

# Future Homes Hub Water Efficiency Building Regs Roadmap Consultation

## Regulations and standards

### **1. What water consumption is possible in terms of litres per person per day (lpppd) in the home and how can it be achieved?**

The current PCC in the Anglian Water region is 135.99l/p/d for 2021/22 and we are expecting this to be reduced to 120.31 l/h/d for 2030 (NYAA) and 109.37 l/h/d for 2050 (NYAA).

A useful reference source for an ambitious view on PCC reduction is this work by [Artesia for Ofwat](#) which looked at the potential for deep cuts in personal consumption. The work highlighted that personal consumption was below 90 lppd in the 1960s but has gradually increased since. They identified and modelled a range of water saving opportunities in the home and mapped these onto various future pathways. Depending on the mix of fittings they modelled a number of pathways that reduced PCC to below 90 lppd and in one case to as low as 49 lppd with innovative water reuse technology and behaviour change.

### **2. Do you have experience in meeting specific water consumption targets below 110 lpppd? What technologies, appliances and fittings do you use to achieve these levels? Any difference between low rise and high-rise developments?**

In the [Anglian Water Shop Window](#) we targeted (and achieved in some cases) a PCC of 80 litres per person per day with metering, water butts, water efficiency devices and behaviour change. Through the Smarter Drop campaign we turned Newmarket into the water-saving capital of the UK. We installed nearly 7000 smart meters across the town and engaged with customers about the latest technology and infrastructure on trial in Newmarket. These included predictive weather modelling in our water and sewer networks, and virtual reality and 3D mapping. We hosted several community events to drive awareness and enthusiasm in the local community. Our Smarter Drop shop offered our customers the chance to interact with our innovative technologies and give us their opinions on the big questions, while helping them save water and money. We created an online community of customers, which has been discussing the issues that matter to them and to the future of their water and sewerage services.

The [Eddington development](#) near Cambridge achieves around 80 lppd based on use of a community scale rainwater harvesting system coupled with a dual pipe supply network. There are many further examples and information on rainwater harvesting and greywater reuse in [this review report](#) and [appendices](#) commissioned by Waterwise in 2020 which also looked at the costs and benefits of rainwater harvesting and greywater reuse in the UK.

### **3. Are you aware of any actual or potential conflicts with the current English Building Regulations and the Approved Documents that could be barriers to the adoption or trial of certain water efficiency measures? Any examples of specific revisions that are needed to Parts G and H?**

Part G calculations in the building regulations are inherently flawed. Assumptions about water use behaviours and occupancy mean that the calculator is meaningless. Research done by Welsh Water and Thames Water have demonstrated that Part G is also not enforced and that homes are not

achieving the 110/125 maximum PCC. Part G needs to be replaced by a mandatory water efficiency label linked to building standards.

As water demand decreases and more efficient homes are built, the minimum pipe sizes for drainage need to be reviewed to maintain self-cleansing velocities. The research institute [KWR](#) have done lots of work around this in the Netherlands and Arup are also involved in this space.

#### **4. Do you know of any product standards, codes of practice or technical specifications that should be considered for development, revision or adoption to aid the UK in improving water efficiency?**

Defra are [currently consulting](#) on options to update regulations to reduce the **occurrence of leaky loos**, Anglian Water will also be responding to that consultation. Around 5-8% of dual flush toilets leak and they are wasting nearly 400 Mld of drinking quality water. Research into the issue is [here](#) and the Waterwise position statement is [here](#).

We also suggest the government looks at the definition of “**readily discernible**” when it comes to **dual flush toilet buttons**. Many of the dual flush button designs on the market are confusing despite the requirement in the Water Supply (Water Fittings) Regulations (Schedule 2 Para 5) for them to be “readily discernible”. Research by SES Water with 1200 customers found that less than 30% of householders knew which button delivered the reduced flush in their home. Incorrect use of the buttons could be leading to over 200 Mld of wasted water a day. Research by WRAS [presented at a 2021 Waterwise webinar](#) with 2000 water users revealed similar findings. They found that the best ways to ensure that dual flush buttons are readily discernible is to have clear and permanently displayed information on or adjacent to the buttons and for the big flush button to be at least 50% larger than the small flush to achieve over 80% customer recognition. We need the government to provide a clearer indication of what it regards as readily discernible.

A **mandatory water efficiency label** for water using devices similar to the energy label and the mandatory water labels in place in [Australia](#), New Zealand and elsewhere. The government has [committed to introducing](#) this and are consulting on this currently. Research by the Energy Savings Trust [has identified significant water, energy and money savings](#) from such a scheme.

## **Current and potential technologies**

**5. Do you know of any developments in design, technology or construction to improve water efficiency in the following areas? Please indicate potential water savings, timescales and costs if known:**

### **5a. WCs, baths, taps or showers?**

**5-8% of dual flush toilets leak** and they are wasting nearly 400 Mld of drinking quality water. A typical leaky loo wastes between 200 and 400 litres per day. Research into the issue is [here](#). We need to see better designed WCs which don't leak.

**Water recycling showers** are emerging on the market (<https://orbital-systems.com/>; <https://www.flow-loop.com/>). This new technology is very exciting as it can significantly reduce water and energy use in an area where water usage trends are increasing. They could reduce household consumption by as much as 20-30 lppd.

Low flow [propelair toilets](#) have been used in commercial settings for years, and are being designed to be quieter than previous ones for use in the domestic setting ([velocity WC](#)).

#### **5b. White goods?**

White goods and all water using appliances should have a water efficiency label.

#### **5c. Leak detection?**

At Anglian Water we have a smart water meter roll out programme. We are therefore able to find leaks fast and encourage water efficient behaviours more easily. We would like to see sector wide support for smart metering.

### **6. Dual supplies: Have you any opinions, evidence, or case studies on their real-world performance? Dual supplies is the provision of separate wholesome and non-wholesome water supplies.**

There are several examples of the implementation of community scale non-wholesome water networks within Cambridge Water's supply area (Eddington, Clay Farm etc.), these were on the whole driven by the desire to achieve Code for Sustainable Homes (CfSH) levels 5 and 6. Since the CfSH was ditched, sadly with the lack of any such standards there appears to be little incentive for developers to strive for greater than what building regulations require for them to achieve.

Anglian Water would like to encourage the delivery of non-wholesome water piped networks at the point of construction to help future proof developments. At present the costs associated with this additional infrastructure, internal and external pipework, are born by the developer. There is also a lack of incentive for water companies to adopt non-wholesome water supplies due to the risks involved in misuse or a fluctuation in water quality.

### **7. What other technologies are available that may inform the roadmap?**

The potential unlocking of final effluent for reuse as a non-wholesome water provision. Currently this potential source of water is considered by the environmental regulator to be a waste product and therefore usage is heavily restricted. There is however significant opportunity for this treated wastewater to be reused locally as an alternative to fully treated potable wholesome water.

Although this may not be appropriate where the receiving waterbody is heavily reliant upon the final effluent flows from an water recycling centre, it should be noted that the main non-wholesome water usage within the home (WC flushing and washing machines) is non-consumptive, meaning it will eventually return to the water recycling centre as wastewater.

## **Rainwater harvesting and grey water reuse**

### **8. Have you seen any examples of domestic schemes where rainwater and/or grey water are applied at a development level? Please provide details of the scheme and how it has performed.**

There are a **number of examples** of rainwater harvesting and greywater reuse in [this review report](#) and [appendices](#) commissioned from Ricardo by Waterwise in 2020. The research also looked at the costs and benefits and [policy options](#) to promote their uptake.

**9. Have you seen any examples of domestic schemes where rainwater and/or grey water are applied at a development level?**

[AQUALITY](#) have a website full of case studies of development and commercial scale examples.

In terms of individual home scale, see Sky News “The Climate Show” programme from 13/08/22 (8mins 2s) - [The Climate Show with Tom Heap: How do we stop water shortages? | Climate News | Sky News](#). The homeowner reports an annual saving of £150-200 from the water bill through the use of a 5,000L rainwater harvesting tank which feeds WC flushing (Tom Wykes).

**10. Do you have any evidence on customer or user experience or perceptions with recently installed water reuse systems?**

[Waterwise and the GLA carried out a public perceptions survey on rain water harvesting \(RWH\) and grey water recycling \(GWR\)](#). Results showed that around three quarters of 406 participants claimed to be familiar with systems that harvest rainwater to flush toilets in the home. Around half of participants also claimed to have heard of systems that utilise used water from the shower or washing machine to flush the toilet. Most people felt very positive about the idea of a rainwater harvesting system and greywater recycling system in their home. In the online survey 87% of respondents expressed interest in a RWH system, and 86% in a GWR system. All the interviewees felt positive about the idea of a RWH system, and around half of the interviewees also felt positive about a GWR system.

**11. The viability of a water reuse system can vary due to its size, complexity and ownership. What scale of rainwater or grey water reuse tends to be viable and why?**

[According to research by Ricardo and Waterwise](#) it was concluded that large RWH systems present an attractive opportunity, both privately and socially, which is likely why they are currently being installed in larger developments (such as the Southbank development in London). However smaller installations are not privately beneficial for the installer and are therefore unlikely to see large scale uptake until they become so, either through falling prices or government backed schemes and interventions.

Overall GWR systems installed in larger buildings such as large tower blocks or multi-house residential developments present an attractive opportunity, both privately and socially. However smaller installations are not privately or socially beneficial for the installer and as such large-scale uptake is unlikely until they become so, either through falling prices or government backed schemes and interventions.

Southeast Water’s [Aquarevo](#) project (Victoria, Australia) concluded there are too many complexities around access for inspection and maintenance involved in delivering reuse on a plot-by-plot basis that they would advise delivering this on a community scale in the future.

**12. What procedures and systems can be put into place to ensure that water reuse systems are safely maintained for the lifetime of the building?**

Longterm stewardship is key to the success of any reuse system. The Ofwat innovation funded Enabling Water Smart Communities project will be examining the challenges around this by rethinking roles of the various stakeholders as well as rethinking assets.

We would welcome the chance to discuss this innovative project further with Defra officials and show them around the finished sites, once we have delivered the project.

**13. How should the ongoing maintenance of communal water reuse systems be financed, and can you provide any examples of projects with these financing arrangements?**

The ongoing maintenance of water reuse systems is something that the Anglian Water Enabling Water Smart Communities project will be exploring. This project received Ofwat Innovation Funding and has a wide range of partners who will be delivering the project over the next few years.

At Eddington the collection system is via the landscaping and its extensive nature-based SuDS, maintained centrally and funded via a ground rent charged to all residents. The non-wholesome water, which is pumped to each property for WC flushing, washing machine and external tap use, is sold to the user at a reduced price, however it is not clear whether this is sufficient to fund its provision or whether it requires a subsidy.

**14. Integration of water supply, drainage, flood alleviation and flood resilience is increasingly important. Do you have any case studies that demonstrate good practice of their integration?**

- Eddington housing development in Cambridge
- Clay Farm (Trumpington, Cambridge)
- Cannock Mill Co-Housing (Colchester)
- [Reclaim the Rain](#), a Defra Funded Innovation project led by Norfolk and Suffolk County Councils, looks to utilise captured rainwater which might otherwise contribute towards surface water flooding for local non-wholesome water uses.

**15. How could policy be developed to encourage greater integration of water supply, drainage, flood alleviation and flood resilience?**

The [2020 independent review report](#) into rainwater harvesting and greywater recycling looked at a range of UK policy options to encourage the take up of rainwater harvesting and greywater reuse systems including planning regulations, building standards, developer incentives. For each policy option they modelled the potential water savings in Mld for household and non household developments and included flood alleviation benefits alongside water supply benefits. **There are significant water savings achievable including through policies that link SUDs and rainwater harvesting to address water availability.**

**Real-world experience for homeowners and residents**

## **16. Do you have experience or records of how people actually use water in homes?**

Yes, Anglian Water's [Smart Meters](#) provide customers with visibility of their water use, the ability to identify water leaks, and give an early warning if a customer's water bill will be higher than normal. Water meters are a brilliant way to help our customers save water in their homes, almost 90% of our customers only pay for what they use. And because of this we have the lowest number of leaks compared to other water companies. Our long-term plan for smart meter upgrades will:

- Make sure every home and business in our region has a smart meter by 2035. In the next 5 years, we're upgrading 1,100,000 meters which we'll connect to our new network.
- Help us have fewer vans on the roads reading meters, reducing our carbon footprint and helping towards our net zero carbon commitment. We'll be able to get the meter readings remotely and more regularly.

The current PCC in the Anglian Water region is 135.99l/p/d for 2021/22.

Ofwat [published information](#) on how the split of water use in homes has changed over time in their 2018 report on options for reducing consumption. There is a consistent increasing trend in the proportion of household water used for personal washing.

## **17. Do you know of any research into user acceptance of water-efficient fittings?**

We are aware of the assumption that customers of new build homes remove water efficient devices when they move into the property, but we do not have any data or evidence to support this.

The [Australian Water Efficiency Labelling scheme](#) has commissioned several independent scheme reviews including customer insights. Sales data shows customers are choosing more and more efficient products over time and that water efficiency is one of the top reasons for product choice by customers.

## **18. What impact do water efficiency measures have on 1) drainage and/or 2) wastewater treatment systems?**

## **19. Do you know of any appliances or products that have operation methods or user interfaces that may be counterproductive in the long run to save water?**

Research by the water sector has found that there are significant levels of public confusion over **dual flush toilet button designs**, where it is not clear which button delivers which flush. This is potentially wasting millions of litres of water a day through incorrect usage.

## **20. Are you aware of any devices, fittings or appliances that are known to be unreliable or are prone to failure?**

As highlighted above, around **5-8% of dual flush toilets are leaking** and they are wasting nearly 400 Mld of drinking quality water. A typical leaky loo wastes between 200 and 400 litres per day.

## **Skills and supply chain challenges**

## **21. Do you or your organisation have the right skills or understanding of water efficiency and how to build water-efficient homes?**

There are many water efficiency, water resources and water reuse experts at Anglian Water who would be happy to consult with Defra further.

Waterwise is the sector expert on water efficiency and should be consulted for any expertise on water efficiency. **The recently consulted [UK Water Efficiency Strategy](#) should be used as a framework to water efficiency ambition in the UK.**

**22. Have you experienced a lack of skills or understanding in other organisations around water efficiency and how to build low-water-use homes?**

It is important that water companies continue to talk to developers and ensure there is clarity around the challenge we face with water resources.

Waterwise offers basic training in water efficiency.

**23. Is there currently sufficient capacity/availability in the supply chain for the products that could reduce water consumption?**

Without a water label it is difficult for developers to be certain of the water efficiency specification of any device. It is often difficult to know whether a device is efficient or not.

**24. Can the process of certification be improved to facilitate the introduction of new water efficiency or water reuse products?**

Water efficiency labelling bring immediate benefits, which is backed up by extensive evidence.

## **Other considerations**

**25. Are there any other considerations or topics that we should investigate to help inform the roadmap?**

**Water neutrality must be the ultimate goal for the building roadmap.** At Anglian we are working on understanding our role in water neutral buildings and being prepared for water neutrality to arrive in our region.

Water neutrality was included in the [Future Homes Delivery Plan](#) published in December 2021 but isn't mentioned in the current consultation.

There has been a lot of activity on water neutrality in the water sector in the last few years:

- Waterwise [published a review](#) of water neutrality in 2021 setting out how it can be achieved through water efficient fittings, water reuse and demand offsetting.
- The sector is watching with interest [developments in Sussex North](#) which will provide evidence that achieving water neutrality is possible for new development.
- Thames Water introduced in 2022 a new three tier [developer incentive scheme](#) which aims to encourage developers to achieve water neutrality for new development with a payment of £1800 per plot if achieved. They are also working with developers in the London area on a number of water neutral developments.
- Affinity Water secured a £2.9m funding from the Ofwat Innovation Fund to progress [a collaborative water neutrality trial](#) across 3000 homes in their area.

**The roadmap needs to consider retrofit and non-household settings.** We appreciate that this consultation and call for evidence has been issued by the Future Homes Hub which is focussed on new housing developments. However, it is critical the governments Roadmap also considers retrofit of the millions of existing homes as well as the existing non-domestic buildings as well.

**We would also like to see clear links between water and energy efficiency.** According to the Energy Savings Trust about 12% of a typical gas heated household's energy bill is from heating the water for showers, baths and hot water from the tap and heating water for use in our homes makes up about 4% the UK's total carbon dioxide emissions - [see here](#). We want all energy efficiency advisory and retrofit programmes to integrate water efficiency options (and vice versa), taking the whole house approach as recommended by the [Construction Leadership Council](#) in the National Retrofit Strategy.

In terms of **nutrient neutrality**, we are working with Norfolk councils, developers and farmers to use new market mechanisms to deliver nutrient neutrality and so unblock a number of currently stalled development sites. We will be taking learnings and observations from the nutrient neutrality area to transfer to water neutrality.

## **26. What could we learn from other countries on water reuse?**

Anglian Water's Enabling Water Smart Communities project looks at this as an early research piece once the project kicks off.

## **27. Would you be prepared to participate in any work groups set up to look at specific or general issues? If so, which areas would you most like to contribute to and what is your particular field of expertise or interest?**

Sarah Castelvechi for water efficiency planning and delivery

George Warren on integrated water management and water reuse

Lydia Dareheath on water neutrality and policy

There will likely be others as well