

## Net Zero and the role of Water Efficiency

### A Water & Energy T&F Group Briefing Paper (February 2021)

#### SUMMARY OF KEY POINTS

- Around 6% of the UK's total greenhouse gas emissions are from household water supply and use. This equates to over 2.6 kg CO<sub>2</sub>e per home per day.
- Approximately 90% of these water-related emissions are from how we use water in the home. The rest are emissions from water companies supplying water and removing and treating wastewater. The water sector has recently committed to reaching Net Zero by 2030 for its operational emissions.
- Modest reductions in household water use of 5-6% can deliver annual emissions savings of around 1.3 MtCO<sub>2</sub>e. This is a bigger saving than was actually achieved in the whole UK housing sector in 2017-18 or in 2018-19.
- A 10-12% reduction in household water use could reduce greenhouse gas emissions by a similar amount to the total operational emissions of the whole UK water sector (circa 2.4 MtCO<sub>2</sub>e).
- It is clear that reducing water consumption, even by modest amounts, can help deliver significant reductions in greenhouse gas emissions whilst also helping secure future water supplies, facilitating growth and leaving more water in the environment. There are also affordability benefits for water and energy customers.
- Carbon emission savings through greater water efficiency will be particularly important in the decade or two until energy supplies are decarbonised and our homes have moved away from using fossil fuels to heat water. Currently, less than 5% of the heat used across the UK's 28 million homes is from low-carbon sources.
- Three key areas have been identified by the WESSG T&F Group for further action:
  - **Awareness** - raising awareness of the link between greenhouse gas emissions and water use and the important role of water efficiency in reaching Net Zero within the water sector; with government and policy makers and with water users (homes and businesses)
  - **Underpinning data** - there is an urgent need to update the 2008-2010 work that underpins many of the assumptions and emissions calculations still used today (including in this briefing note)
  - **Delivery** - we need to see better join up in the delivery of energy and water efficiency in terms of new build design, retrofitting existing buildings and provision of advice.

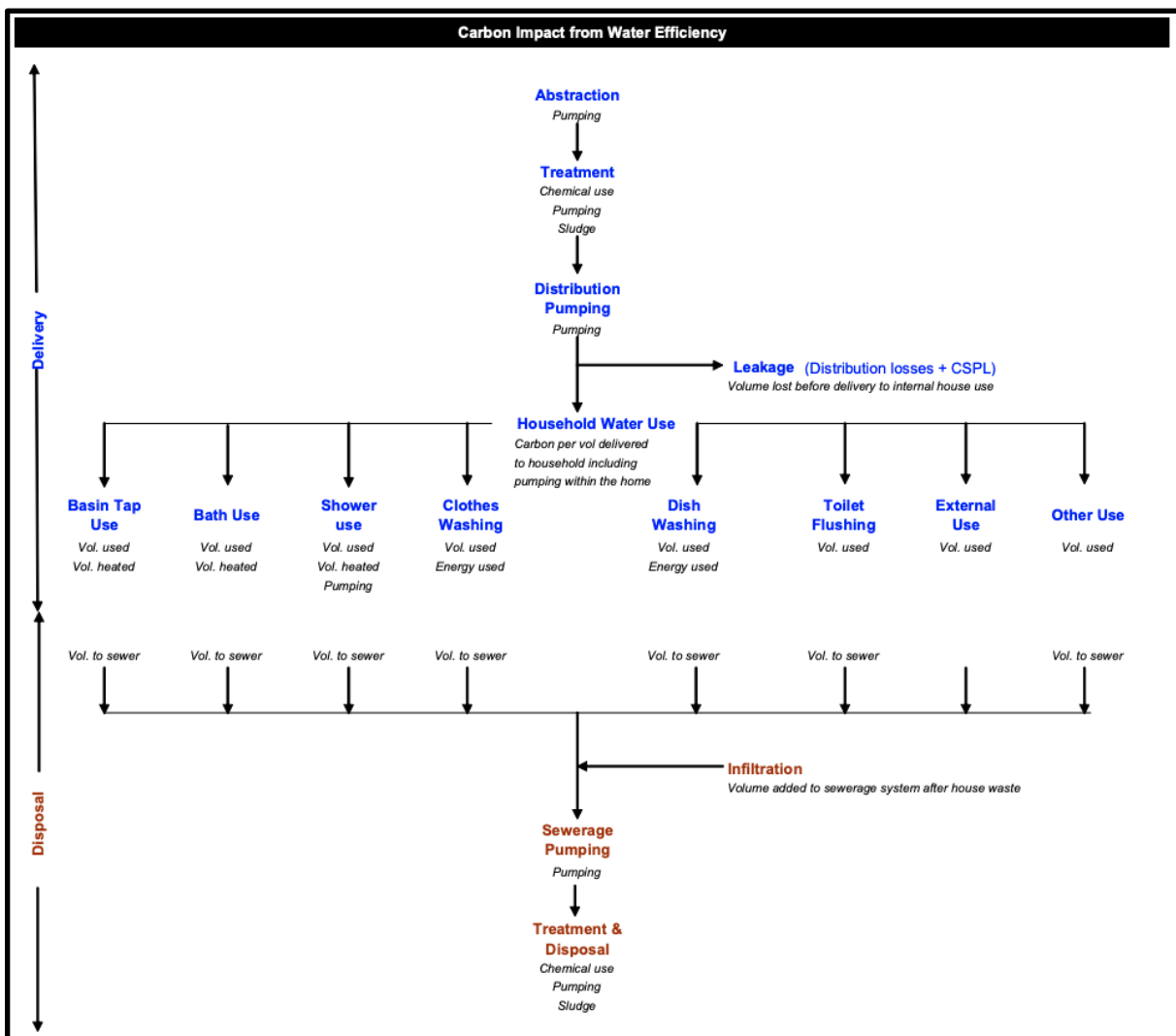


### How is water consumption relevant to Net Zero?

Water consumption and energy are strongly linked. Abstracting, pumping, treating and heating water, and pumping and treating wastewater consumes energy and releases greenhouse gas emissions such as CO<sub>2</sub>. If water consumption is reduced then less energy is used, emissions are reduced and we move towards Net Zero.

### Where do the greenhouse gas emissions from water use come from?

The schematic below shows the main sources of greenhouse gas emissions from how we use water supplied to our homes. The two main components are the emissions the water companies make supplying water/removing wastewater and the emissions that come from how water is used in homes (and businesses).



From MTP : Impact on carbon (CO<sub>2</sub>e) emissions of water efficient strategies (2008)

### What is the scale of greenhouse gas emissions arising from water use?

Annual UK emissions from household water supply and water use are around 27 MtCO<sub>2</sub>e and make up nearly 6% of total UK greenhouse gas emissions, estimated to be 435 MtCO<sub>2</sub>e<sup>1</sup> in 2019.

This estimate for household water related emissions is based [2019 work for Water UK](#)<sup>2</sup> undertaken by Artesia which calculated that at a per capita water consumption of 138 litres per person per day the total carbon emission per household per day due to water use is around 2.64 kgCO<sub>2</sub>e per property per day (around 1 tonne CO<sub>2</sub>e/prop/year)<sup>3</sup>. There are around 28 million properties in the UK<sup>4</sup>. This figure is comparable with an emission estimate of 27.7 MtCO<sub>2</sub>e in 2018 made as part of the ICE Carbon Project<sup>5</sup>.

### How does the 27 MtCO<sub>2</sub>e breakdown?

By far the biggest proportion (over 90%) is from how we use and consume water in the home. This is derived from heating water for general use in the home (e.g. through boilers) and through use of white goods such as washing machines, some electric showers and dishwashers<sup>2</sup>. The figures do not include emissions due to heating water as part of central heating systems which are largely non-consumptive of water.

Source of emissions relating to water	kg CO <sub>2</sub> e/property/day at 138 litres per person per day	MtCO <sub>2</sub> e UK emissions per annum	Approx % of total emissions
Abstraction, treatment and distribution	0.12	1.23	4%
Water heated centrally in homes	1.30	13.29	49%
Water heated for electric showers	0.78	7.97	29%
Washing machine use	0.26	2.66	10%
Dishwasher use	0.16	1.64	6%
Wastewater collection, treatment and disposal	0.05	0.51	2%
Proportion from water company operations		1.74	6%
Proportion from how water is used in the home		25.55	94%

<sup>1</sup> [https://UK\\_greenhouse\\_gas\\_emissions\\_provisional\\_figures\\_statistical\\_release.pdf](https://UK_greenhouse_gas_emissions_provisional_figures_statistical_release.pdf)

<sup>2</sup> <https://www.water.org.uk/wp-content/uploads/2019/12/Water-UK-Research-on-reducing-water-use.pdf>

<sup>3</sup> It should be noted that many of the calculations of greenhouse gas emissions from water use are based on core government data and conversion factors from circa 2008 which need to be updated. They also do not account fully for grid decarbonisation. Average personal consumption levels are currently higher than 138 lppd (nearer 143 lpps in England and Wales) and higher than that in Scotland and Northern Ireland.

<sup>4</sup> <https://www.ons.gov.uk/releases/familiesandhouseholdsintheuk2019>

<sup>5</sup> <https://www.ice.org.uk/news-and-insight/latest-ice-news/civil-engineers-can-make-a-difference-to-net-zero>

### What level of carbon emissions reductions can be delivered by using less water?

Even modest reductions in water consumption can deliver significant savings in greenhouse gas emissions. For example, a very modest 5-6% reduction in UK domestic water consumption could save around 1.33 MtCO<sub>2</sub>e per year.

In the same 2019 report<sup>6</sup> there are estimates of the emissions savings that can be achieved if personal water consumption levels were reduced from a nominal baseline of 138 litres per person per day.

Per capita consumption level (lppd)	% reduction in consumption	kg CO <sub>2</sub> e/property/day	Saving kg CO <sub>2</sub> e/property/day	UK MtCO <sub>2</sub> e emissions saving per annum based on 28 million households
<b>Baseline 138</b>		2.64		
<b>130</b>	5.80	2.51	0.13	1.33
<b>120</b>	13.04	2.34	0.3	3.07
<b>110</b>	20.29	2.19	0.45	4.60
<b>100</b>	27.54	2.1	0.54	5.52
<b>90</b>	34.78	1.87	0.77	7.87
<b>82</b>	40.58	1.74	0.9	9.20

The saving of 1.33 MtCO<sub>2</sub>e per year from a just a 5-6% reduction in water consumption can be compared with the 1.2 MtCO<sub>2</sub>e decrease in total UK emissions from residential properties between 2018 and 2019<sup>7</sup> or the 1.0 MtCO<sub>2</sub>e decrease in residential emissions the previous year. It can also be compared with the total annual operational greenhouse gas emissions from UK water companies own operations which are around 2.4 MtCO<sub>2</sub>e<sup>8</sup>.

In their 2019 and 2020 analysis of the costs and benefits of product water efficiency labelling the Energy Savings Trust calculated that fitting and use of more water efficient products in the UK could reduce PCC by around 25 lppd after 25 years; saving around 58 MtCO<sub>2</sub>e<sup>9</sup> over the same period. Around 90% of these emissions savings are in the home and the rest realised by water companies.

Additional carbon savings can also be achieved if non household water consumption can be reduced. This plays into both corporate net zero commitments and local authority climate emergency plans.

<sup>6</sup> <https://www.water.org.uk/wp-content/uploads/2019/12/Water-UK-Research-on-reducing-water-use.pdf>

<sup>7</sup> [https://UK\\_greenhouse\\_gas\\_emissions\\_provisional\\_figures\\_statistical\\_release.pdf](https://UK_greenhouse_gas_emissions_provisional_figures_statistical_release.pdf)

<sup>8</sup> <https://www.water.org.uk/routemap2030/>

<sup>9</sup> <https://waterwise.org.uk/knowledge-base/water-labelling-phase-2-project-technical-report/>



The UK water industry has committed to reaching net zero for its own operational emissions of around 2.4 MtCO<sub>2</sub>e<sup>7</sup>. In England and Wales this is by 2030 and in Scotland by 2040. The sector has developed the world's first detailed routemap which includes a “demand” reduction pathway in which reductions in water use contribute to the sector achieving net zero. The routemap highlights that reducing demand will also deliver more significant carbon savings for wider society (see earlier).

### **But isn't energy becoming decarbonised?**

The UK Governments are pushing ahead with plans to decarbonise energy supplies and convert our homes so they no longer rely on fossil fuels. However, this is a huge undertaking and it will take a couple of decades to deliver. Currently, less than 5% of the heat used across the UK's 28 million homes is from low-carbon sources<sup>10</sup>.

In the meantime it is clear that reducing water consumption, even by modest amounts, can help deliver significant reductions in greenhouse gas emissions whilst also helping secure future water supplies, facilitating growth and leaving more water in the environment. There are also affordability benefits for water and energy customers.

The Climate Change Committee in their 6<sup>th</sup> Carbon Budget published in December 2020<sup>11</sup> highlight the importance of improving energy efficiency over the next 15 years while the energy system is decarbonised. It includes a spend of £5-10bn per annum on energy efficiency advice and retrofit through to 2035 and the adoption of a “whole house” efficiency approach. It is crucial that water efficiency is embedded in this and it is good to see this link made in the Construction Leadership Council's recent Greener Homes National Retrofit Strategy<sup>12</sup>.

### **What do we need to happen?**

A Water Efficiency & Energy task and finish group has been set up as part of delivering the UK Water Efficiency Strategy. That group has identified three areas where action is needed:

1. **Awareness raising** - there is an urgent need to raise awareness of the role that water efficiency can play in the Net Zero agenda. This includes
  - a. Within the WESSG - a new Task & Finish Group has been set up to look at the links between water, energy and carbon reporting back into the wider UK WESSG. This paper is an early output from that group.
  - b. Within the water sector - the water sector in England, Wales and Scotland has made an ambitious commitment to reach net zero on its own operational emissions. In England and Wales this is by 2030. Whilst initial plans<sup>13</sup> do include a demand reduction pathway the additional, far larger, wider societal benefits from programmes to reduce water use are not prominent. We need to engage

<sup>10</sup> Committee on Climate Change (2019) Net Zero: The UK's contribution to stopping global warming

<sup>11</sup> <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

<sup>12</sup> <https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2020/12/CLC-National-Retrofit-Strategy-final-for-consultation.pdf>

<sup>13</sup> <https://www.water.org.uk/routemap2030/>

with energy and carbon managers within water companies to ensure water efficiency is a core part of their Net Zero activities.

- c. Across government - the absence of water efficiency retrofit measures in the Green Homes Grant scheme is symptomatic of limited join up between energy and water policy. This recent National Audit Office report on achieving net zero does not mention water efficiency<sup>14</sup>. More supportive policies such as product water labelling and tighter building standards offer low cost policy routes to help make progress towards water and Net Zero targets and should be accompanied by stronger links between energy and water advice and retrofit schemes and support.
- d. With householders - the link between saving water and helping combat climate change needs to be promoted in public campaigns and messaging. It is a simple way that everyone can play a part in reducing carbon emissions.
- e. With businesses and public sector organisations - for many businesses Net Zero and climate emergency planning will have greater resonance than water saving, Much more can be made of the link between reducing water use and reducing energy use and emissions including working with water retailers.

## **2. Updating the underpinning data-sets**

- a. Much of the analysis in this note and in the wider literature is predicated on calculations and factors deriving from detailed work undertaken for government between 2008 - 2010. There is a need to update these data-sets and this work could be progressed as a new collaborative project steered by the T&F Group.

## **3. Greater join-up in the delivery of actions to improve water and energy efficiency to include:**

- a. New build design,
- b. Retrofitting existing buildings; and
- c. Provision of advice to homeowners and businesses.

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<sup>14</sup> <https://www.nao.org.uk/report/achieving-net-zero/>