much more efficient products, smart devices and competition for water services. Whilst this scenario is highly innovative, there is a risk of consumer inequities due to affordability and levels of service may also be inconsistent. Uncertainty of outcomes are low in this scenario.

Regulation and compliance



In this scenario demand reductions are achieved through a combination of regulation of products and the sector as a whole, including tariffs to deliver behaviour change. These may result in winners and losers. Innovation is limited and controls on water availability may constrain levels of service.

Effect of different scenarios on total household water demand



The graphic above shows the effect of different scenarios on the total amount of water demanded by households from the distribution system (that is household consumption and customer side supply pipe losses). The volumes quoted are MI/d, and assume current ONS population growth for England and Wales. The dotted line represents the volume used now.

Recommendations

1 Leadership for concerted action.

Strong leadership to ensure that water companies, government, regulators, the supply chain, academia, innovators and others work in a concerted and coordinated way.

2 Monitor and support.

Monitor progress towards deep reductions in household water demand, and provide support for the ongoing business cases for water efficiency.

3 Metering and tariffs.

Meter all domestic properties to facilitate future savings through customer behaviour, utility services, water saving technologies and further research on tariffs.

4 Water labelling.

Mandate water labelling for water-consuming products to help consumers select suitably water efficient products.

5 Leaky loos.

Tackle losses from leaky loos through product standards for new toilets, along with monitoring and fixing of plumbing losses.

6 Customer supply pipes.

Develop a strategy to reduce customer supply pipe losses and maintain these assets in the future.

7 Behaviour change.

Prioritise research into behaviour change for influencing consumer choice of products and changing water use practices.

8 New development and growth.

Update planning rules to require new developments to be water efficient, e.g. through community rainwater harvesting and water reuse.

9 Open data.

Make performance data openly available to encourage and facilitate innovation in services and technologies.