WATEF Conference 2014

Water Use in Non-Domestic Buildings: Technical vs Behavioural Interventions

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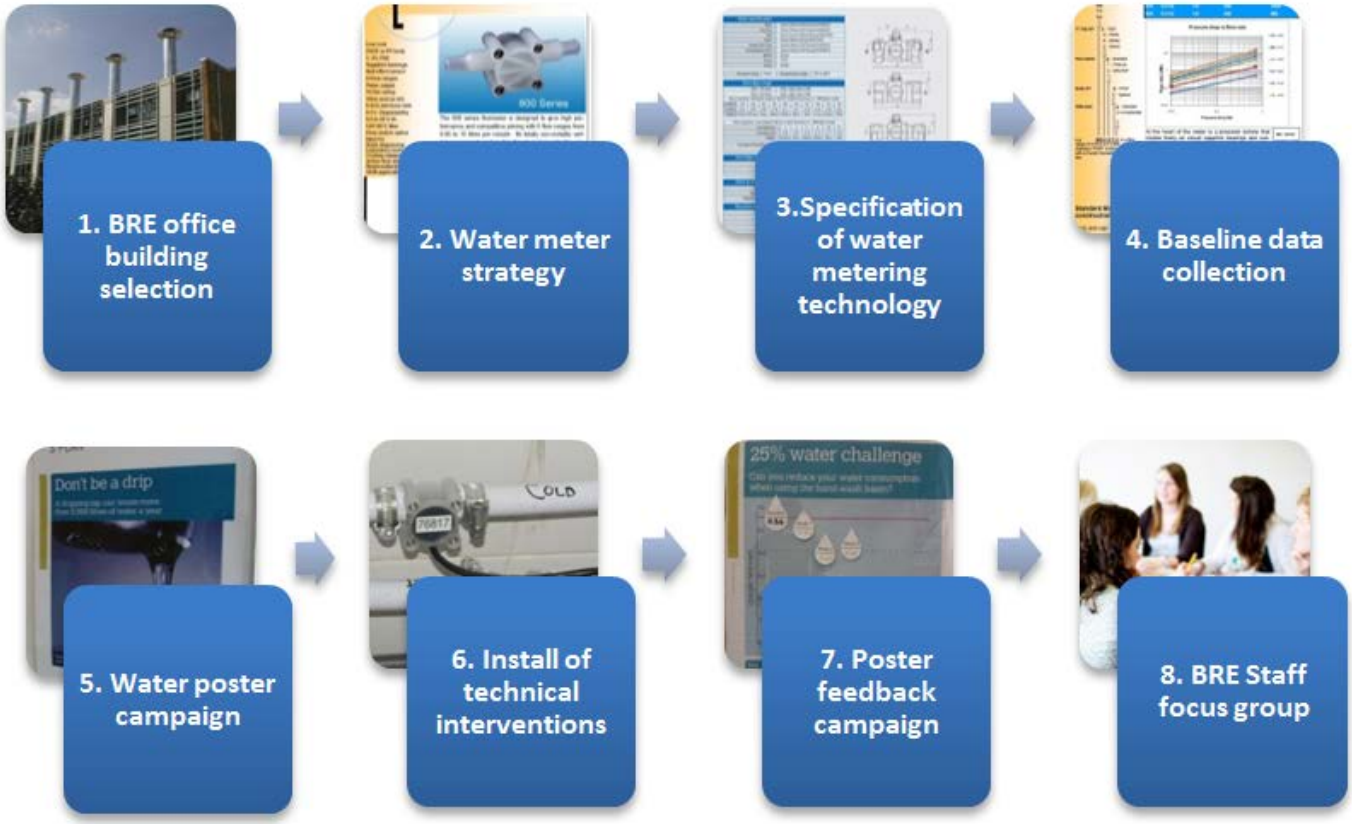
Water use in non-domestic buildings

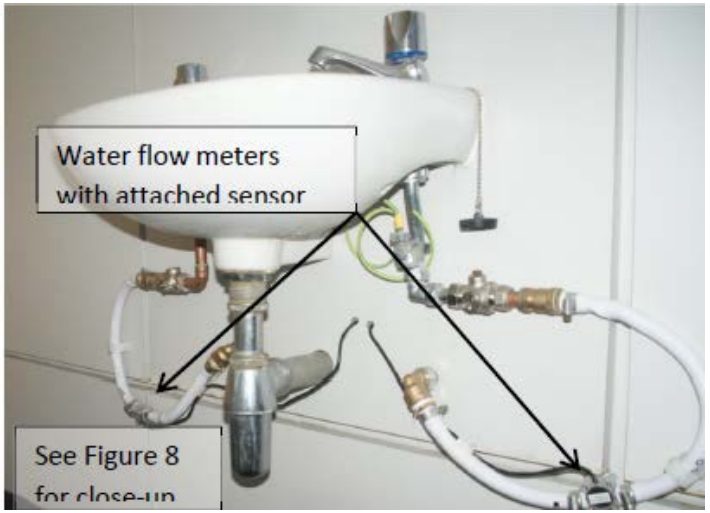
- Research project funded by the BRE Trust
- Objective: Test the effectiveness of intervention versus behavioural campaign, in an office building.
- Two key research questions
  - Q1: What impact does the installation of flow regulators have on water consumption, and does it lead to a direct equivalent reduction in water use?
  - Q2: What effect do staff behavioural & awareness campaigns have on water consumption, and how does this compare to the installation of flow regulators?

Research approach



Sub-metering: flow meters

- Test building: BRE Building 16 - 1st floor
- 22 pulse sub-meters fitted capable of measuring flow rates between 0.03-9.00 litres/minute
- Data logging: Squirrel Eltrek data loggers

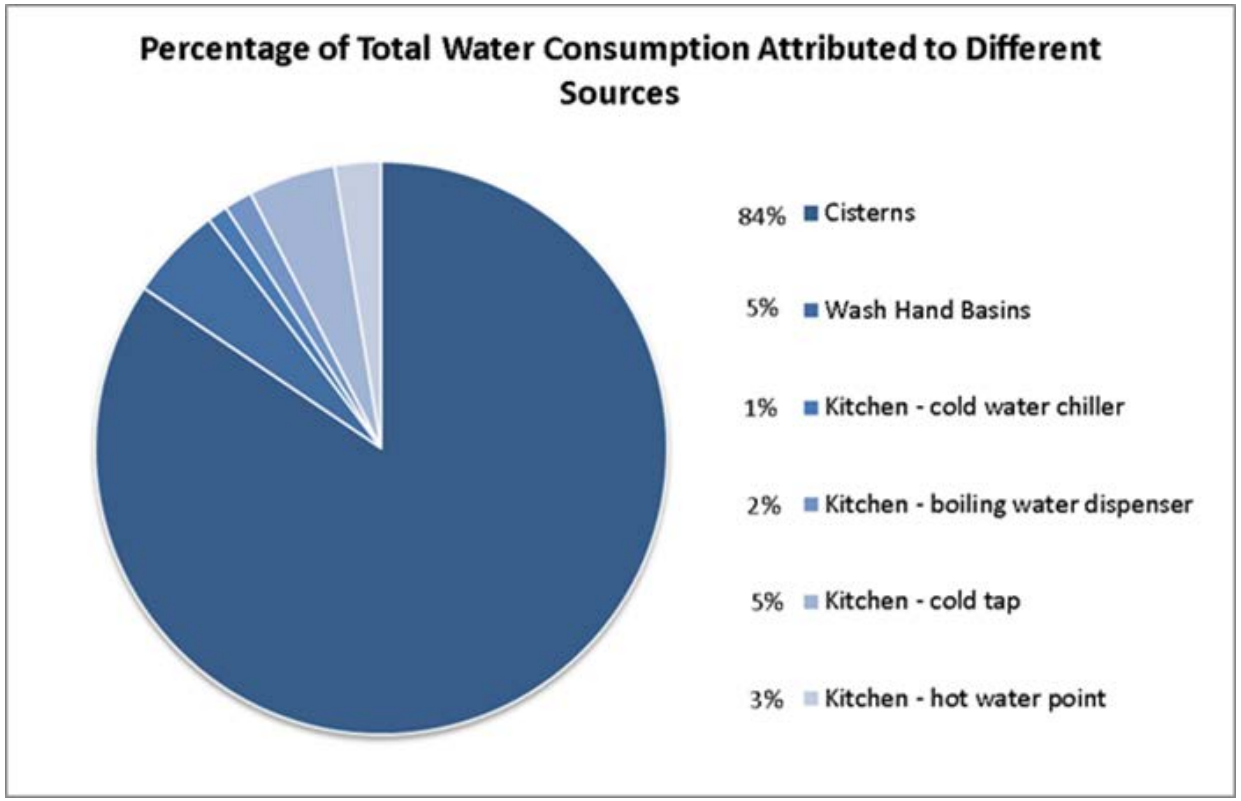


Metered fittings and type of water meters

Fitting and number of meters fittings	Meter type	Number of meters installed
Cold water feed to hot water cylinder	Zenner	1
Toilet Cistern	Zenner	5
Cleaners cupboard sinks	Zenner	2
Hot wash-hand basin sink tap	800 series	5
Cold wash-hand basin sink tap	800 series	5
Chilled water drink dispenser	800 series	1
Point of use hot water dispenser	800 series	2
Kitchen sink cold tap	800 series	1
Boiling water dispenser	800 series	1

Total: 23

Percentage consumption per source

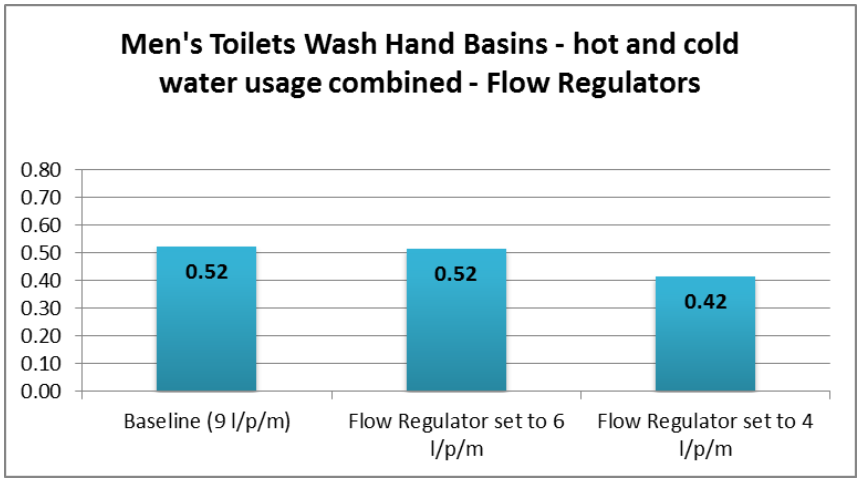


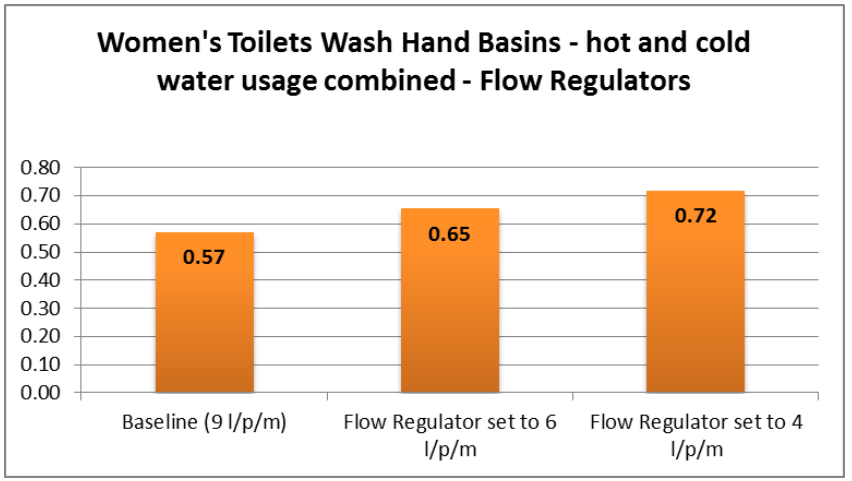
Lessons learnt in project set-up

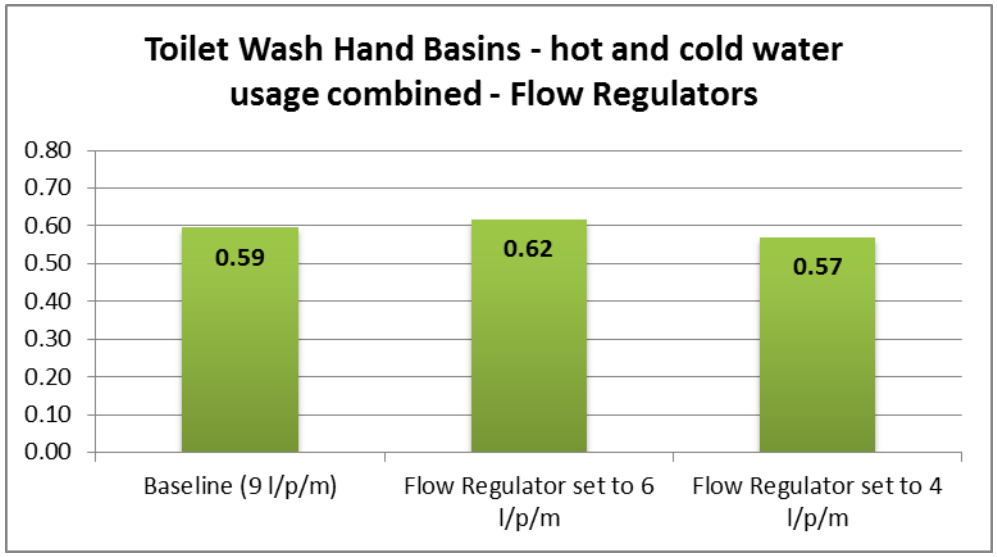
- Challenges
  - Costly and time intensive to carry out sub-metering and data logging activity
  - Technical issues

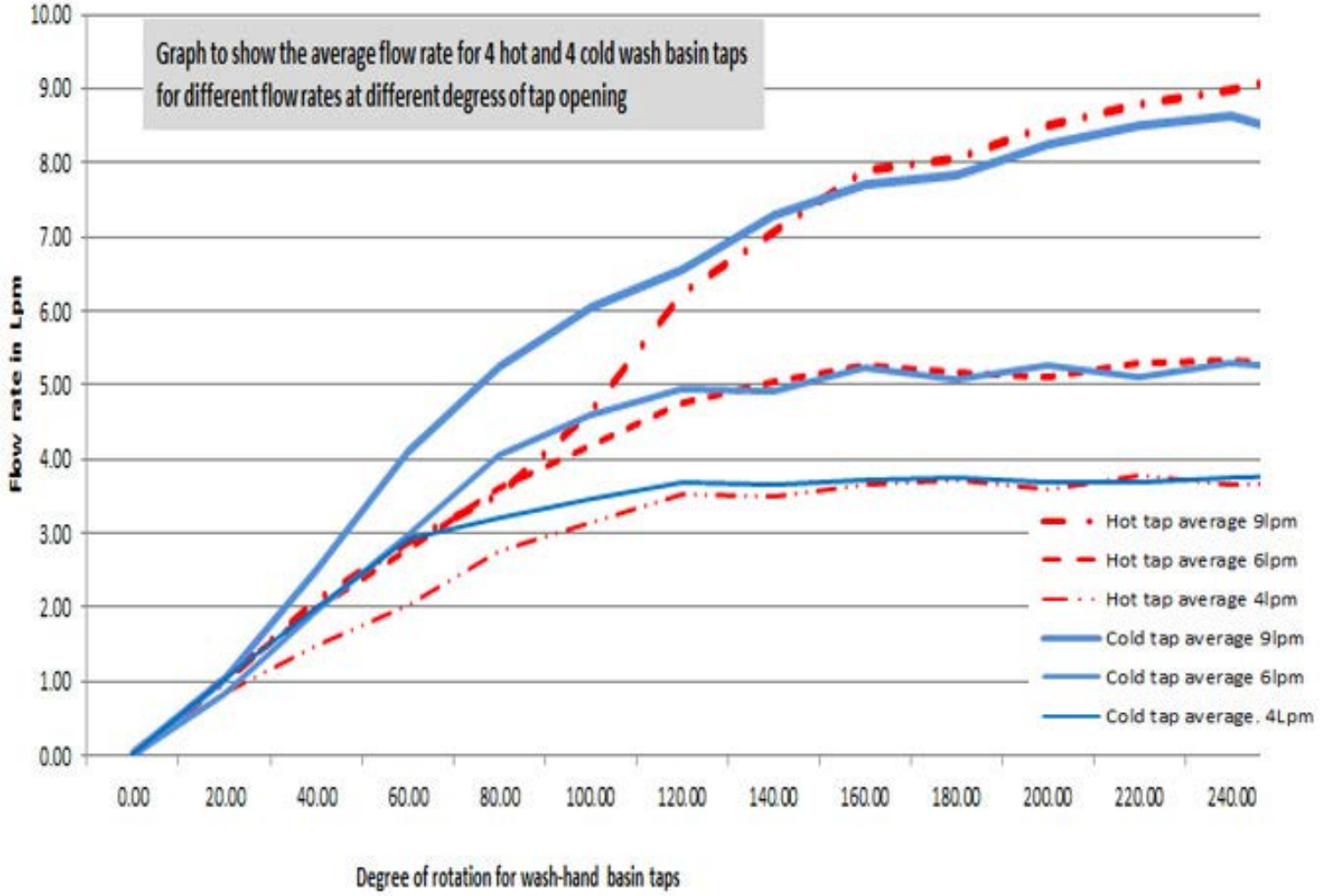
- Benefits & Opportunities
  - Highly detailed and in-depth data
  - Test bed for future research

Findings: Water usage per event







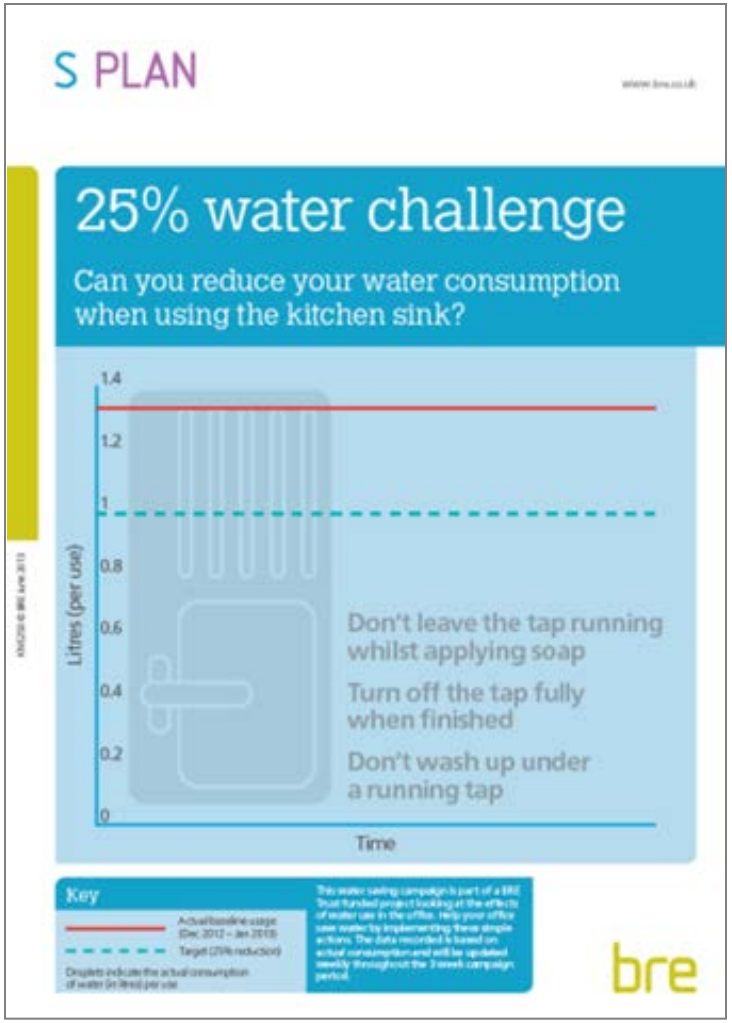

Graph to show the average flow rate for 4 hot and 4 cold wash basin taps for different flow rates at different degress of tap opening
Flow rate in Lpm
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00
240.00
Degree of rotation for wash-hand basin taps
Hot tap average 9lpm
Hot tap average 6lpm
Hot tap average 4lpm
Cold tap average 9lpm
Cold tap average 6lpm
Cold tap average. 4Lpm

Lessons and discussion points

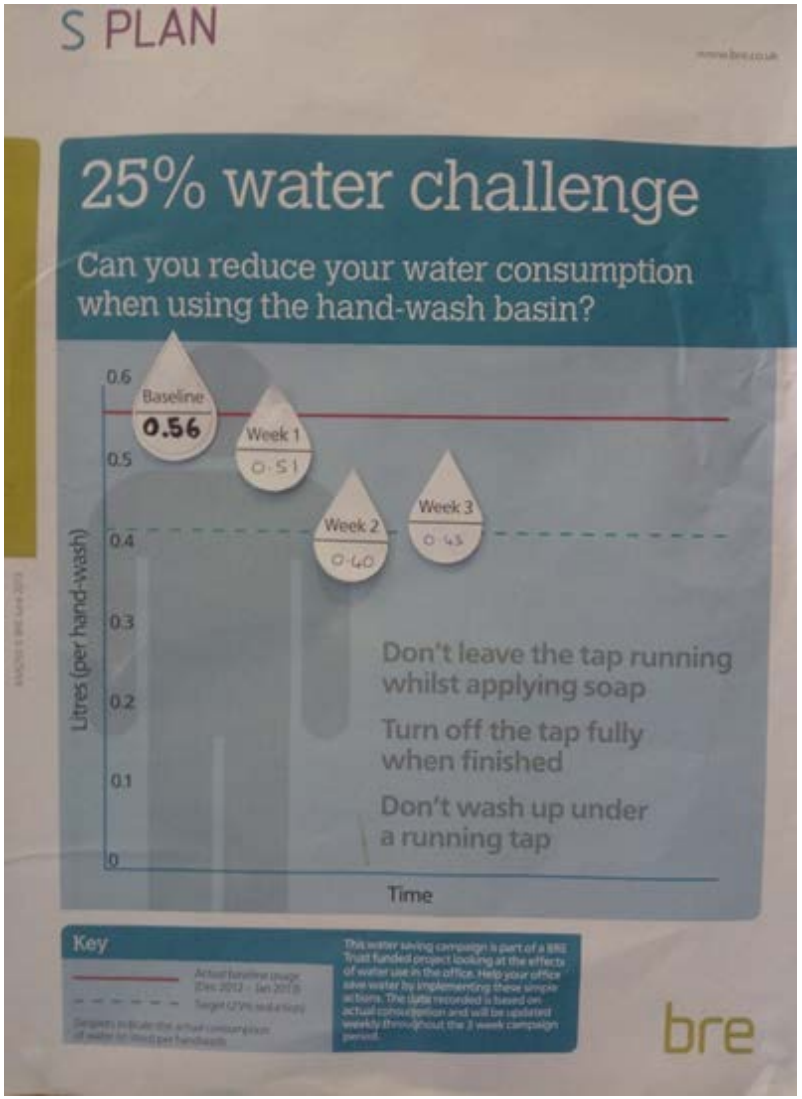
- The premise that water flow reduction valves consistently reduce water usage associated with wash-hand basin taps was not supported by the evidence
- *NB: Kitchen taps were not included*
- There was no direct relationship between the anticipated reduction in flow rates, as a result of flow reduction valves, and actual water consumption
- The data shows two opposing trends in water use consumption change for male and females.
- Rationales why there was a minimal reduction for males and increase for females.

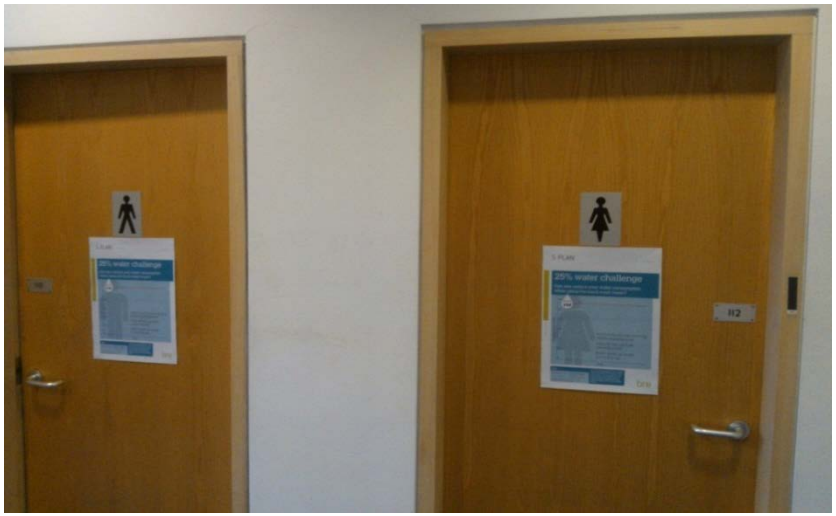
Behavioural campaign

- Interactive poster feedback campaign for a three week period (flow restriction values were removed)
- Challenge for staff to reduce consumption by 25%
- Competition element
- Actual water consumption for the male and female hand-wash basins was reported back to staff via posters on the entrance door of the toilet cubicles
- Introductory e-mail and presentation to staff explaining the water challenge and suggesting ways to reduce water usage

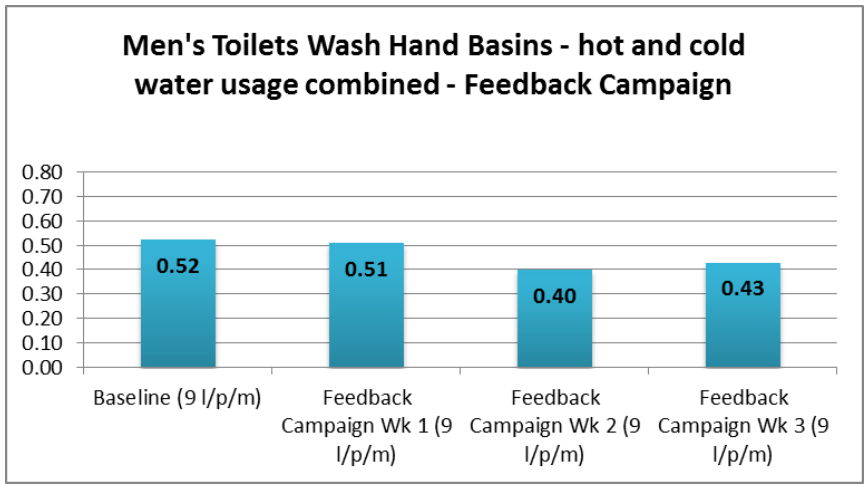


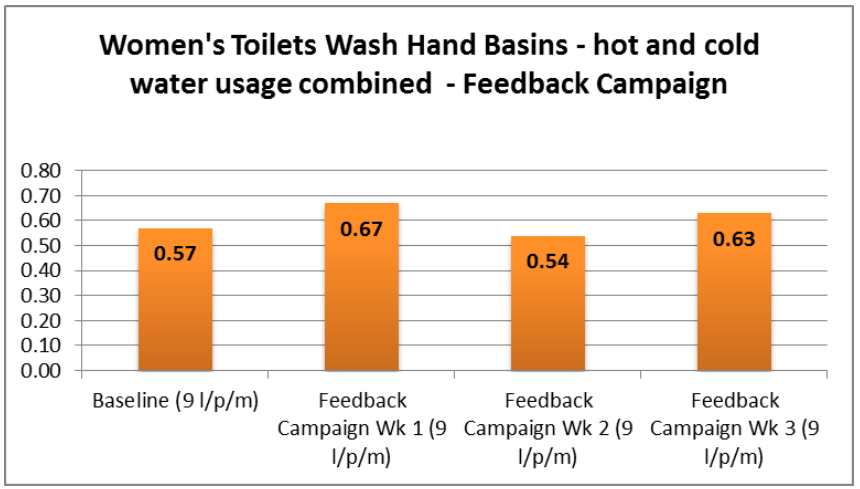
Feedback poster – water drops illustrate actual consumption

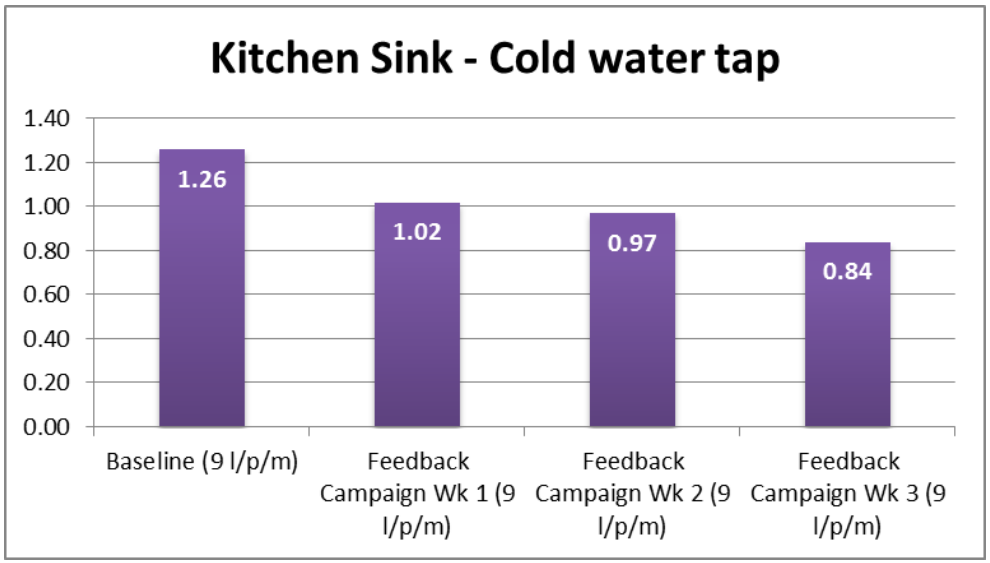




Behavioural Feedback Campaign Findings

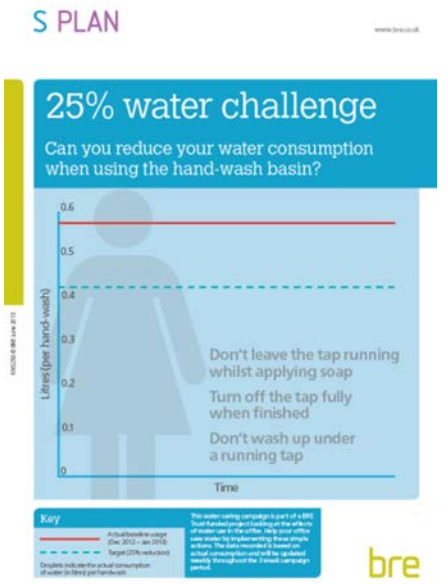






Lessons and discussion points

- Time limitations - not able to monitor the impact of the feedback campaign on behaviour over the longer term
- Week 3 for the male and female toilets both show a slight increase
- Behavioural campaign had a greater impact on consumption than flow regulators-in this situation
- Greatest behavioural change seen in kitchen tap: more opportunities for users to reduce consumption versus hand washing



Focus groups

- 2 staff focus groups to discuss findings
- People had not noticed the changes in flow rate
- Impact of competition element – small changes in behaviours eg turning off the taps but mainly in the kitchen.
- Different methods of hand-washing
- Some stated that if the weather was cold, hot water used to warm hands

Conclusions 1

- Monitoring water consumption to this degree of detail is valuable for research purposes but constraints in cost, time, resource and requires an understanding relationship with FM staff.

- Water efficiency retrofitting requires post-installation analysis, however if low resolution of data is collected (main meter) issues such as variable building occupancy etc need to be taken into account

- Flow regulator valves are not a ‘one size fits all’ solution – depends on context eg location, water pressure

- Assumptions about achievable reductions

Conclusions 2

- In this case, behavioural change was more effective. But, period too short to record long term impact, habit change - also potential bias in building occupants
- There were other hand wash behaviour variables to be taken into account; type of soap, time of day (hot water), outside temperature
- Further research needed eg on flow rates chosen, behaviours, volume of water vs flow rate
- Need both technical and behavioural interventions for maximum impact

Thank you

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