
Water efficiency in the non-domestic sector

RIBA South East
May 21st 2009



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Water efficiency in the non domestic sector - an ech₂o workshop for RIBA SE, May 2009

A water efficient strategy for the non-domestic sector

- Must understand the carbon load of different types of water
- Should prioritise water efficiency over alternative sources of water
- Requires behavioural changes as well as technological solutions
- Requires water meters inside buildings and should use data loggers to understand usage
- Should use rainwater or greywater only where it makes carbon sense to do so



Reducing demand in public and commercial buildings

- BREEAM credits for offices and schools are:
 - 4.5 - 5.5m³/person/year = 1 credit
 - 1.5 – 4.4 m³/person/year = 2 credits
 - less than 1.5 m³/person/year = 3 credits
- For other buildings the requirement is to: provide evidence that the specification includes taps, urinals, WCs and showers that consume less potable water in use than standard specifications for the same type of fittings
- Also credits leak detection, pulsed water meters, proximity detection shut off in toilet areas, rainwater harvesting and greywater recycling systems.



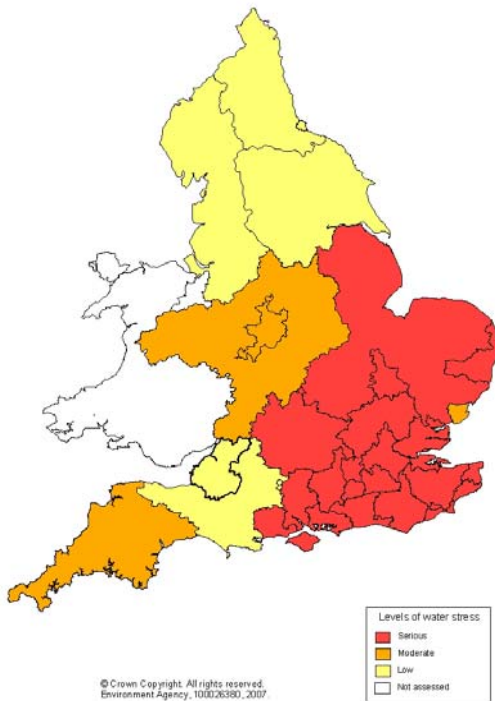
Any water efficient strategy for the non-domestic sector should reduce the load on the mains water supply and should not increase the carbon load of the water supplied





The carbon load of water

- It takes 1.2 kWh of (mostly) electrical energy to supply and treat 1m³ of mains water.
- This results in 0.7 kg of CO₂ emissions per m³ of mains water used
- Carbon emissions from the water supply industry are only 0.6% of total UK emissions but when we add domestic hot water use this figure rises to 5%.



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Any water efficient strategy for the non-domestic sector should prioritise water efficiency over alternative sources of water

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Reduce WC Demand



- Specify dual flush WCs in new build or refurbishments.
- 4/2.5 litre in the commercial sector saves 2.5m³ water per person per year.
- 6/4 litre in the commercial sector saves 1.6m³ water per person per year.
- Savings in schools will be less, in hotels and other residential buildings will be more

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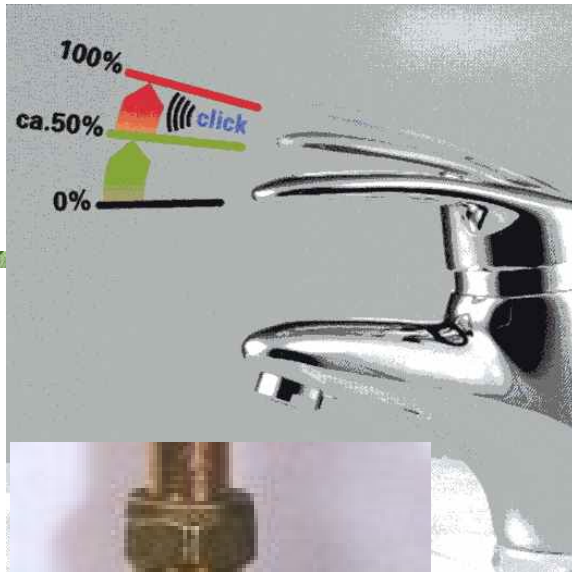
Urinals



- An uncontrolled urinal in the UK can use 90,000 litres of water per year. Retrofit urinal controls in existing buildings
- Controlled flushing relating to use of urinals (in-line valves allowed under 1999 Water Regulations) can save large amounts of water in low traffic situations
- Waterless urinals use no water. No water means no scale but removal of uric sediment still required. There is a consumables cost which can be quite high

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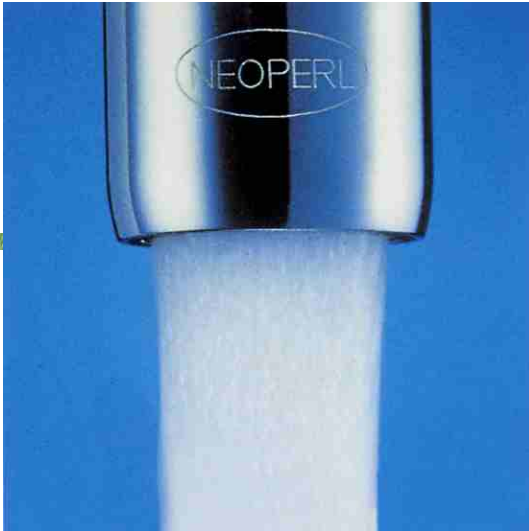
Specify efficient terminal fittings 1



- Control flow rates from taps and showers with flow regulators.
- Flow regulators give constant flow regardless of pressure fluctuations at 1 bar and above. Prevent starvation at end appliances. Reduce water use
- Specify automatically controlled taps with spray heads in commercial situations regulated to 2 - 4 litres/min for basins
- Specify flow regulators for taps in hotels, care homes etc combined with aerated heads

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Specify efficient terminal fittings 2



- Use flow regulators and aerated heads for showers. 8 litres/min is a good flow rate for showers, and due to the CSH there is a large choice in the UK market
- Don't specify power showers
- BMA rates 13 litres/min showers as water efficient!



Any water efficient strategy for the non-domestic sector requires behavioural changes as well as technological solutions, therefore should have education at its core



The South East is under water stress. Be Water Aware!

Reducing flow rates at basin taps can save 6 litres of water per hand wash in public toilets. The flow rates at these taps have been adjusted to save water.



Saving Water in Crawley's Hospitality Sector is run by ech₂o for Crawley Borough Council and funded by SEEDA. To find out more visit: www.ech2o.co.uk



Raising awareness in the hospitality sector



Save Water Save Money

This toilet has a Save-a flush bag fitted saving 1 litre of water with every flush

To get one free, contact your local water supplier



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The importance of education to improve water efficiency

The South East is Under Water Stress



Use Water Sparingly

SEEDA SOUTH EAST ENGLAND DEVELOPMENT AGENCY
Working for England's World Class Region

Medway SERVICE
Serving You

ech₂o
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'Saving water in the hospitality sector' www.ech2o.com

- A project to save water in the hospitality sector, funded by SEEDA
- Comprehensive water audits and individualised feedback coupled with proactive action during site visits. Reduced flow rates at taps and WC flushing volumes. Urinal controls fitted for free
- Logging of sites to gather data
- Direct water savings of 5000m³ a year
- Indirect savings unquantifiable, but expected to be significant

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Be Water Aware!

Raising awareness with school pupils as part of Thames Water's Water Makeover for Schools 2008 and 2009



worth asking
it's worth everyone
answering.

CAN I GAIN POINTS FOR MY HOUSE?



Complex Speed Sounds

Consonant sounds

f	l	m	n	r	s	v	z	sh	th	ng
ff	ll	mm	nn	rr	ss	ve	zz	ti	ci	nk
ph	le	mb	kn	wr	se	c	se			
					ce					

b c d g h j p qu t w x y ch
bb k dd gg j g pp tt wh x y ch
ck ch ge dge

Vowel sounds

a	e	i	o	u	ay	ee	igh	ow
	ea				a-e	y	i-e	o-e
					ai	ea	ie	oa
					e			

oo oo ar or air ir ou oy ire
u-e ue ore aw au oor are ur ow oi



150 241

118 203
138 368!
126 226
110 181
3729.5
litres
of water
a day

213
409!

0.5

9.00 Register
Maths
10.10 Assembly
Break

Star of the Week
Awarded For 4 Weeks

SPORTS AWARDS



How much water do schools use?

- On average primary schools use $7\text{m}^3/\text{pupil}/\text{year}$ and secondary schools use $11\text{m}^3/\text{pupil}/\text{year}$. The DCSF suggests this could be reduced to $4\text{m}^3/\text{pupil}/\text{year}$ (school without a pool)
- Installing urinal controls in a school can reduce the water required to 10,500 litres per urinal space per year saving up to 55,200 litres of water.
- Installing dual flush WCs or retrofit dual-flush mechanisms in existing WCs can save up to 2700 litres per pupil per year (assumes pupils use the WC 3 times a day, so actual savings often less)



Any water efficient strategy for the non-domestic sector requires water meters inside buildings and should use data loggers to understand usage



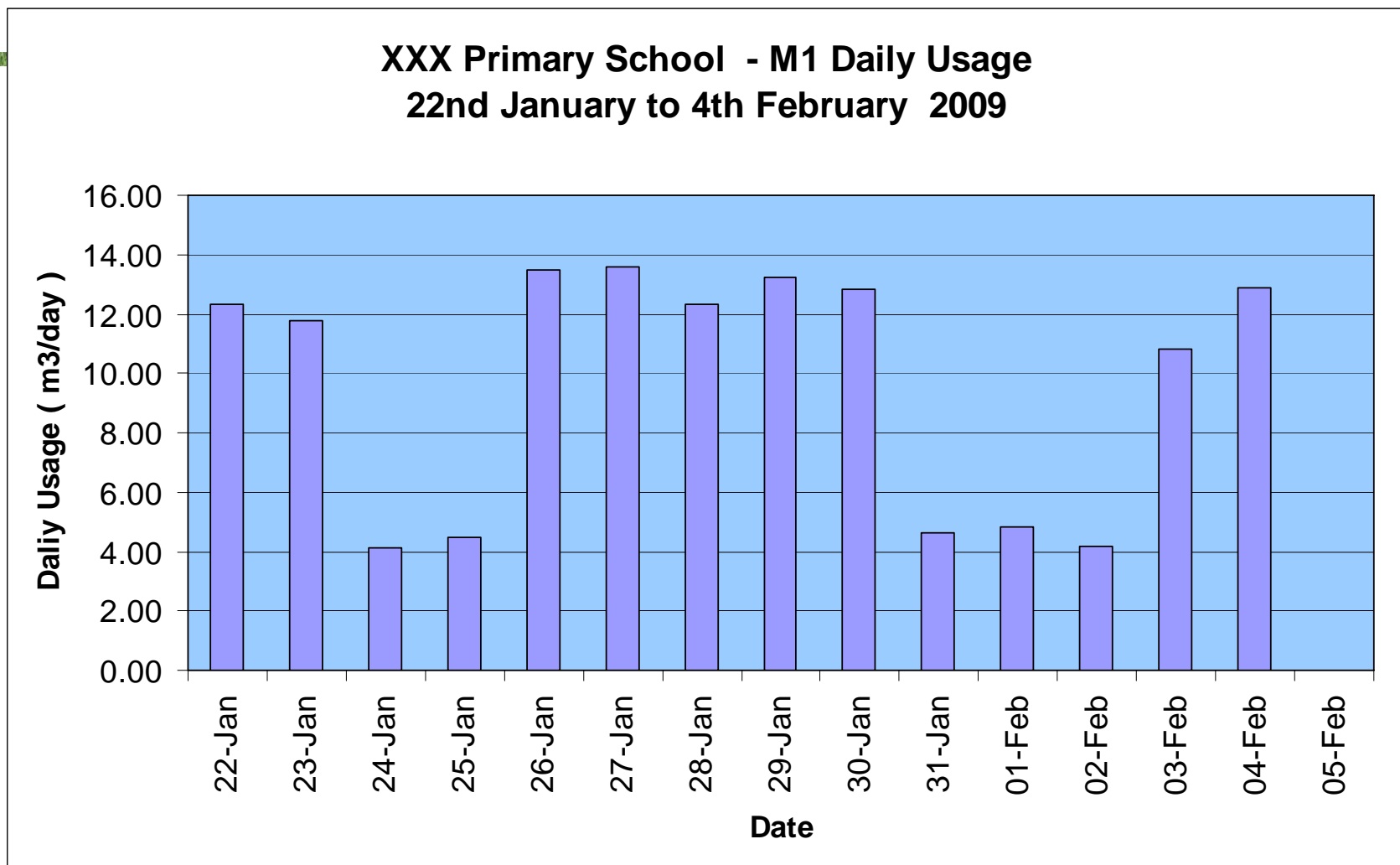


Meters should be installed inside buildings

- Allows building occupiers to monitor usage – post occupancy evaluation
- Reduces number of estimated bills
- Secondary meters (when regularly checked against Water Supplier's meter) allow underground leakage to be detected and can detect any increase in leakage from branch pipelines following upgrading of mains in the street
- Following our work on various school projects, at ech₂o we currently consider underground leakage to be one of the main reasons so many schools are still performing above the DCFS benchmark figures

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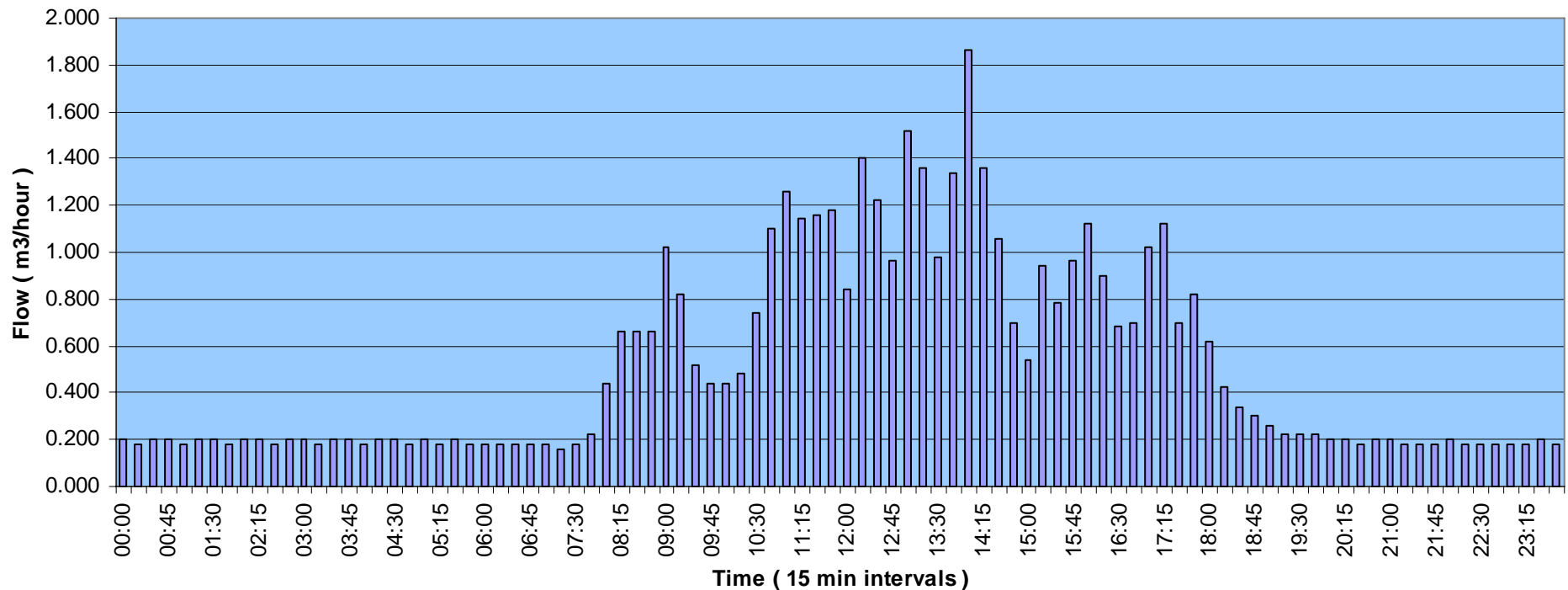
Using data loggers to understand usage



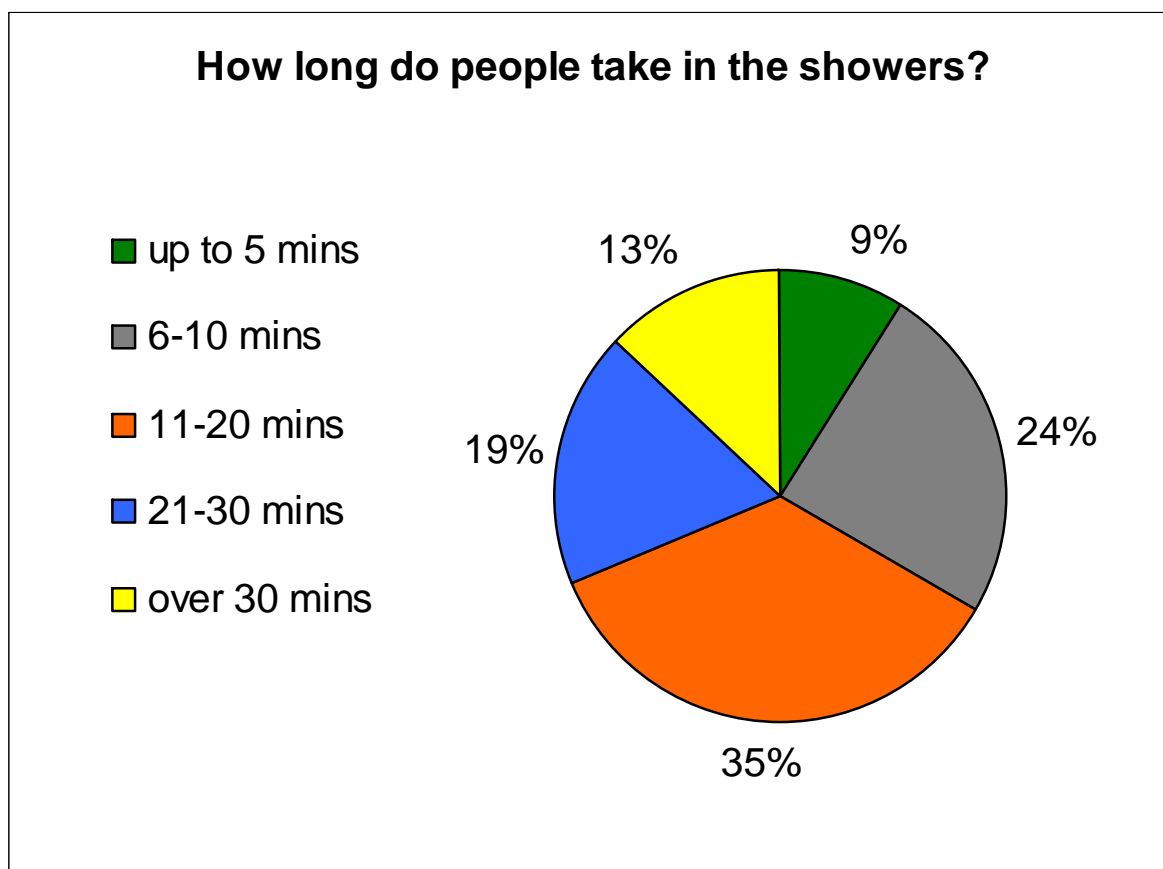
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Using data loggers to understand usage

XXX Primary School - M1
Daily Flows at 15 min intervals
on Thursday 22nd January 2009



Is the 5 minute shower an urban myth?



- A survey of 67 school pupils, 44 boys and 23 girls in Years 7 and 10, 54 of whom had showers.
- Average shower time was 21 minutes
- Any underestimation of shower use will have a large knock-on effect on both water use and carbon emissions

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Has the smoking ban led to an increase in urinal flushing in pubs and clubs?



- Work in this sector using data loggers to demonstrate actual water savings from urinal controls showed a change in the pattern of use post controls but in some cases little overall savings
- Premises had reduced flow into urinals to a trickle to save water pre the smoking ban, but landlords wanted more water to flush post the ban
- Hygiene parameters were increased but so was water use

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Saving water from shorter showers

	Water use/day @	Water use/day @	Water use/day @	Water saving/year
Duration of shower	5 litres/min	10 litres/min	20 litres/min	A 10 litre/min shower for 5 mins
2 mins	10	20	40	-
5 mins	25	50	100	-
10 mins	50	100	200	SAVE 18,250 litres!
15 mins	75	150	300	SAVE 36,500 litres!
30 mins	150	300	600	SAVE 91,250 litres!

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Increasing CO₂ emissions from longer showers (10 litre/min shower)

Duration of shower	Water use per day litres	Water use per year litres	CO ₂ emissions per year kgCO ₂	Extra CO ₂ load/ year between a 10 litre/min shower for 5 mins and kgCO ₂
2 mins	20	7,300	58.4	-
5 mins	50	18,250	146.0	-
10 mins	100	36,500	292.0	146 kgCO ₂
15 mins	150	54,750	438.0	292 kgCO ₂
30 mins	300	109,500	876.0	730 kgCO ₂

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Any water efficient strategy for the non-domestic sector should use rainwater or greywater only where it makes carbon sense to do so

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Rainwater Harvesting



- In the UK rainwater can be used for WC flushing, washing machines and garden watering with no further treatment needed
- Generally, rainwater harvesting is better suited to larger buildings, agricultural, commercial, hotels or industrial.
- The quality of water from a well designed, properly installed and well maintained system is high
- High quality components are available on the UK market and technical back up is improving all the time
- The UKRHA (www.ukrha.org) is the industry body

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System supplied
by Aquality Ltd

RWH at Westfield's

- 60,000m² of hard roof surface.
30,000m² connected to RWH system
- 2000m³ combined rainwater harvesting and attenuation
- 11,000m³ per year expected yield
- 50m³ per day demand, 18,000m³ per year. Rainwater calculated to meet 61% of demand
- Very carbon efficient design



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Greywater Recycling

- Is the reuse of waste water from baths, basins, showers. Usually used for WC flush only. Can be used for washing machines and garden irrigation when cleaned to a higher standard
- A good solution for hotels?
- The greywater recycling market is increasing due to the Code for Sustainable Homes
- The more the greywater is cleaned, the higher its carbon load but the greater flexibility for end use and less concern re water quality issues

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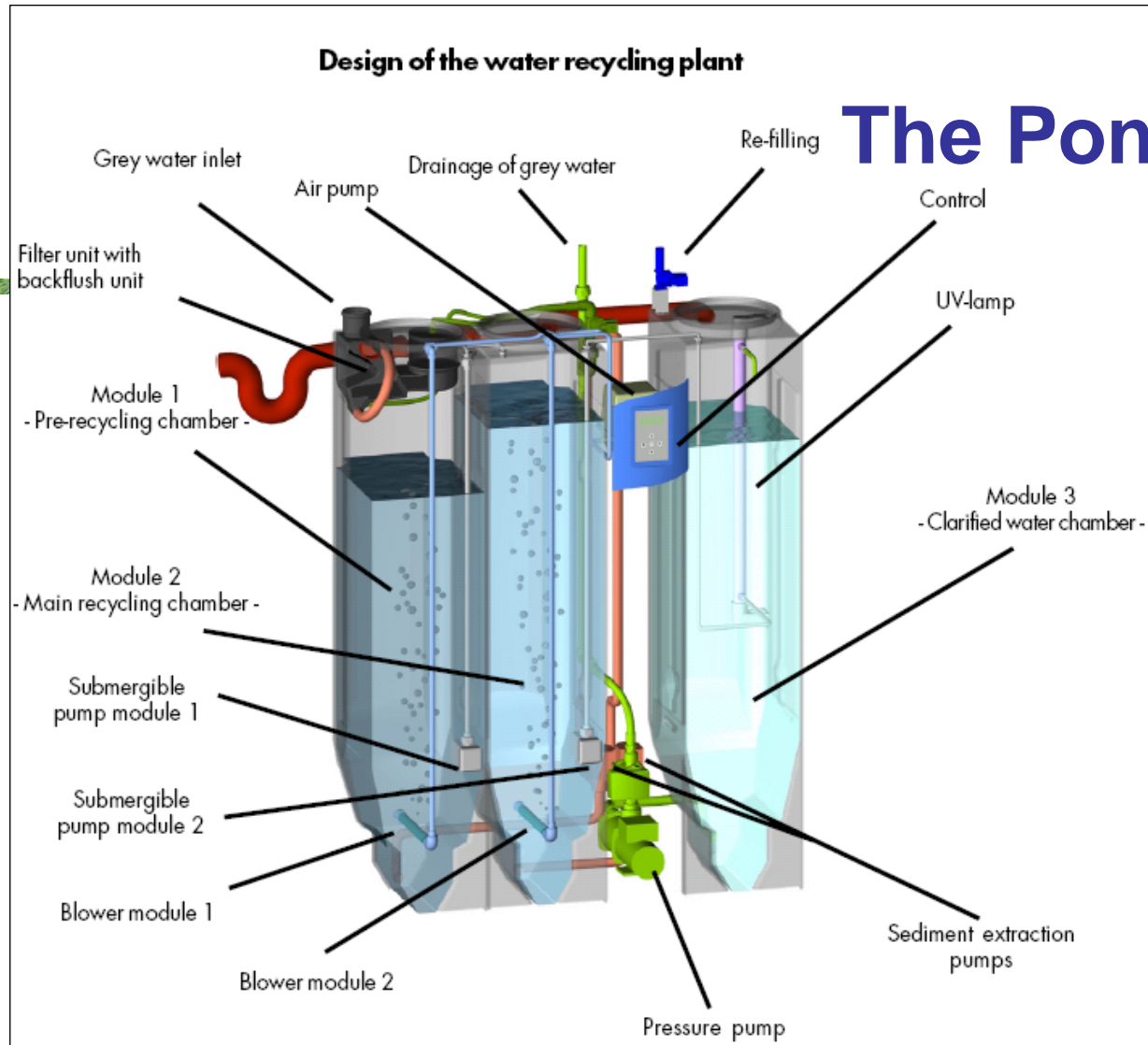


Ecoplay system

- Collects from bath and shower but not the washbasin
- Designed to fill with greywater by gravity, but can fill using a “Saniflow” or similar
- Feeds to WC cistern by gravity
- Can feed a second WC using an integral pump
- Has a low carbon load as cleans the greywater minimally

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The Pontos AquaCycle

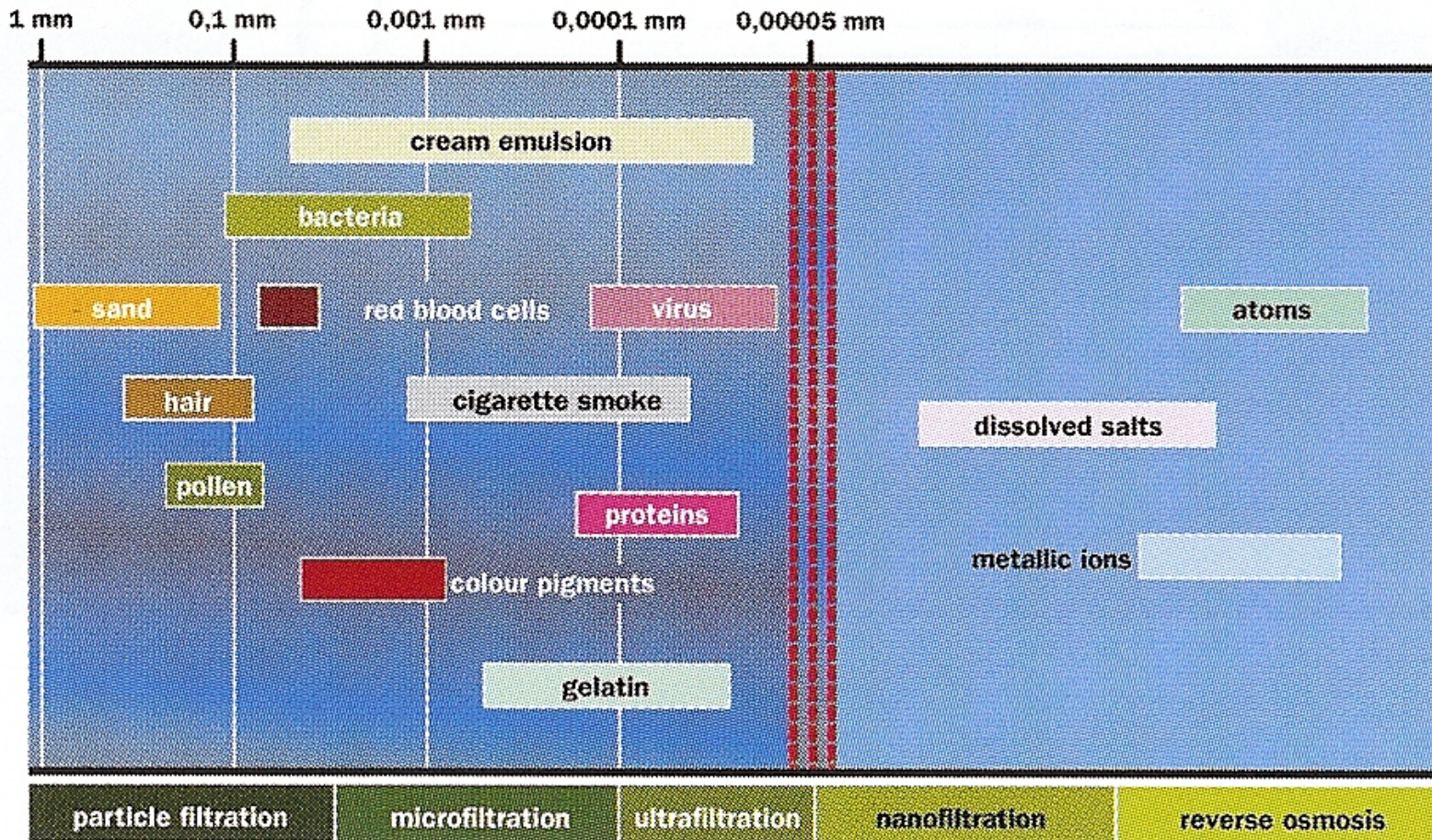


- Uses membrane filtration and aerobic bacteria
- Very high water quality at end use

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ISB Membrane –in the AQUA Recycling Control



- If sized correctly membrane filtration systems can provide recycled greywater at the same carbon load as mains water

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Solutions from ech₂o

- Identification of best water efficiency solutions and Code solutions
- Feasibility studies and design guidance for rainwater or greywater (new build or retrofit)
- Identification of most effective SUDS solutions for existing buildings including green roofs
- Water audits of existing buildings, residential and commercial
- Working with stakeholders to change behaviour

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The South East is Under Water Stress



Designed by Ed Bellow



Use Water Sparingly



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ech₂o consultants Ltd work with local authorities, developers, housing associations, water companies, community groups, architects and engineers, at both a strategic and individual site level, to successfully incorporate sustainable water and low carbon solutions into the built environment. www.ech2o.co.uk



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