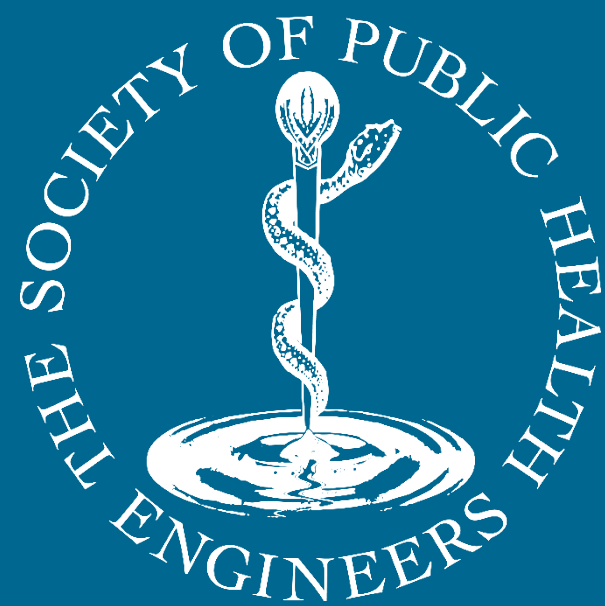


Manage Water Through Technology

Lutz Johnen
Managing Director
Aquality Trading & Consulting Limited



Water neutrality

Waterwise definition:

“For every new development, water demand should first be minimized, then any remaining water demand offset, so that the total demand on the public water supply in a defined region is the same after development as it was before.”

Waterwise – A review of Water Neutrality in the UK, Jan 2021

Step 1 Reduce water use

Water efficient devices
Smart metering
Water saving culture

Step 2 Reuse water

Rainwater harvesting
Greywater recycling
Other water reuse

Step 3

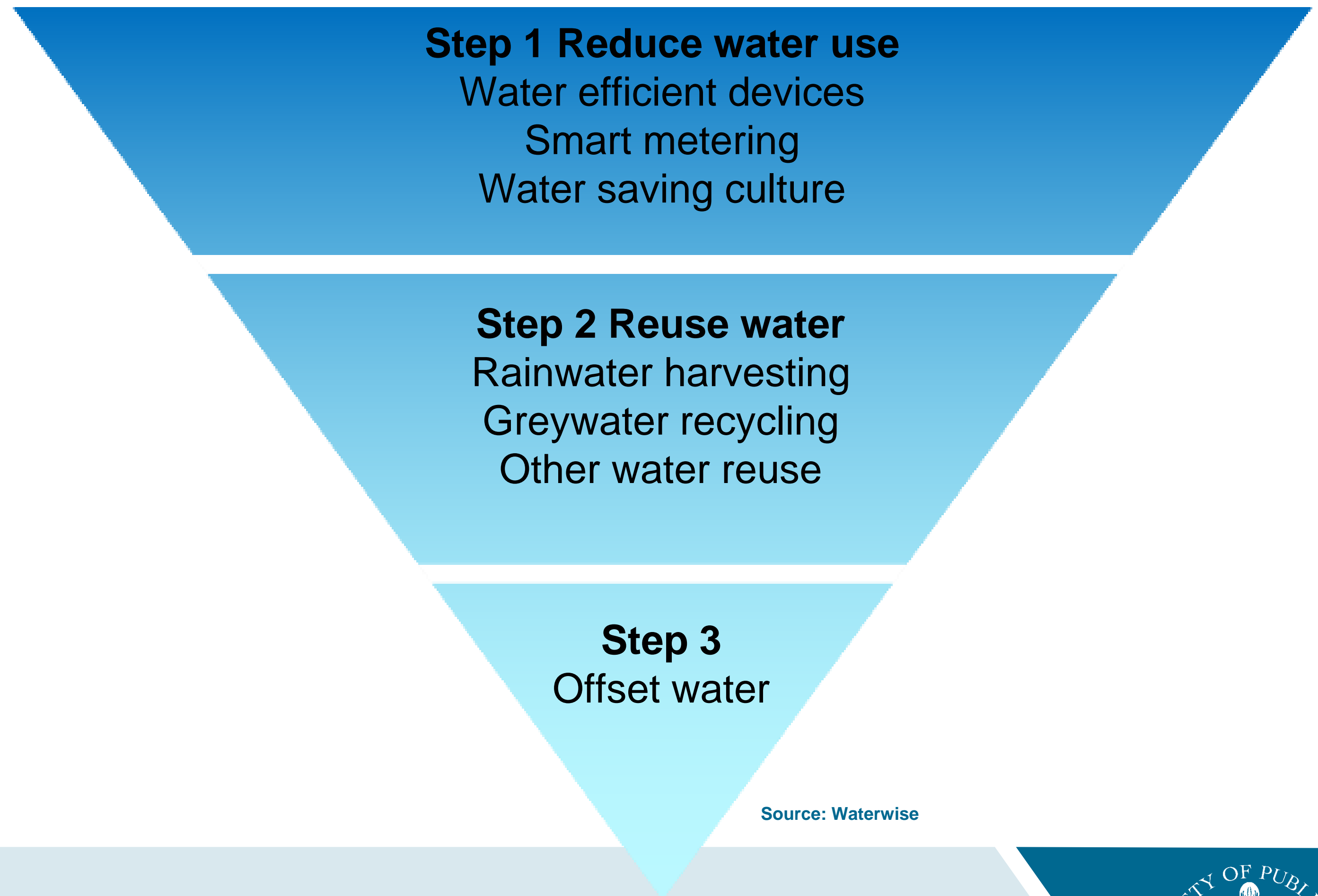
Offset water

Source: Waterwise

Water neutrality

Benefits:

- Water savings
- Carbon savings
- Sewer flow reductions
- Money savings
- Reduction of environmental impacts
- Improved resilience

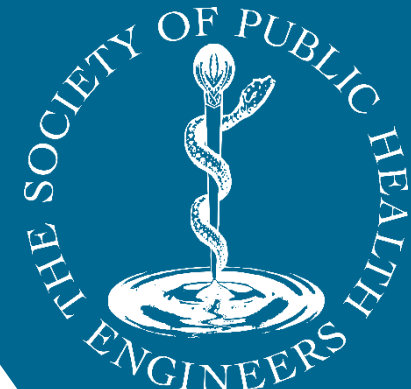
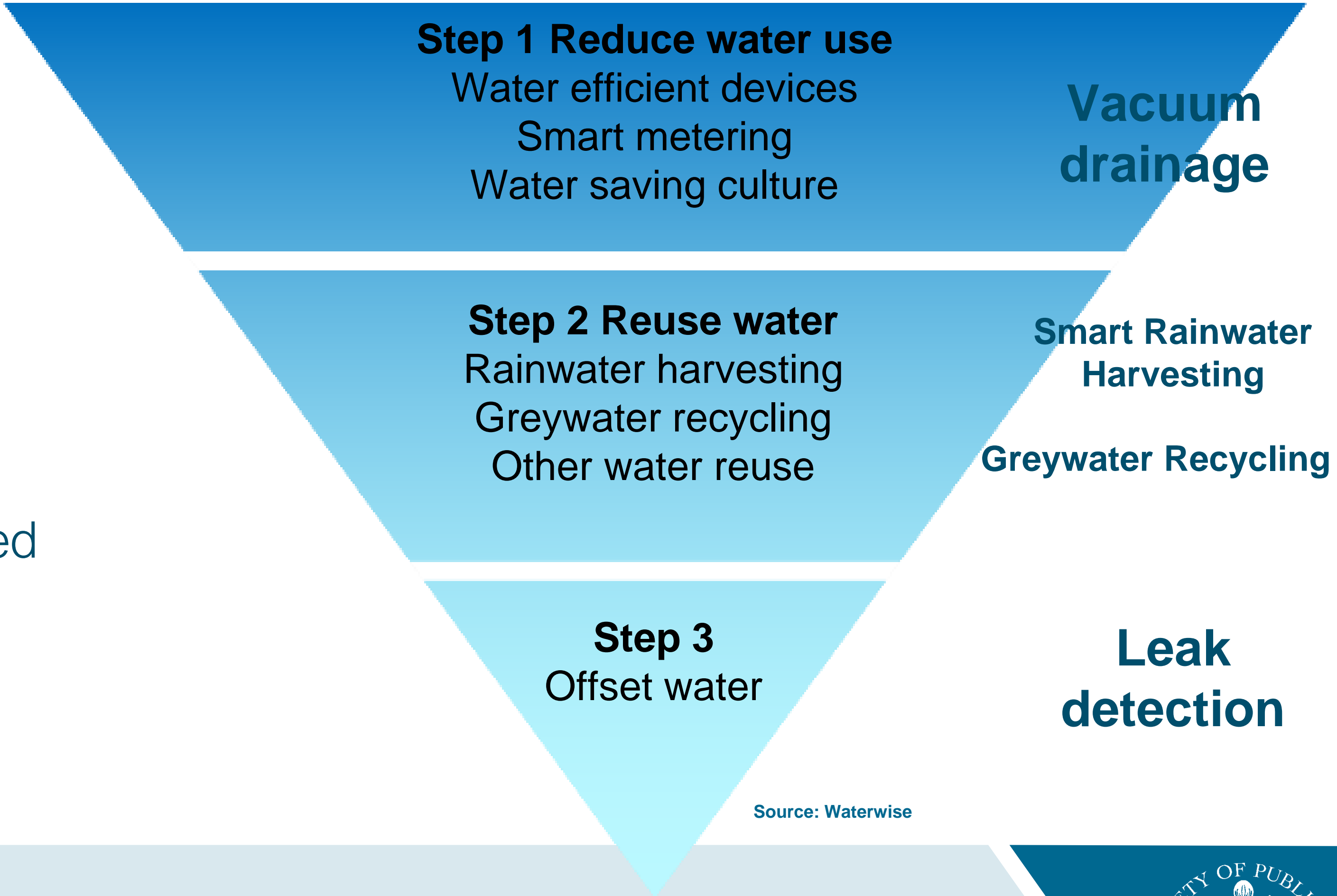


Water neutrality

We need proper :

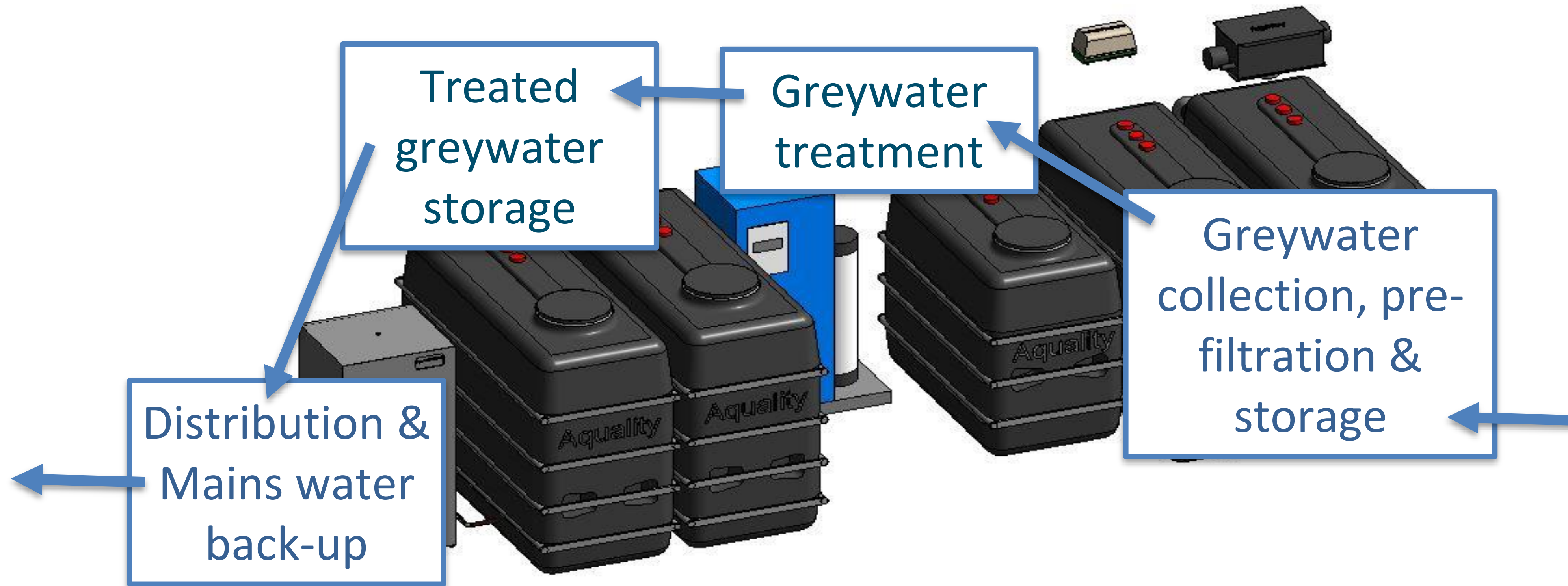
- Design,
- Installation
- and Operation/Maintenance
- Performance monitoring

Thames Water incentive aimed at housing development, but Water Neutrality is needed in all new developments!



Greywater recycling

Greywater recycling – reuse of water from showers/bath and HWB



Greywater recycling

Benefits:

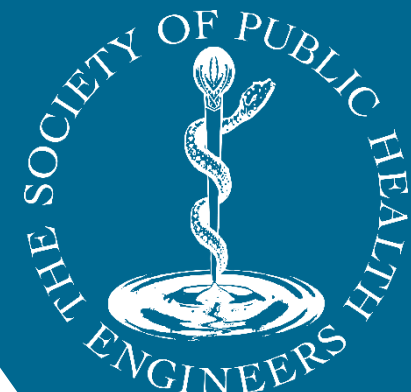
- Reduction of mains water and sewage leading to quick ROI
- Reduction of sewers flows
- Odourless and colourless reclaimed water
- Compact physical footprint
- Reliable and simple to operate with low maintenance needs
- Reuse quality effluent, which may be used for WC flushing, laundry washing, irrigation and for other non-potable purposes
- Online monitoring for easy maintenance and performance evaluation



Case study - Bloomberg HQ, London

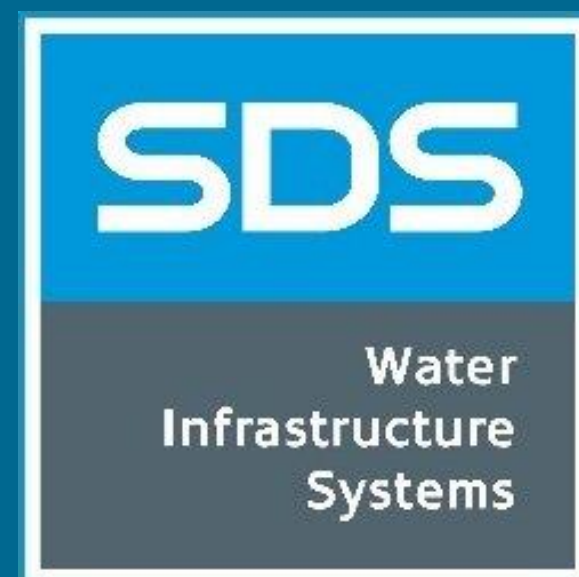
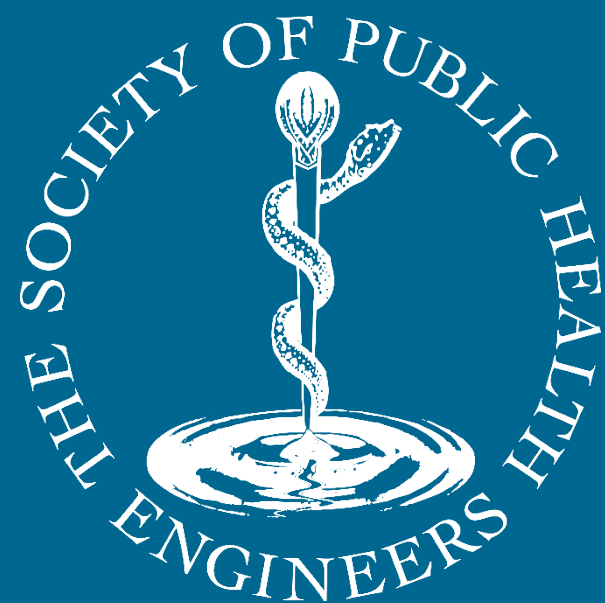


98.5% BREEAM assessment rating – highest design-stage score ever achieved for mayor office building
Combination of low flow devices, vacuum drainage, rainwater harvesting, greywater recycling and cooling tower bleed of recycling



Maximising rainwater potential with smart rainwater management

Dr Neil Sewell,
Director of New Technology Services
SDS Limited



Brief Intro

- SDS have heritage in water systems
- Motto is “Capture, treatment, storage and reuse”
- We understand how important water is and fully support the Water Neutrality concept



The big idea

- Achieving Water Neutrality is vital.
- Climate change causes high volatility and impact of rainfall.
- Water systems are straining to deliver against demand.
- The challenge is to reduce flooding and increase water reuse.

- What's needed?
- Something that can cope with any size/scale, gives easy (invisible / seamless?) rainwater reuse, can reduce contribution to flooding, can be retrofitted (27.8 million homes in the UK) or new-build installed.

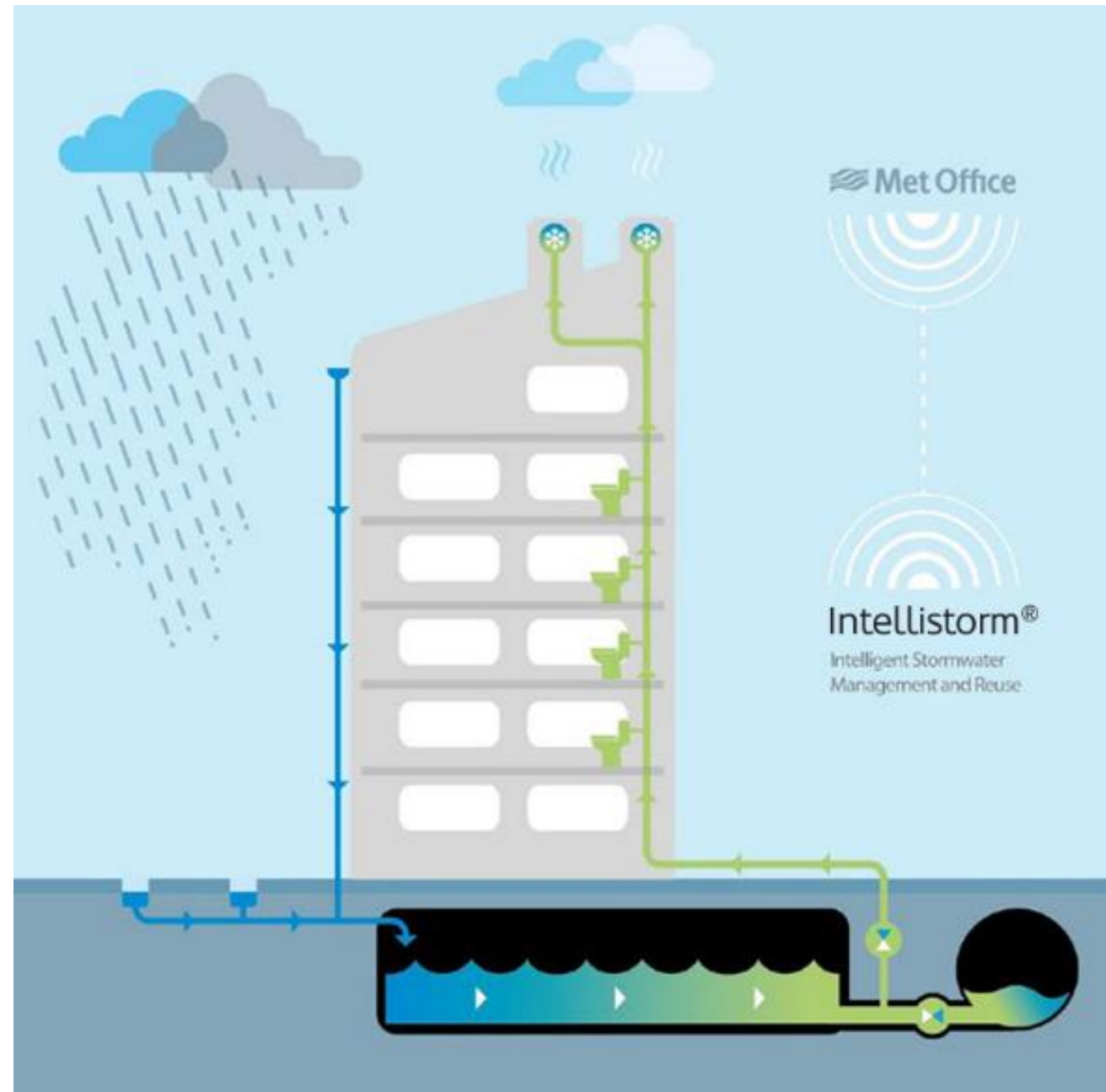
- For Water Neutrality, our answer is smart attenuation and rainwater management – SDS calls this the Intellistorm® system.
- It maximum reuse whilst maintaining flood mitigation.
- One big tank or many small tanks – we believe in both!



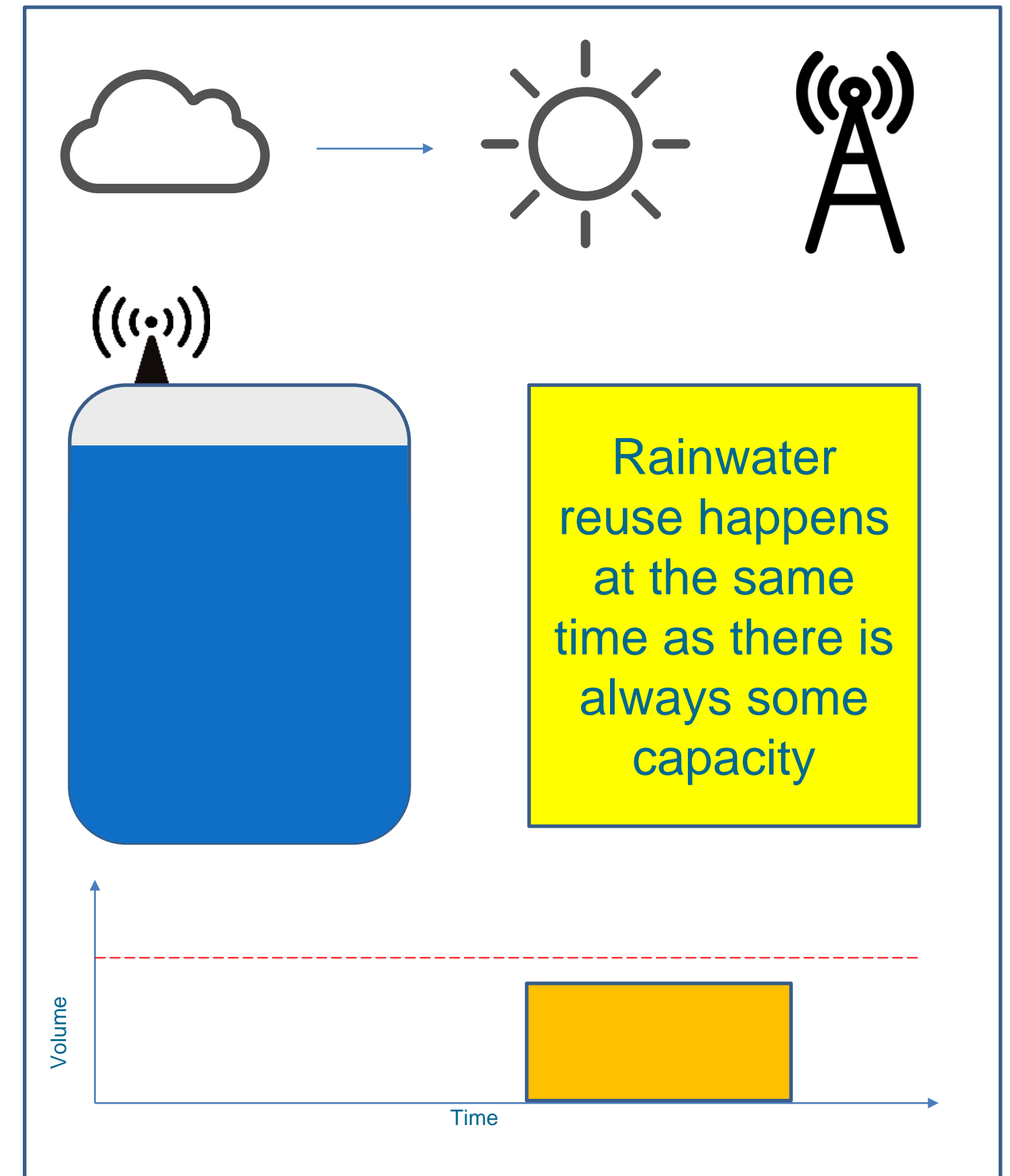
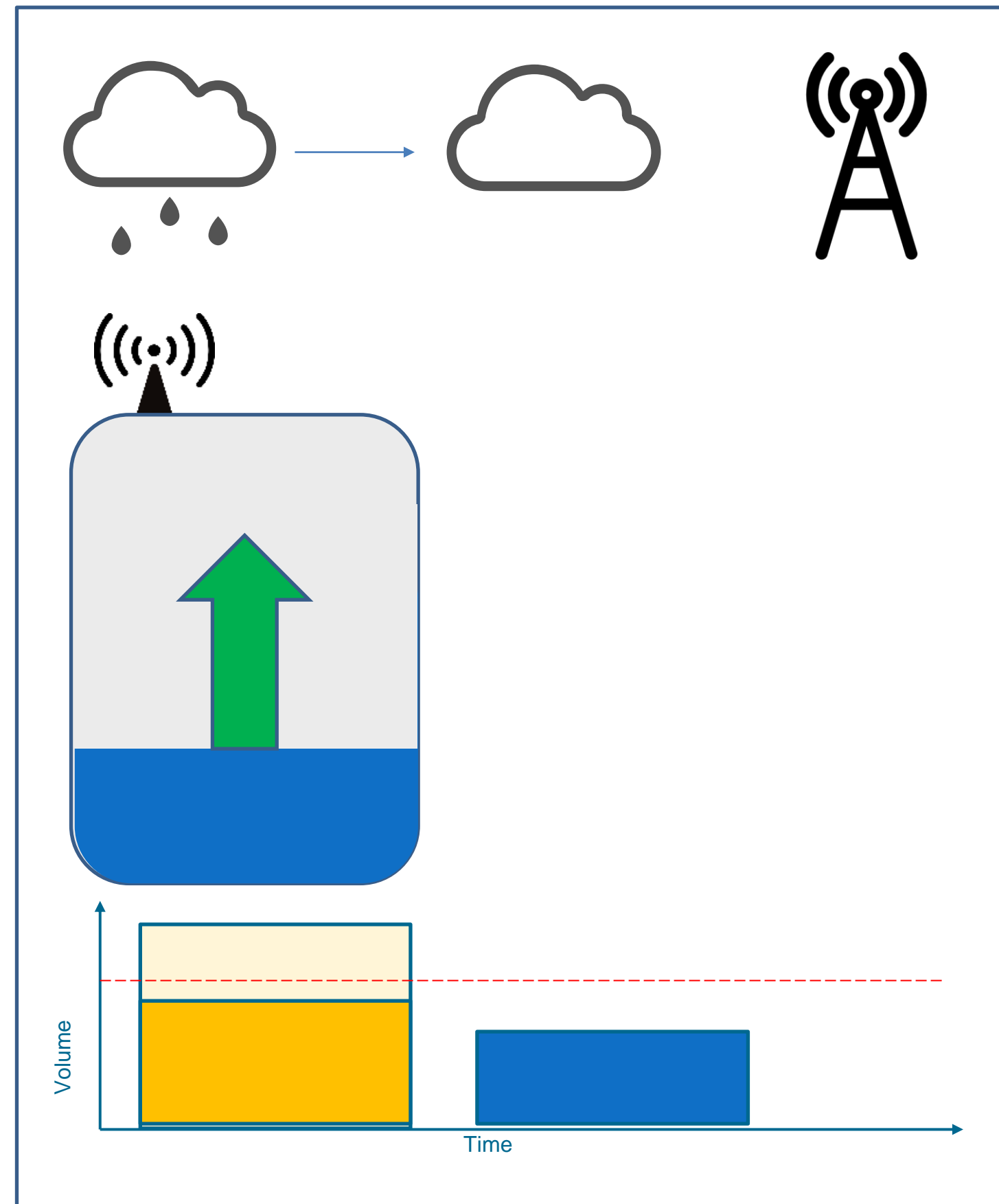
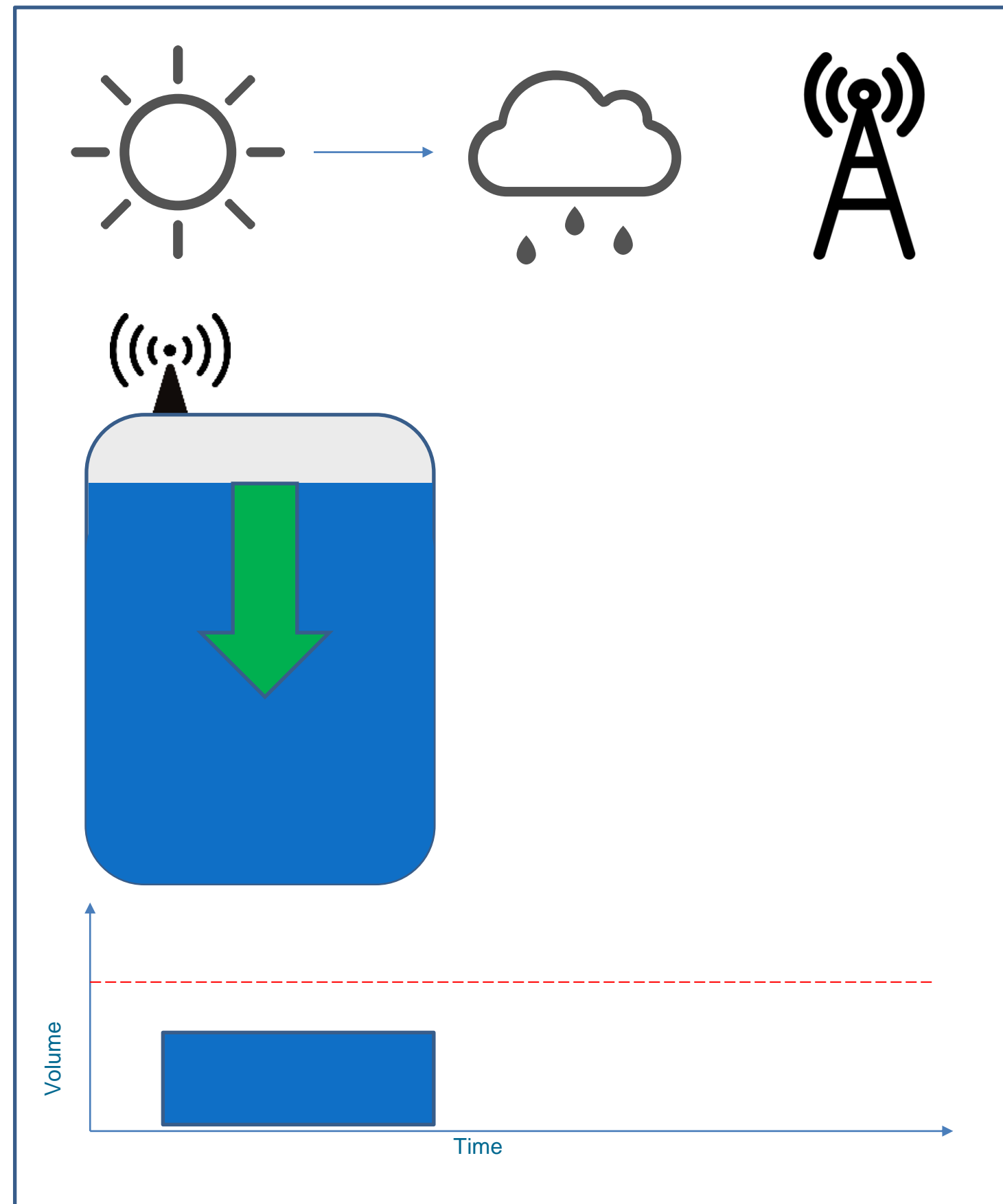
The image is a screenshot of a BBC News article. At the top, the BBC logo is visible on the left, and navigation links for 'Sign in', 'Home', 'News', 'Sport', 'Weather', 'iPlayer', and 'Sound' are on the right. Below this is a red banner with the word 'NEWS' in white. Underneath the banner is a secondary navigation bar with links for 'Home', 'Coronavirus', 'Brexit', 'UK', 'World', 'Business', 'Politics', 'Tech', 'Science', 'Health', and 'Family & Education'. The article is categorized under 'Science & Environment'. The main headline reads 'UK already undergoing disruptive climate change'. The author is identified as 'By Roger Harrabin, BBC environment analyst'. The article was published '3 hours ago' and has a 'Comments' link. Below the text is a photograph of two people walking on a wet path in a park, one holding a pink umbrella. The photo is credited to 'PA MEDIA'. Below the photo, there is a short summary: 'The UK is already undergoing disruptive climate change with increased rainfall, sunshine and temperatures, according to scientists.' This is followed by a paragraph: 'The year 2020 was the third warmest, fifth wettest and eight sunniest on record, scientists said in the latest [UK State of the Climate report](#).' and a final line: 'No other year is in the top 10 on all three criteria.'

How does it work?

- We dynamically create storage capacity in one tank, or many tanks, whilst guarding water for reuse



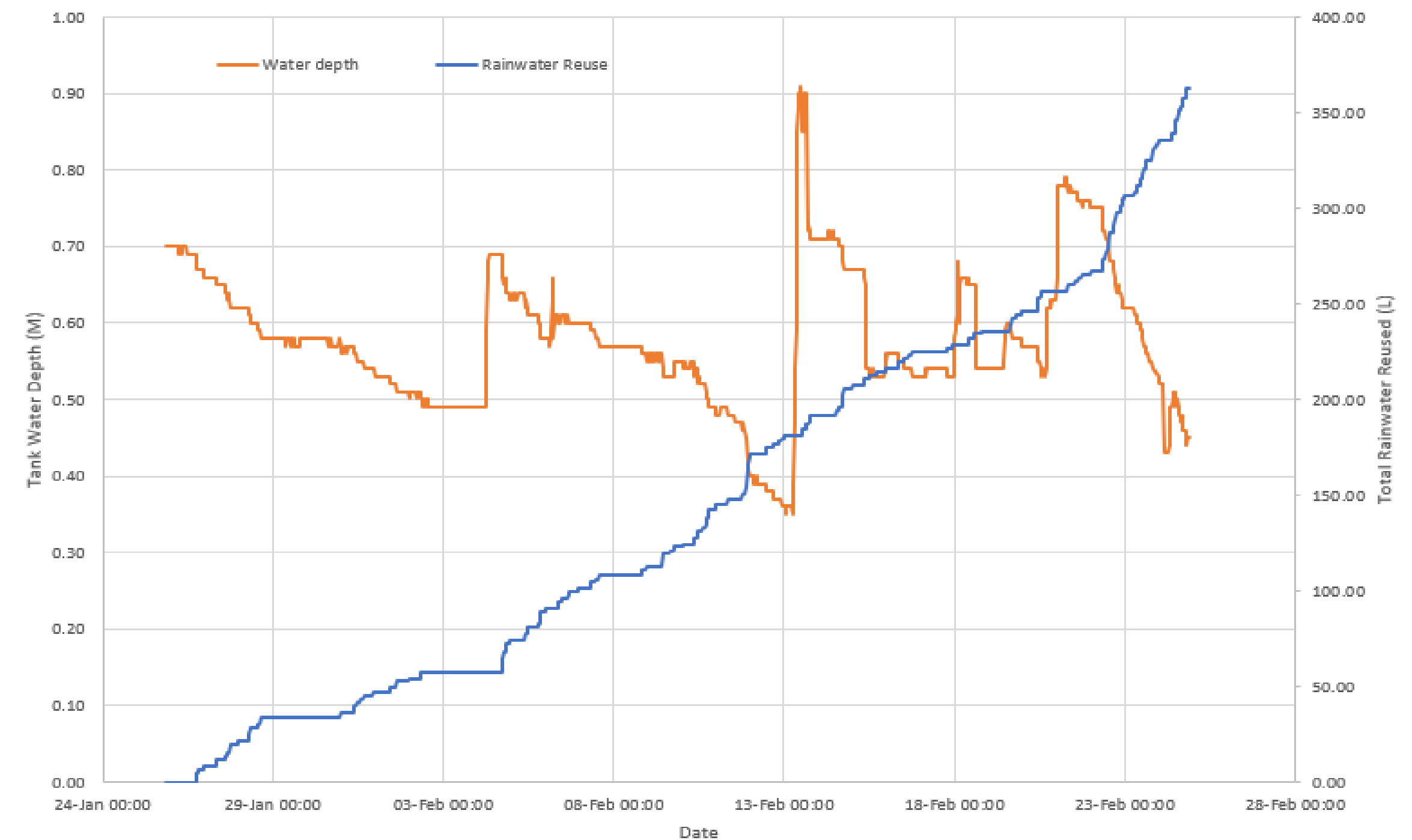
Our smart water tanks



How does this impact Water Neutrality?



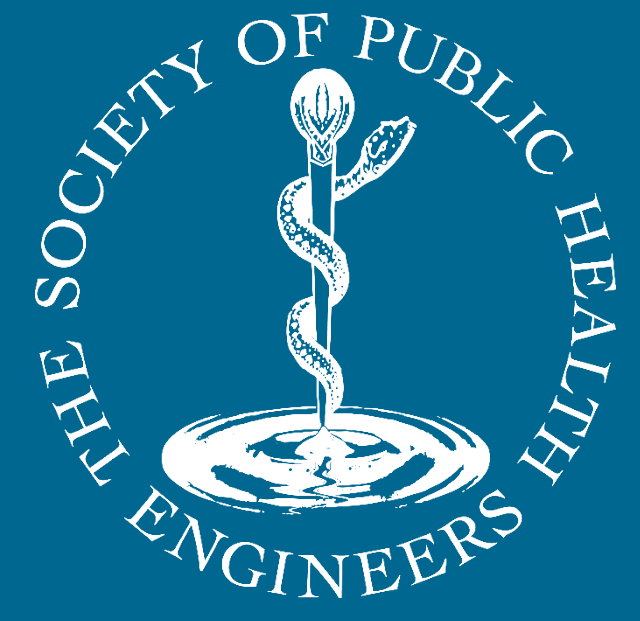
Tank depth and rainwater reuse for tank d-e471157



Storm mitigation + >12,000L per household / year saved, solar powered & retrofit!
Large roofs give even better yield (up to 30% potable replacement)

evac Vacuum Drainage

Stephen Royle

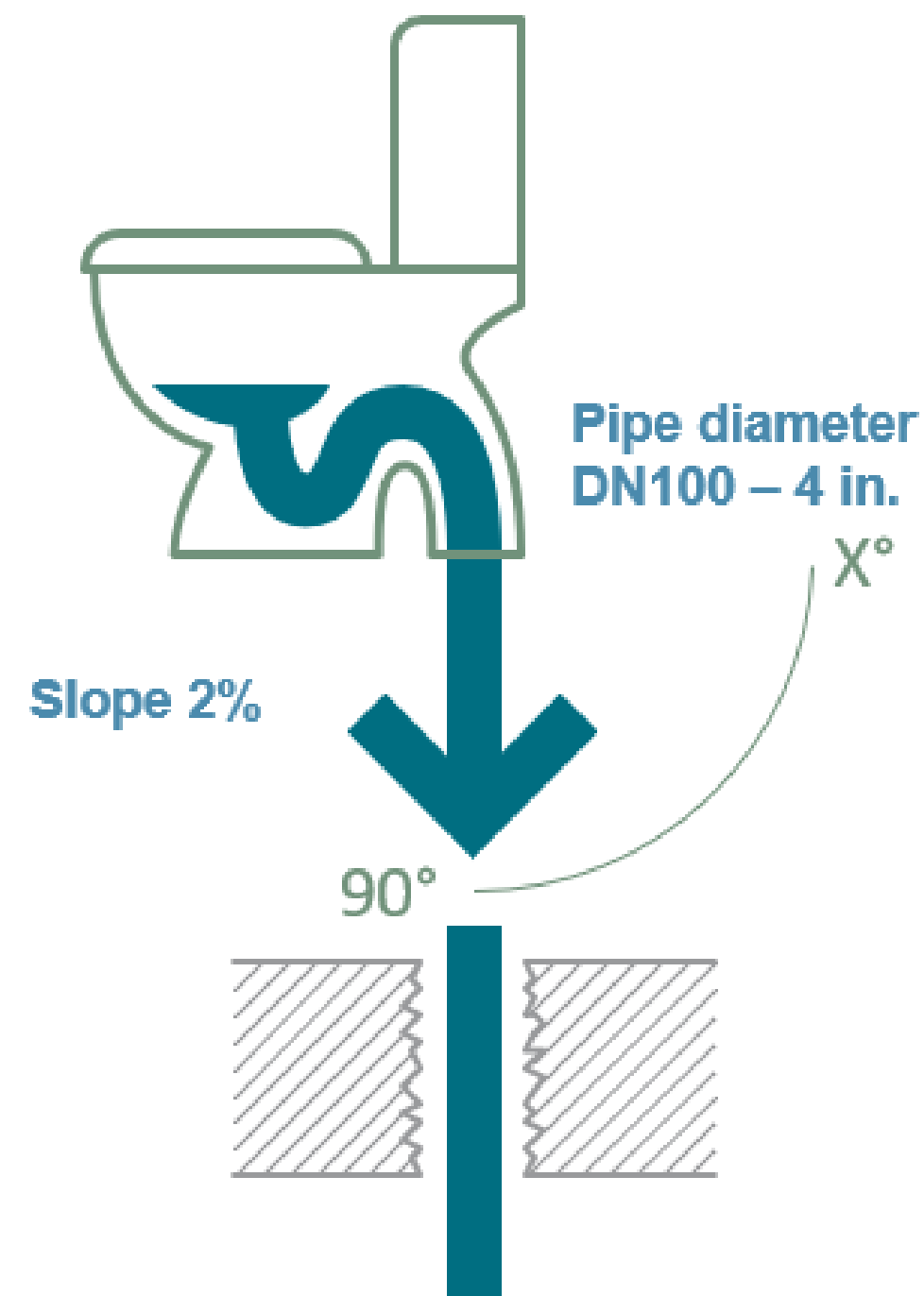
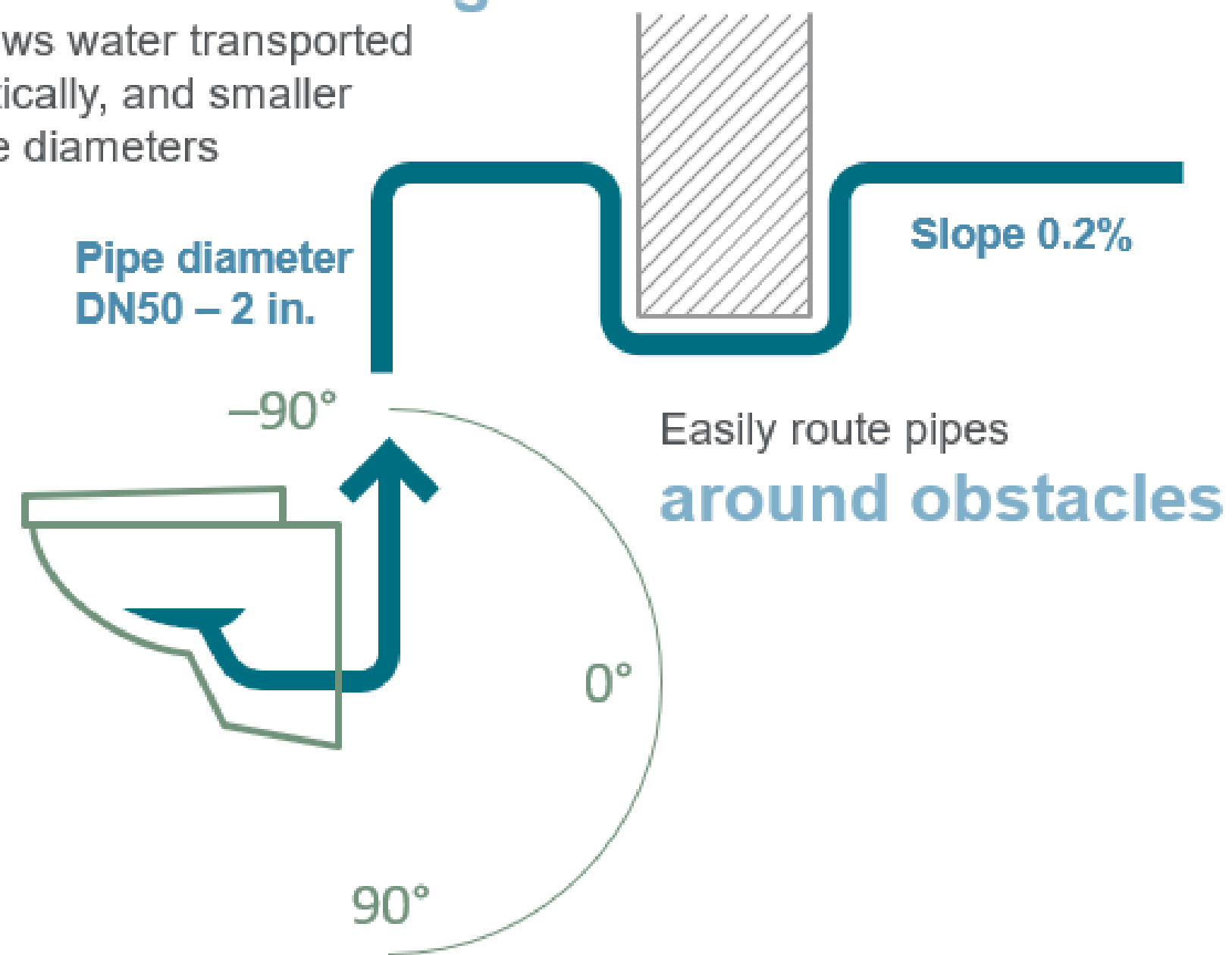


Vacuum Drainage - Benefits

Flexibility of piping vacuum toilet vs. gravity toilet

Freedom in design

Allows water transported vertically, and smaller pipe diameters



- **Design Flexibility**
- Allows waste pipes to rise to high level and travel long distances
- Put drains & fixtures anywhere
- Route around other obstacles
- Pipe sizes far smaller than traditional gravity waste pipes.

Vacuum Drainage - Benefits

Hygienic sanitation vacuum toilet vs. gravity toilet

Vacuum toilet made of antimicrobial material reduces the bacteria on the surface up to

99,99%

Flush

60-70 L

of odors, mists, and bacteria



Overspray of up to

80,000

polluted droplets when flushed, stay suspended 1 metre in air for hours

- **Promoting Hygiene & Comfort**

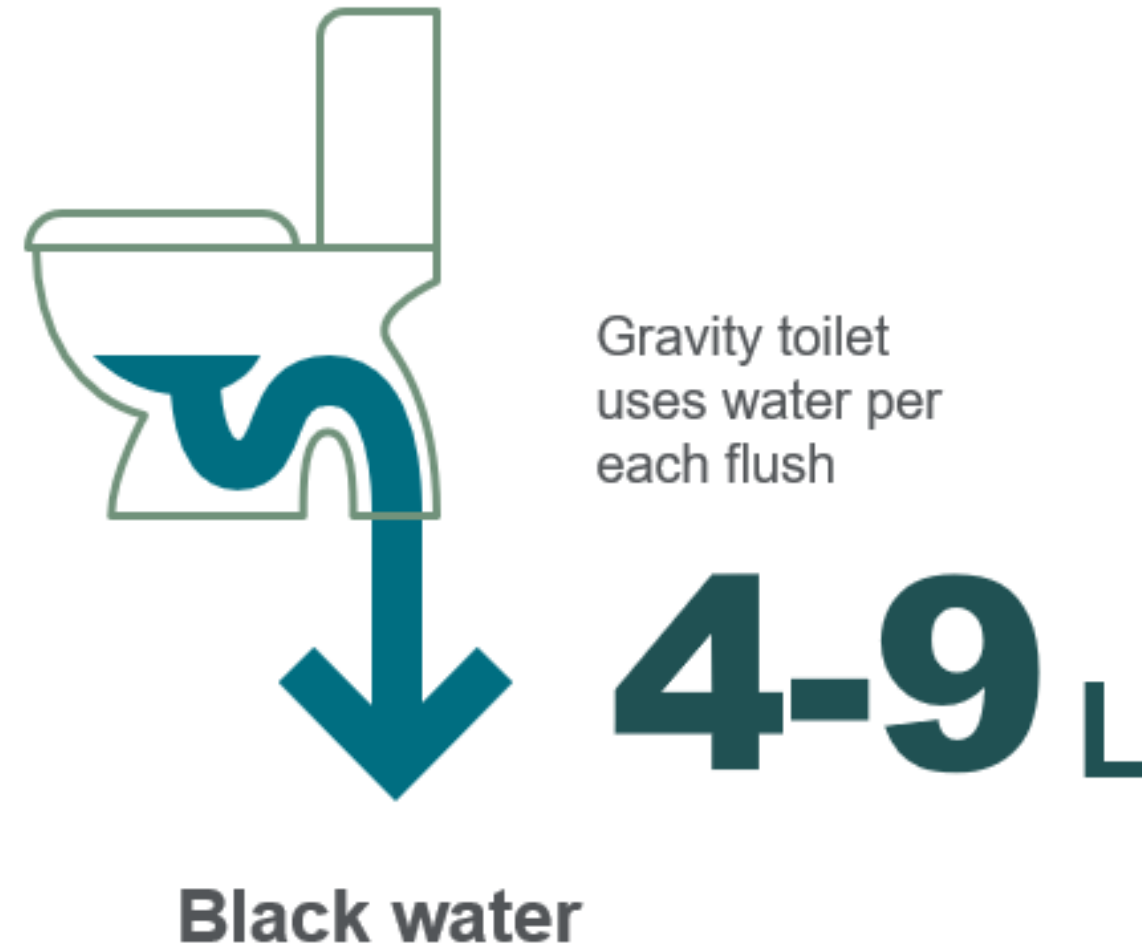
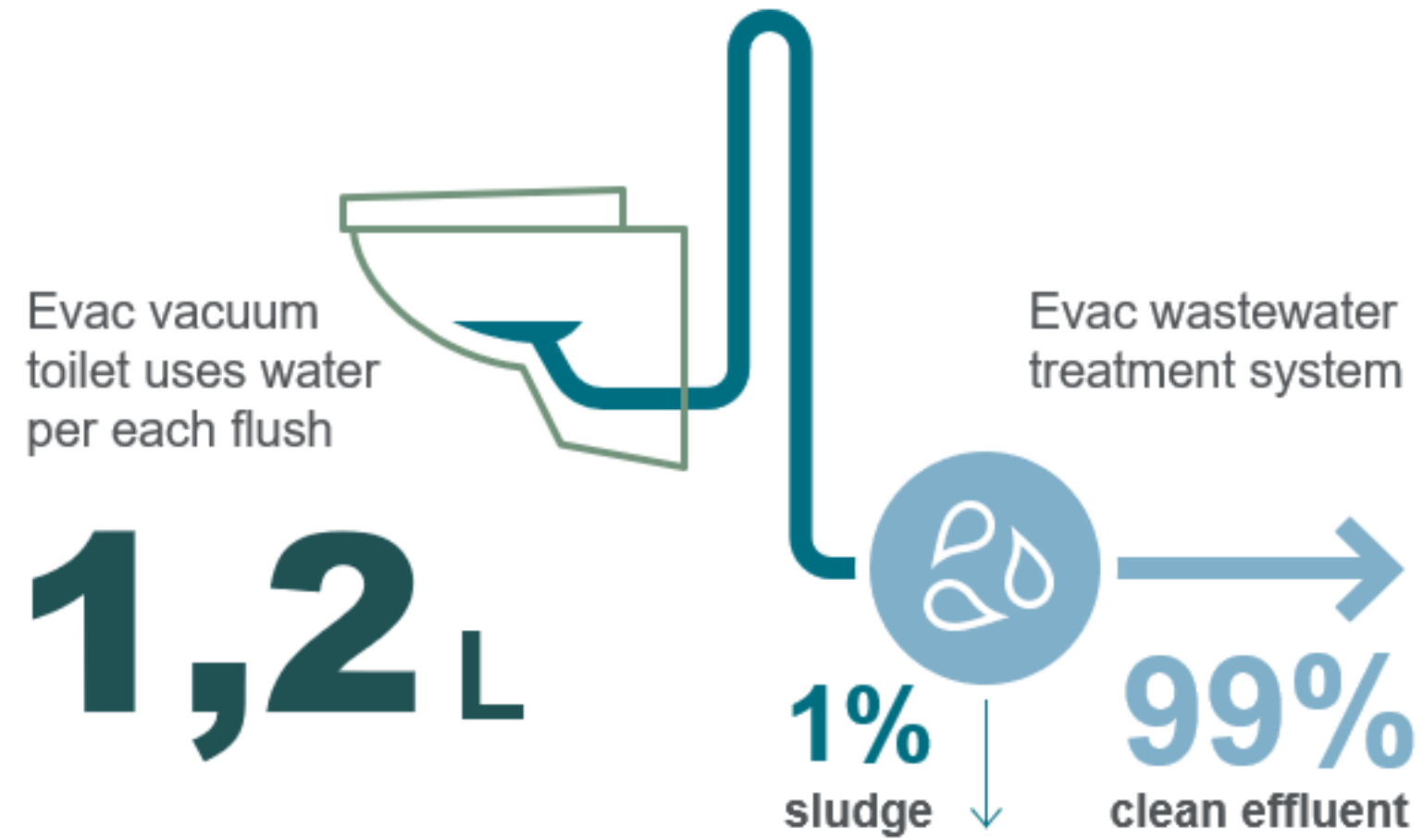
Two contact points in every toilet visit

- Seat & Cover
- Pushbutton

We have a solution to make toilet visits more safe – new Antimicrobial products

Vacuum Drainage - Benefits

Water consumption
vacuum toilet vs. gravity toilet



- **Offers Substantial Water Savings**

However, what we want to emphasise is the huge water savings that vacuum technology can offer.

- **Vacuum toilets only require between 1.0 – 1.2l per flush**



Vacuum Drainage - Toilets

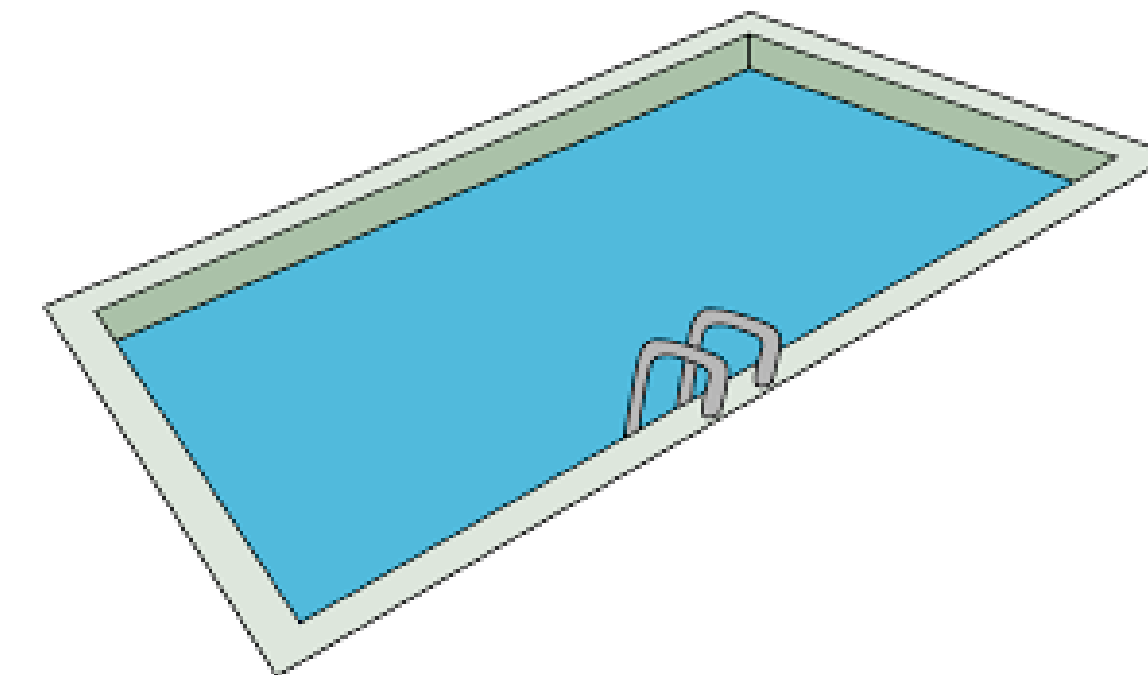
We should explain that the toilets used in the building industry are very different from those used in the transport sector.

- Quietest vacuum model available emits just 66dB
- Formed of white vitreous porcelain
- Whilst conventional toilets emit 75-85dB
- Looks and feels like a conventional toilet
- Has been used in many “high end” applications
- Does not require any electrical connections

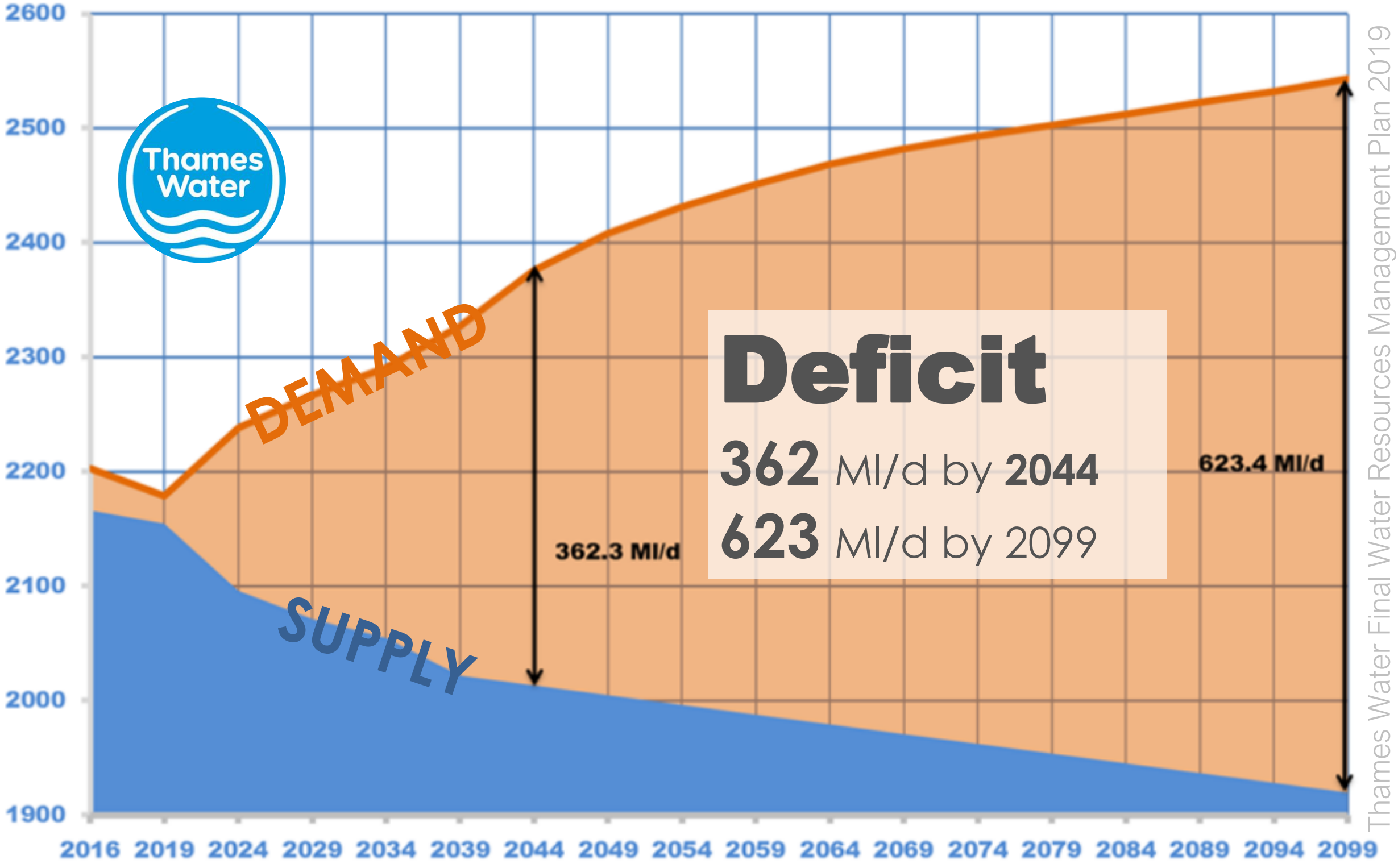


Vacuum Drainage – Water Usage

- ▶ In our case study, we can prove that public toilets will flush at a frequency of at least 10 flushes per hour
 - ▶ Conventional toilets
 - Consumption @ 6l per flush
 - 20 toilets x 10 flushes/hr x 6 l/flush = 1200 l/ hour
 - ▶ Vacuum toilets
 - Consumption @ 1.2 l per flush
 - 20 toilets x 10 flushes/hr x 1.2 l/flush = 240 l/hour
 - **Saving = 960l/ per hour**
- ▶ That equates to a water saving of approximately 2,500,000 litres every 100 days.
- ▶ That's the equivalent of the volume of an Olympic sized swimming pool.



Vacuum Drainage – Water Reduction



CAPACITY PROBLEMS

In London alone we have an issue where the demand for fresh water is greater than the capacity that Thames water can produce.

If the trend continues within the calculated patterns, then the deficit will be 362,000,000/day in just over 20 years.

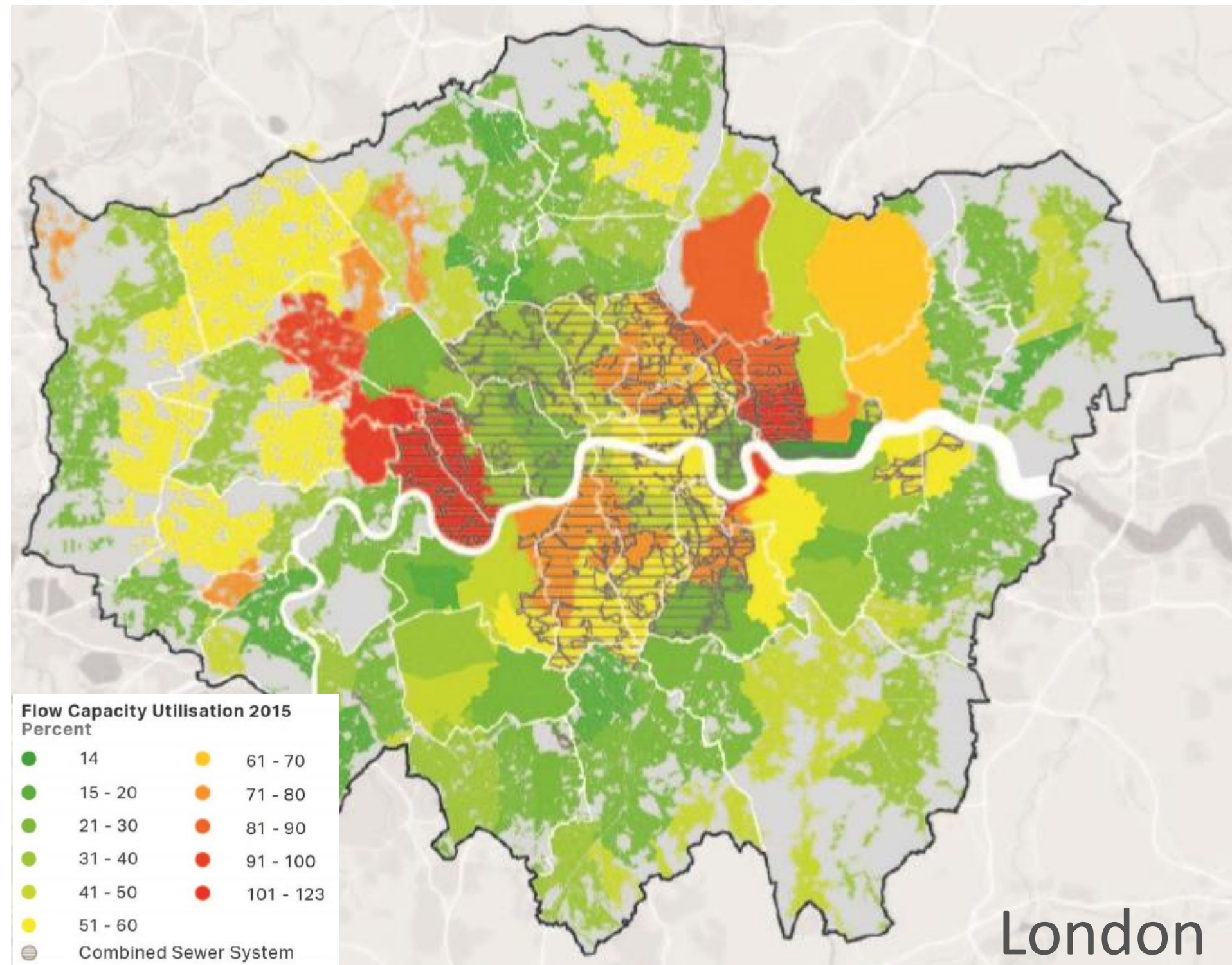
- Water supply/demand balance for London – dry year



Vacuum Drainage – Water Reduction

CAPACITY PROBLEMS

Coupled with the fact that London's sewer capacity is working above its efficient levels.

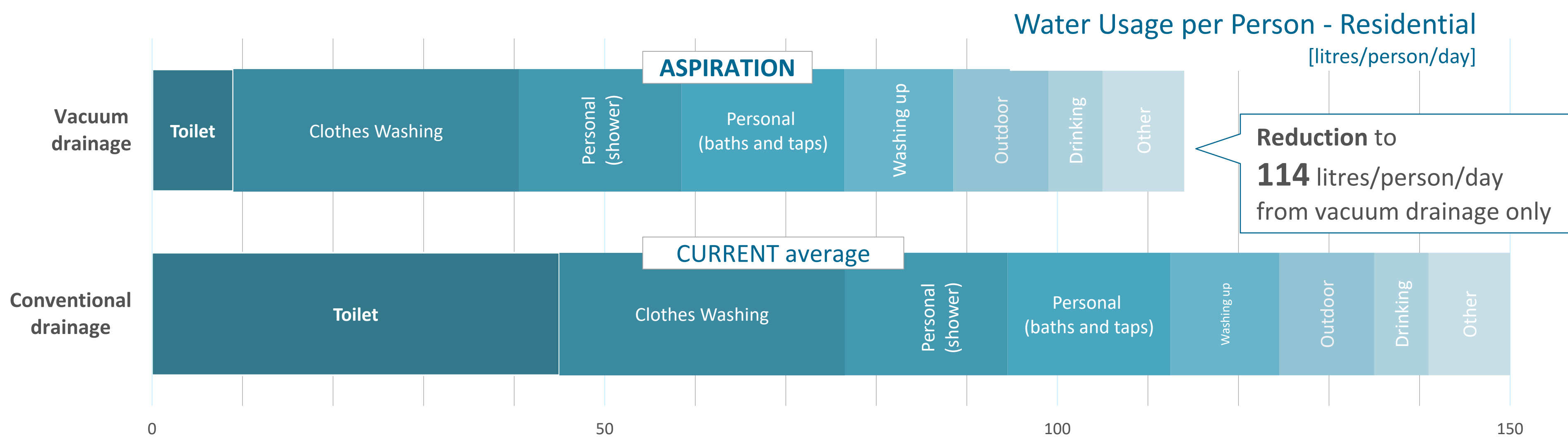


Wastewater **drainage** capacity

REDUCTION with VACUUM DRAINAGE



Source: <https://www.mcginley.co.uk/news/how-to-make-a-glass-of-water/bp142/>



149 litres person/day

Source: London Plan 2021

THE LONDON PLAN

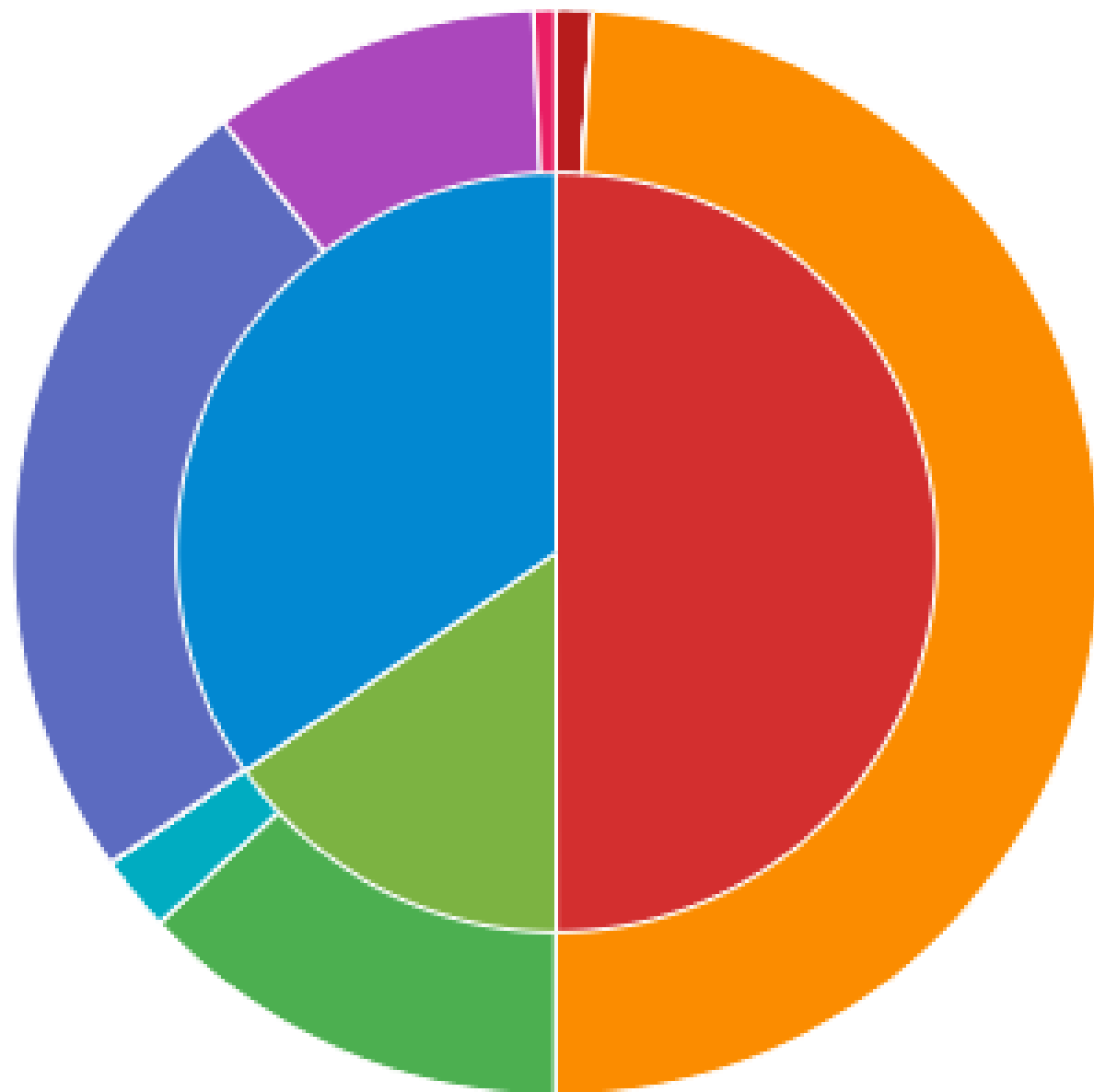
105+5 litres/day

Great Britain's ENERGY Generation

AVERAGES

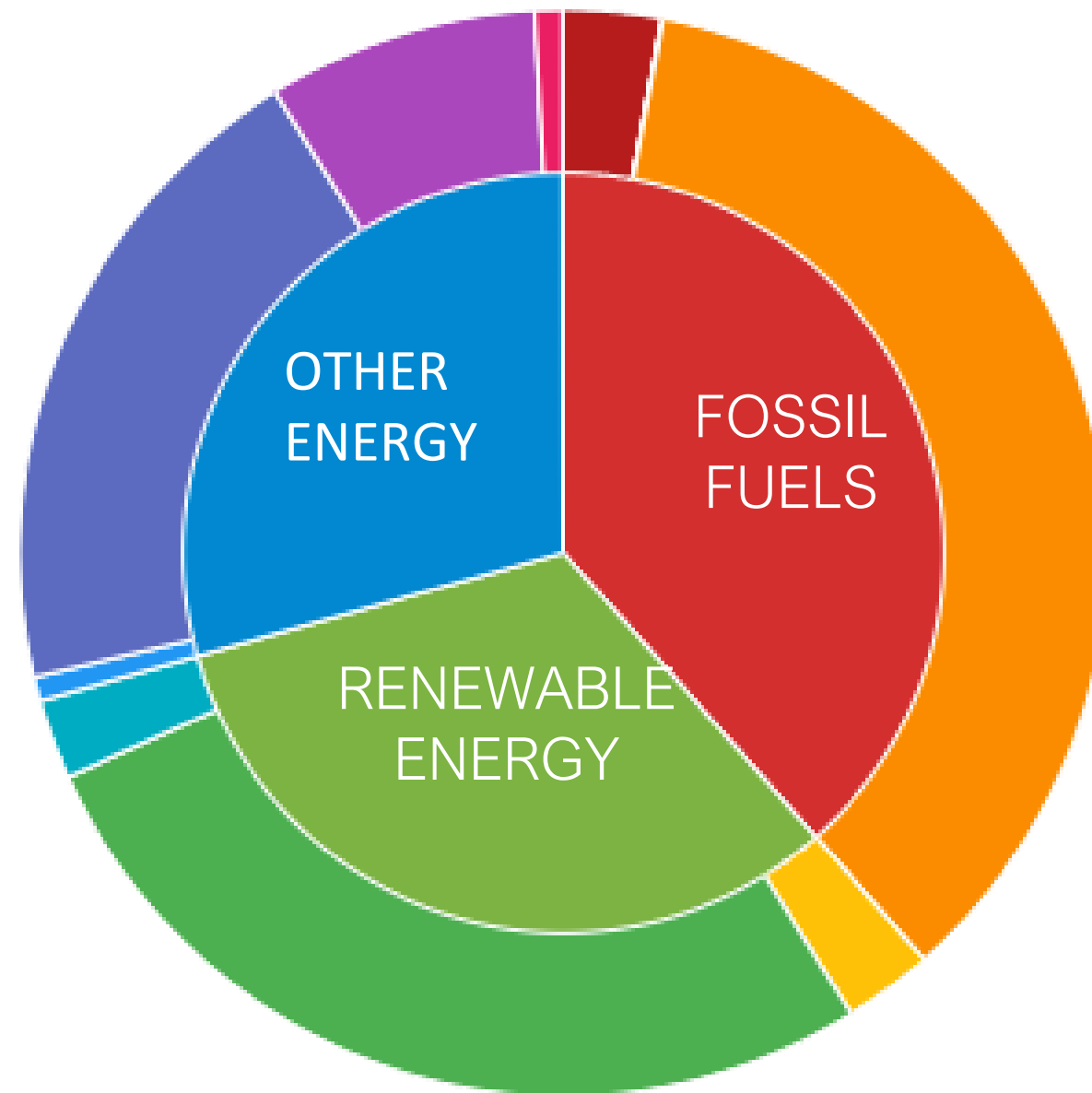
Past day:

Average demand: 28.4GW



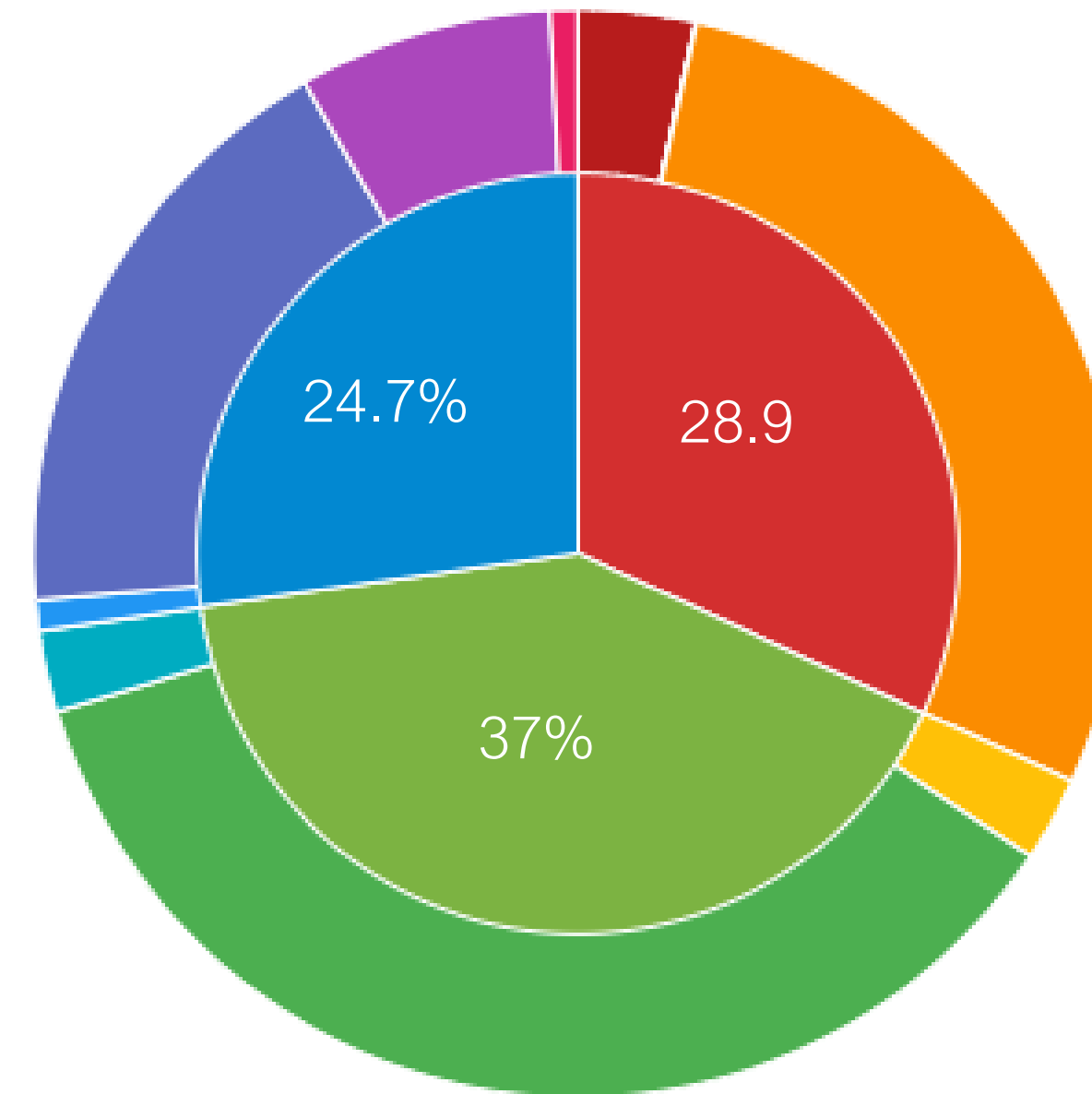
Past week:

Average demand: 31.8GW



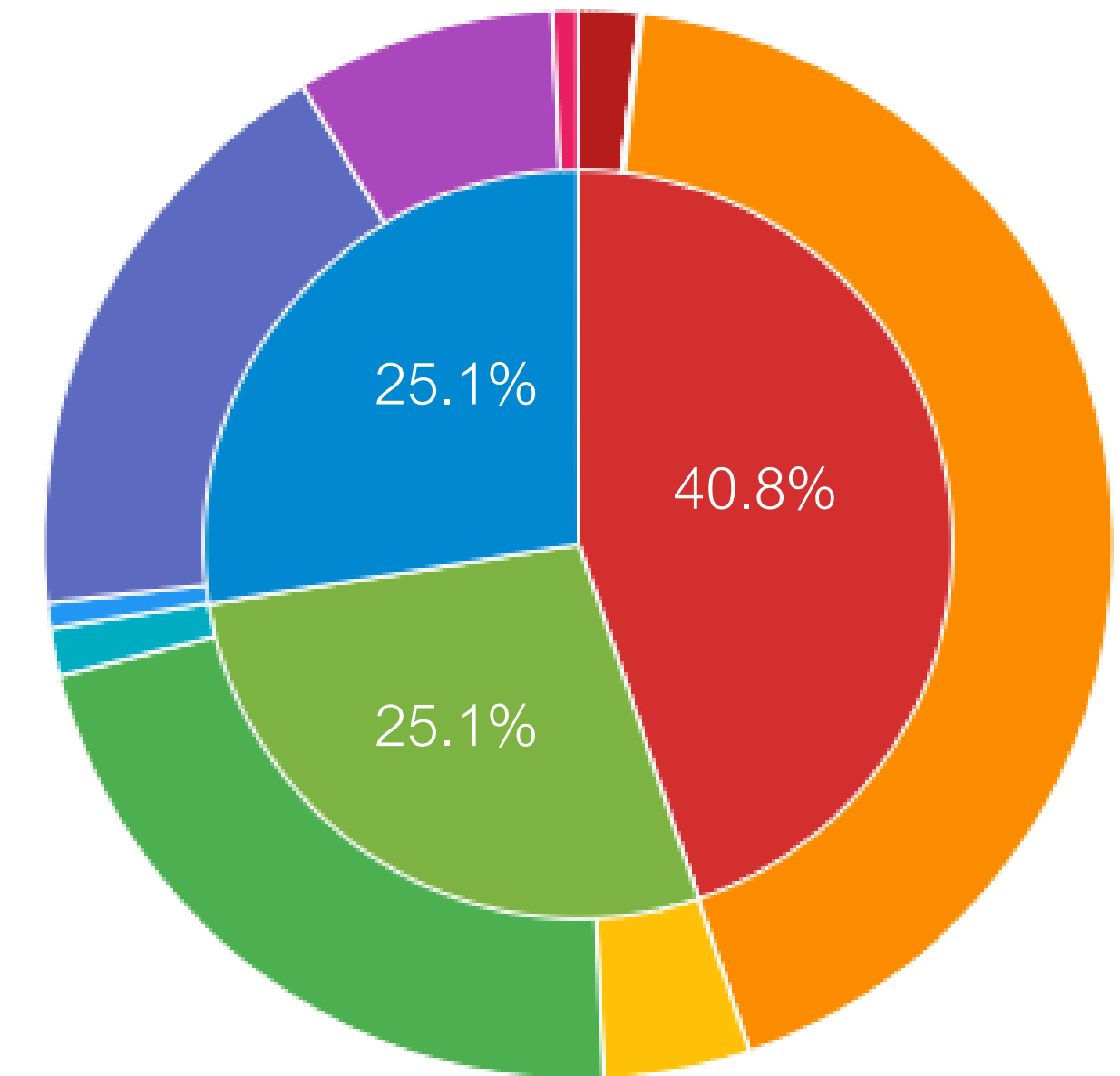
Past month:

Average demand: 32.1GW



Past year:

Average demand: 30.2GW



RENEWABLE ENERGY

- Solar photovoltaic
- Wind
- Hydroelectric

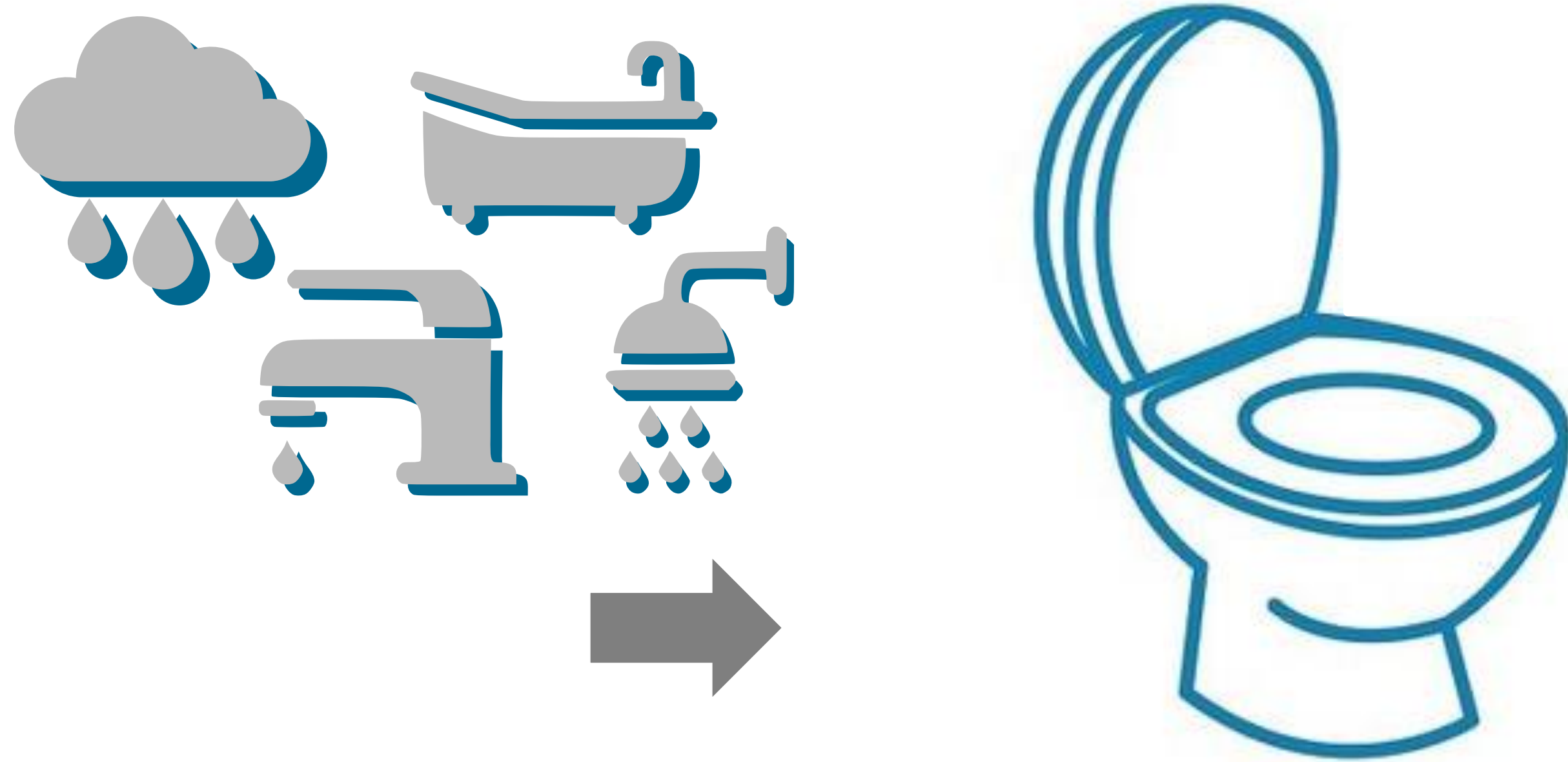
FOSSIL FUELS

- Coal
- Oil
- Gas (open cycle) ⓘ
- Gas (combined cycle) ⓘ

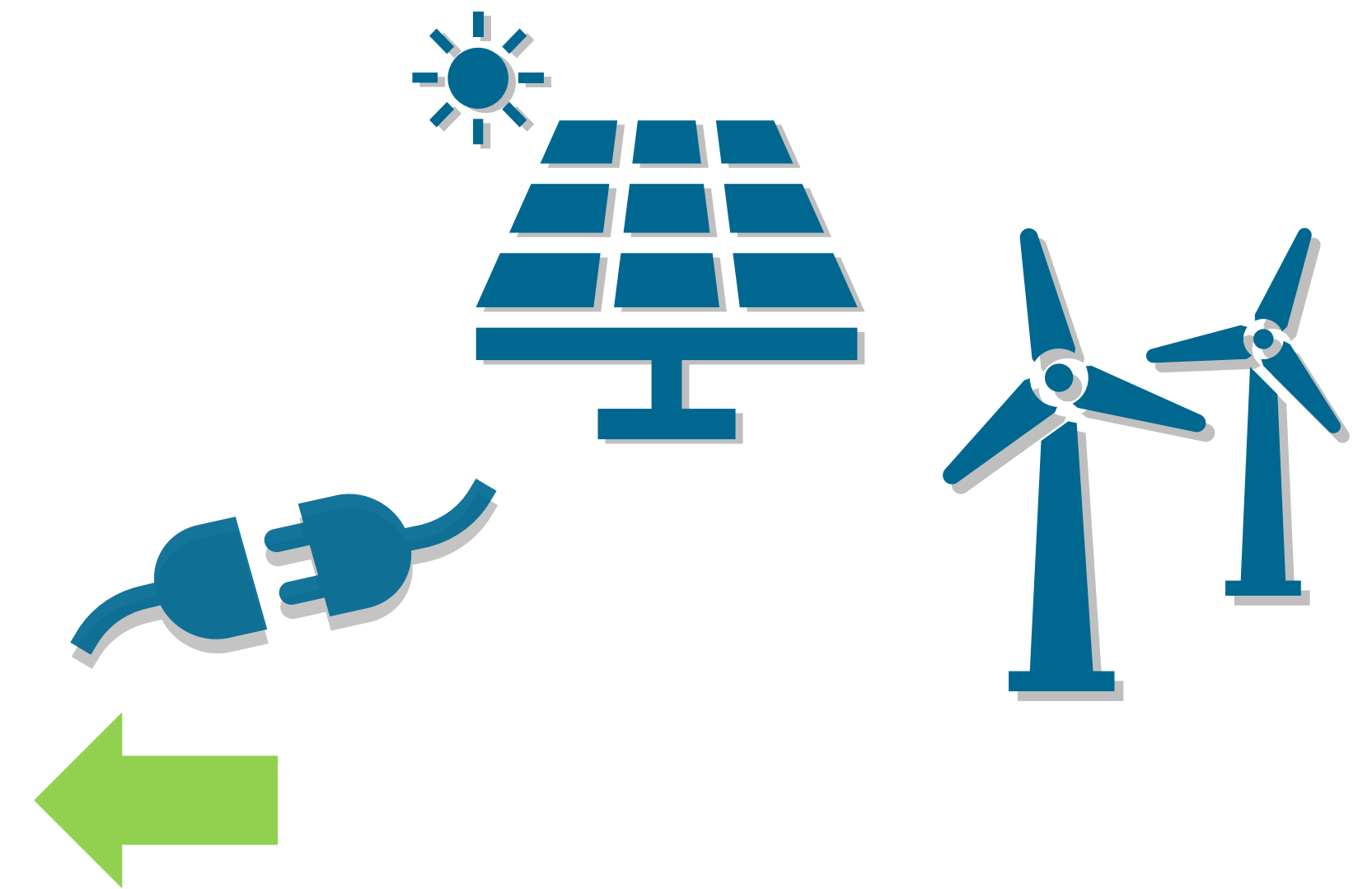
OTHER ENERGY

- Pumped storage ⓘ
- Nuclear
- Biomass
- Other

Water & carbon neutral operation



In addition, with the option to recycle “GREY” water to flush the vacuum toilets we can achieve **WATER NEUTRALITY**



With the option to operate pumps with “GREEN” energy, carbon neutral power can be utilised to operate the vacuum pumps.

Vacuum Drainage



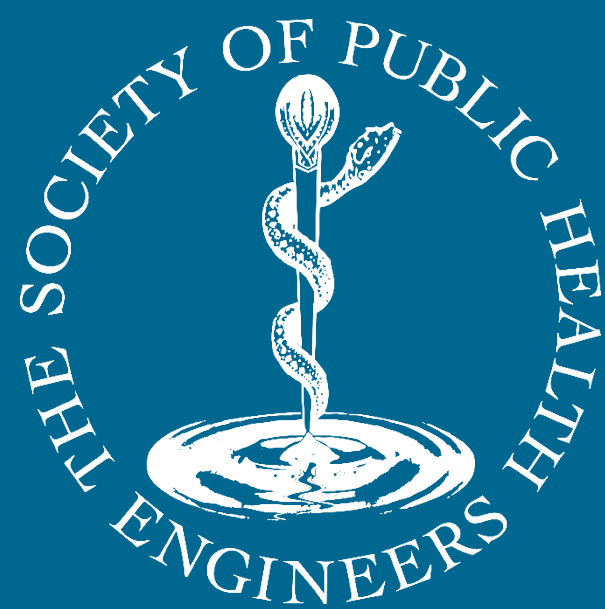
Consider your Water Footprint

To reduce unnecessary water usage.....

.....think **VACUUM DRAINAGE.**

LEAK DETECTION JUST GOT SMARTER - SONIC

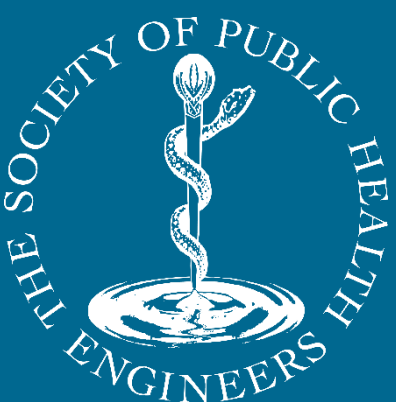
Julian Waumsley, Managing Director
Aquilar Ltd – Leak Detection Solutions



aquilar
leak detection solutions

Let's better manage
our water supply
and
consumption

aquilar
leak detection solutions



How serious is the problem ?

Water leaks waste trillions of litres of water a year

Two thirds of the world will suffer water shortages by 2025

How do we work towards Water Neutrality ?

3.2 bn
litres per day in the UK

More than the
total water
consumption of
London



Around **30%**
of all drinking
water worldwide
is lost to leaks

Leaks are the #1 cause of UK property damage

More damage than
all fires and burglaries
combined

£18B
in Europe

£13B
in the USA

£855M
in the UK



54%

of European households
will experience a leak



What can we do to reduce this waste ?

Avoiding leaks is key

- Detecting & informing users of small undetected leaks before they become a problem
- Warning of high pressure situations (which can create leaks)
- Warning of potential frozen pipe (unoccupied buildings)

Disaster mitigation

- Preventing leaks becoming worse by detecting escape of water **and automatically shutting off the supply**

What is SONIC ?

Smart and Green

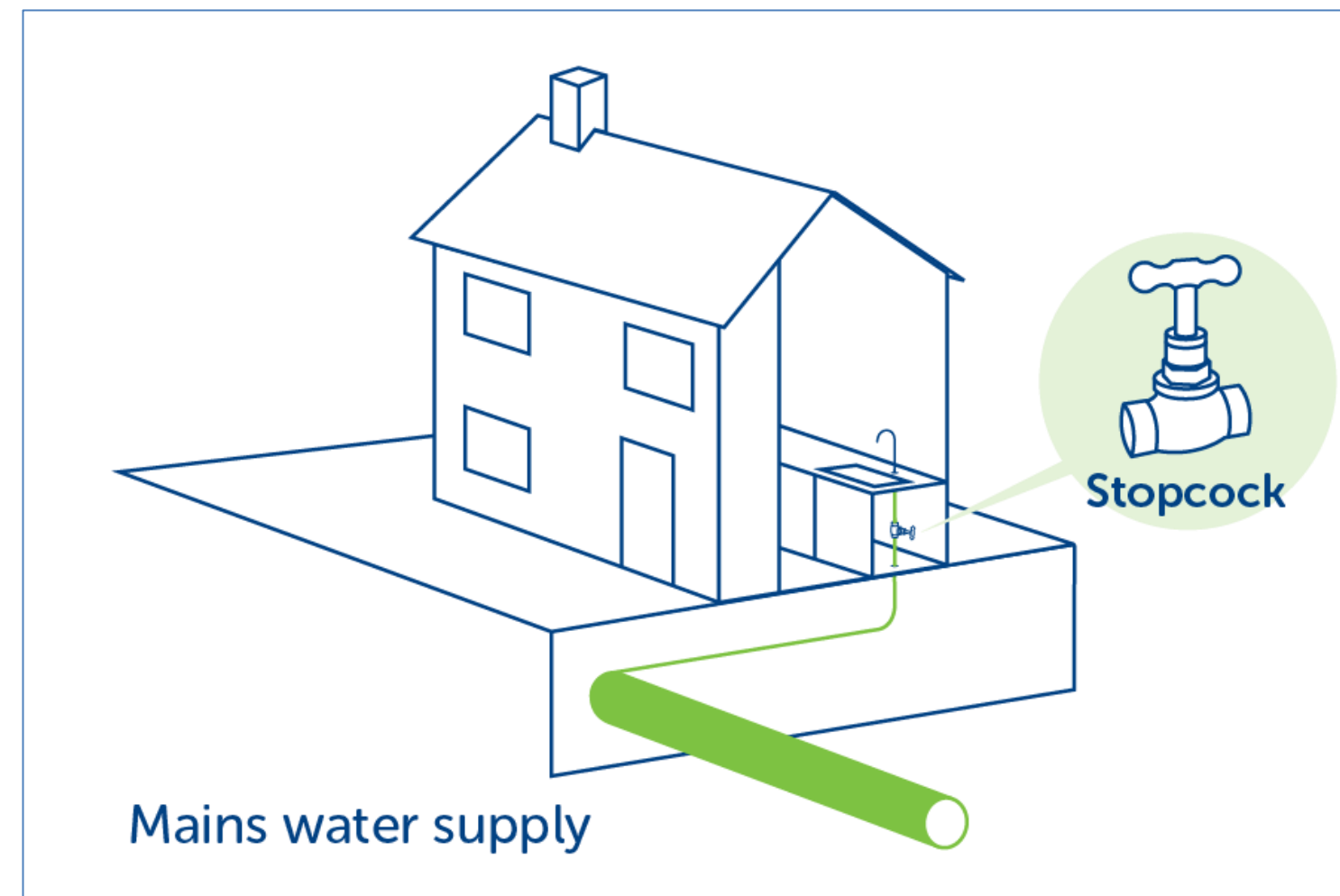
- ❖ **Ultrasonic flow-meter**
- ❖ **Integrated shut-off valve**
- ❖ Protects an **entire home** from a **single point**
- ❖ Machine learning to categorise water usage
- ❖ Pressure checks your plumbing system every night
- ❖ Monitor temperature for pipe freezing
- ❖ Battery powered (& mains option)

S
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C



Where to fit it ?

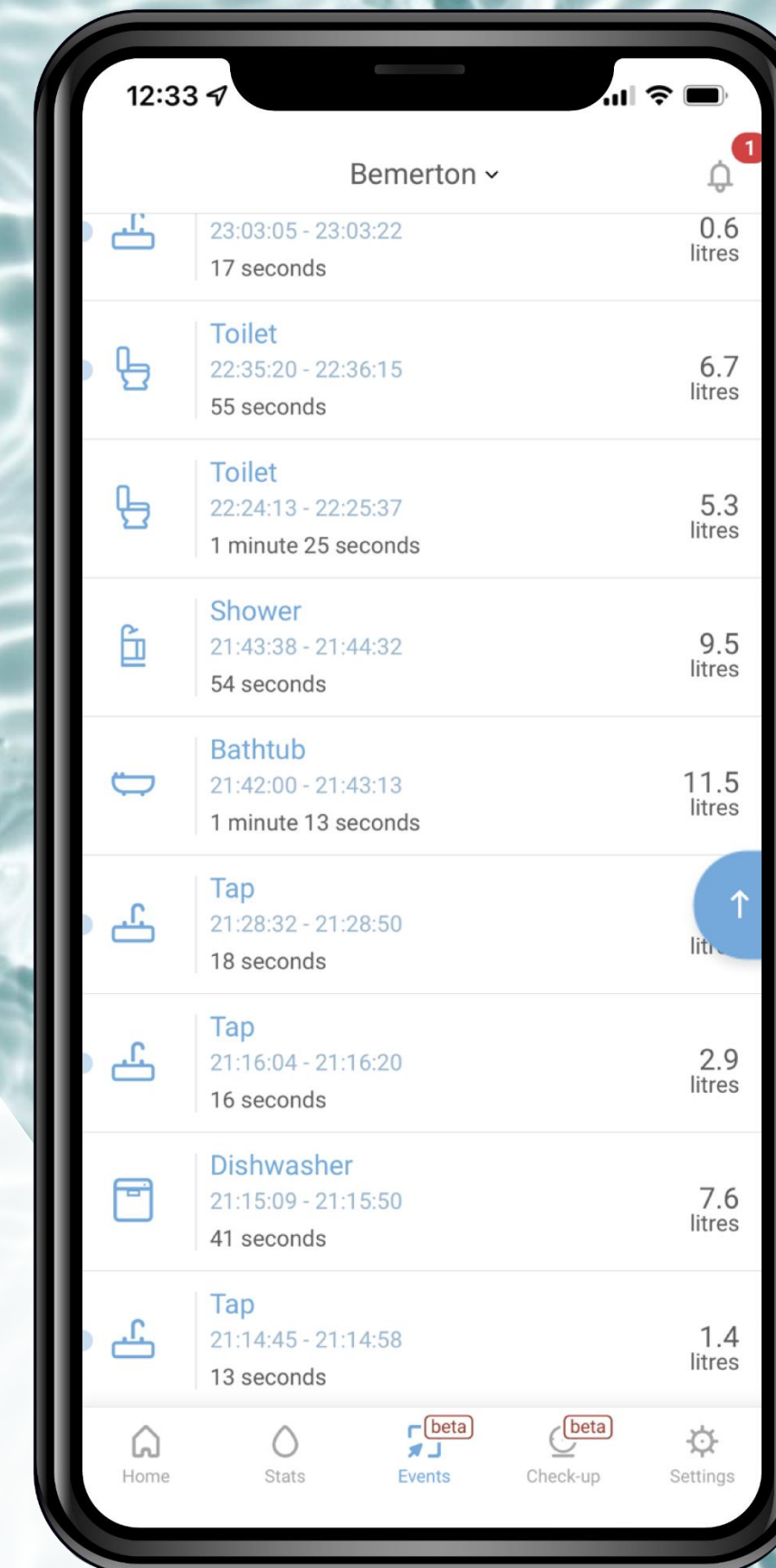
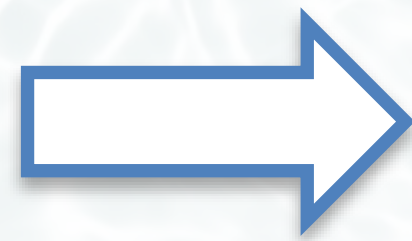
- The most effective point is as early as possible as it enters the property
- Directly after the stop cock, enables monitoring of the whole system



Save water...

Avoiding unnecessary water use is so important

- But changing user behaviours is vital



Educating users ...

on how to manage water use by showing exactly how much water is used during different time periods (i.e. per day, month, year)

By showing what rooms use most water,

- allowing informed pattern changes

This can't be done without good data

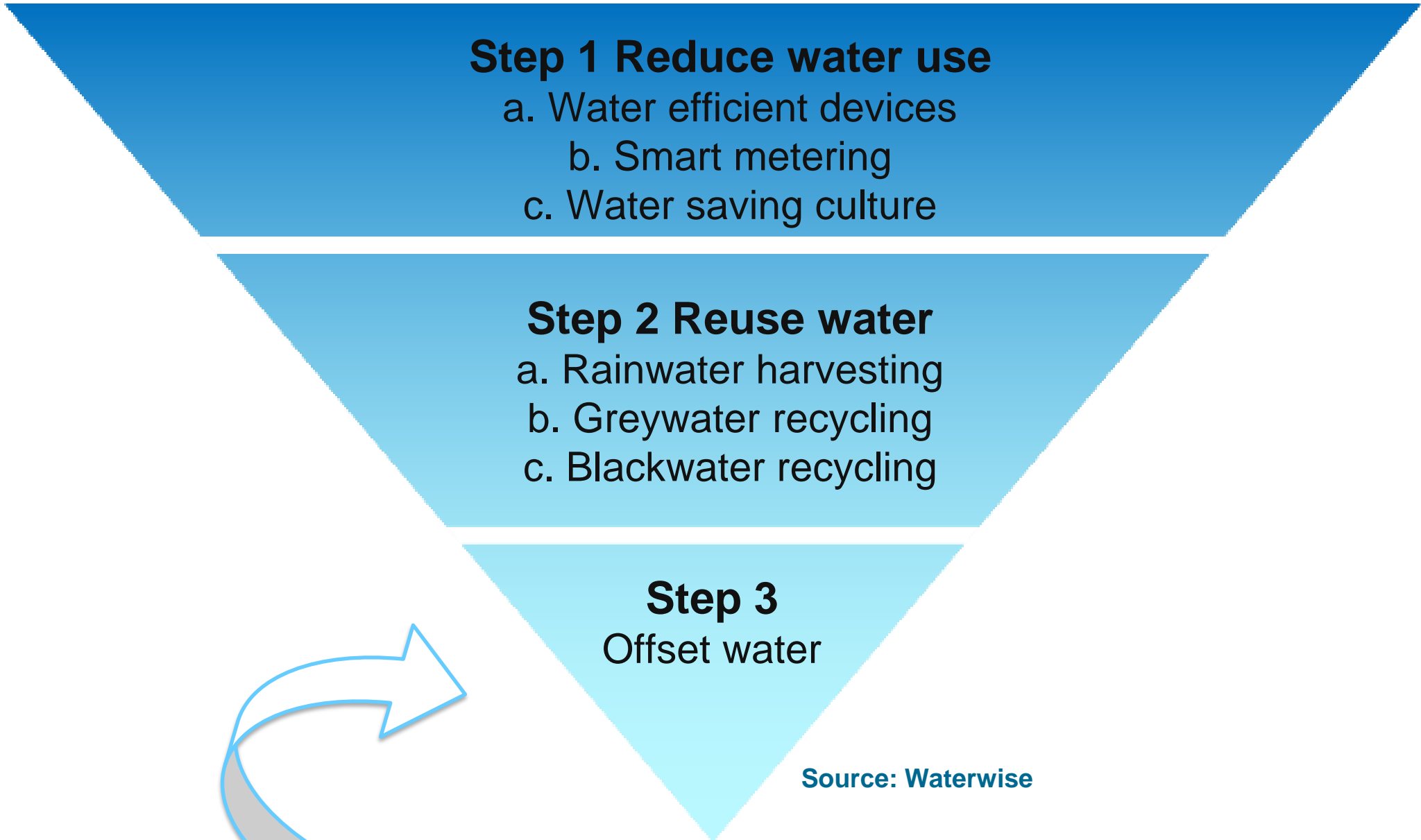
which SONIC provides



Other benefits follow as a result ...

- Potential insurance saving
- Water supply can be isolated to minimise damage when on holiday or away
- Remote monitoring (legionella, elderly monitoring)
- Scalable for large developments
- Ease of install & use – retrofittable and simple informative app
 - Fewer reasons not to use smart technology to protect properties
- Sub-metering capabilities
- Can be installed to provide a CIREG system

Water Neutrality – Leak Detection



Leak detection falls into this section

Helping towards Water Neutrality

How do we make it happen ?

Good Partnerships

Water neutrality needs a multi-stakeholder approach, particularly with the offsetting component, so establishing strong partnerships early in the development process is crucial. As a starting point, the developer, local authority, water company and **product experts** should discuss ambitions to achieve water neutrality in the very early stages of a development.

