



Socio-cultural Drivers of Water Demand in Student Residential Accommodation: implications for water conservation

C. Staddon, K. Simpson, D. Toher, F. Jeddere-Fisher

Funded by



Led by

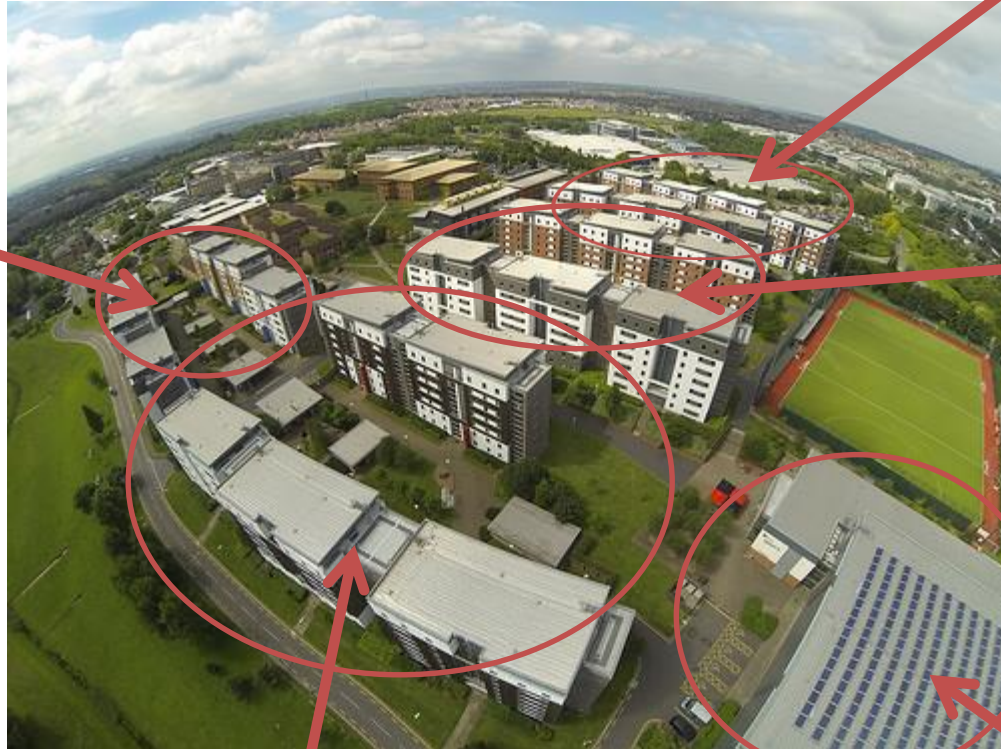


In partnership with





Scale: 1:1220	Date: 18/07/2012	<p>EXISTING</p> <p>MANS </p> <p>RAW WATER </p> <p>SEWER DUCT </p> <p>SPLAYED </p> <p>VALVES </p> <p>FIRE HYDRANT </p>		<p>PROPOSED</p> <p>ABANDONED MANS </p> <p>SPLAYED </p> <p>OTHER</p> <p>CABLE WITH MAIN </p> <p>PRIVATE MAIN </p> <p>METER </p>		<p>SERVICE OBJECTS</p> <p>COMM. PIPE </p> <p>SUPPLY PIPE </p> <p>STOPTAP </p> <p>COMMON COMM. PIPE </p> <p>COMMON SUPPLY PIPE </p>		<p>UWE</p> <p>COORDINATES AT THE CENTRE OF THE PLAN ARE</p> <p>362056 178368</p>	
<p>This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of the Company's pipes or apparatus, not all service pipes are shown.</p> <p>Based on the Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office (c) Crown Copyright reserved Licence number: VVV 230735.</p> <p>Unauthorized reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Bristol Water plc, PO Box 216, Bridgepark Road, Bristol, BS29 7AU Tel: (0117) 965981 Fax: (0117) 963476</p>		<p>N </p>		<p>BRISTOL WATER</p>					



Quantock Court:
468 rooms
(6 blocks)

Brecon Court:
564 rooms
(7 blocks)

Cotswold Court:
500 rooms
(6 blocks)

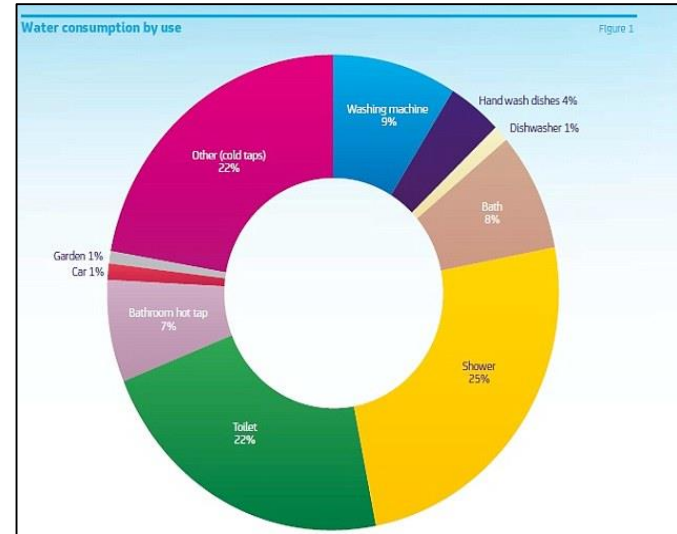
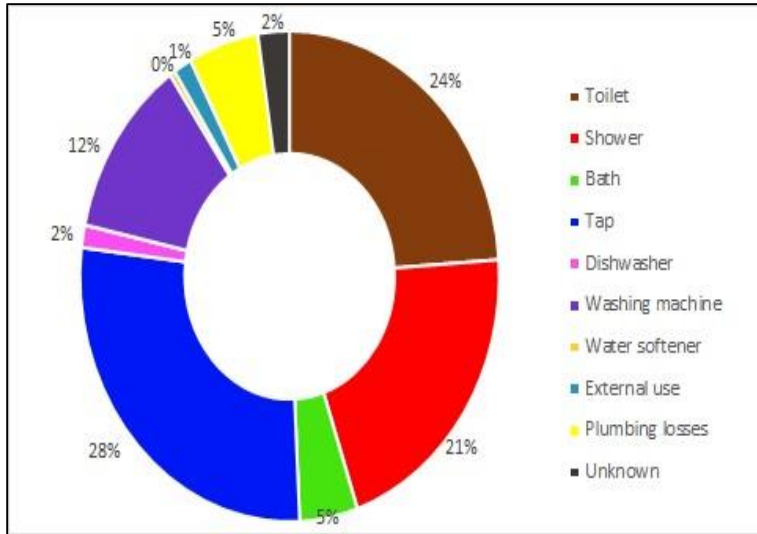
Centre for Sport

Mendip Court:
400 rooms
(5 blocks)

Initial study assumptions/design (2012-13)

- Water company (Bristol Water) interest because of high usage
- 2012 consumption = 188,890 m³
- Students randomly allocated to blocks
- No opt-in bias (common problem with panel-type studies)
- Standardised context controlled for variables e.g. house age/type, outside use
- All WCs fitted with Siamp Optima 50 dual flush valve (3/6 litres per flush)
- Fixed network meter reads every 30 minutes – 24 blocks
- Each block (68-84 rooms) equivalent to a street scale District Metered Area (DMA)
- Audit of flow rates – higher than industry standards
- Excludes laundry

Potential savings



%	UKWIR		EST		Average
WC	24	32	22	27	30
Shower	21	28	25	31	29
Taps + dishwasher	28 + 2	40	33 + 1	42	41
<i>Total</i>	<i>75</i>	<i>100</i>	<i>81</i>	<i>100</i>	<i>100</i>

zero intervention
 24% reduction in flow
 c.60% reduction in basin use, but zero kitchen intervention

What is the split between bathroom and kitchen tap use?

2013-14 interventions

	Interventions 2013-14
Mendip Court	Control
Brecon Court	Hand-basin tap inserts (6 l/min)
Cotswold Court	HB tap inserts & showerheads (5.7 l/min)
Quantock Court	HB tap inserts, showerheads, shower timers and posters

Initial research questions:

1. What is baseline (personal) water use?
2. Are there differences in water use by gender, student origin (UK/EU versus international)?
3. Does involvement in sporting activities increase/decrease showering at home? (proximity of Sport Centre)?
4. Can we identify the difference that different “hard” and “soft” interventions make in water use?
5. Also of interest was the life-span of the fixtures used in the study and associated maintenance issues (became increasingly important!)

In first two annual cycles discovered a number of confounding factors, including....



But also:

- Students NOT allocated randomly, but according to:
 - arrival dates/times
 - degree course (sometimes, esp. Kaplan International College)
 - nationality/gender (for some non-EU nationals)
- Fittings being non-uniformly replaced as part of *Legionella* control
- Large number of internal stakeholders to engage:
 - UWE Estates
 - Facilities Management
 - Accommodation Services
 - Students Union

.....AND several incidences of “exceptional” water use



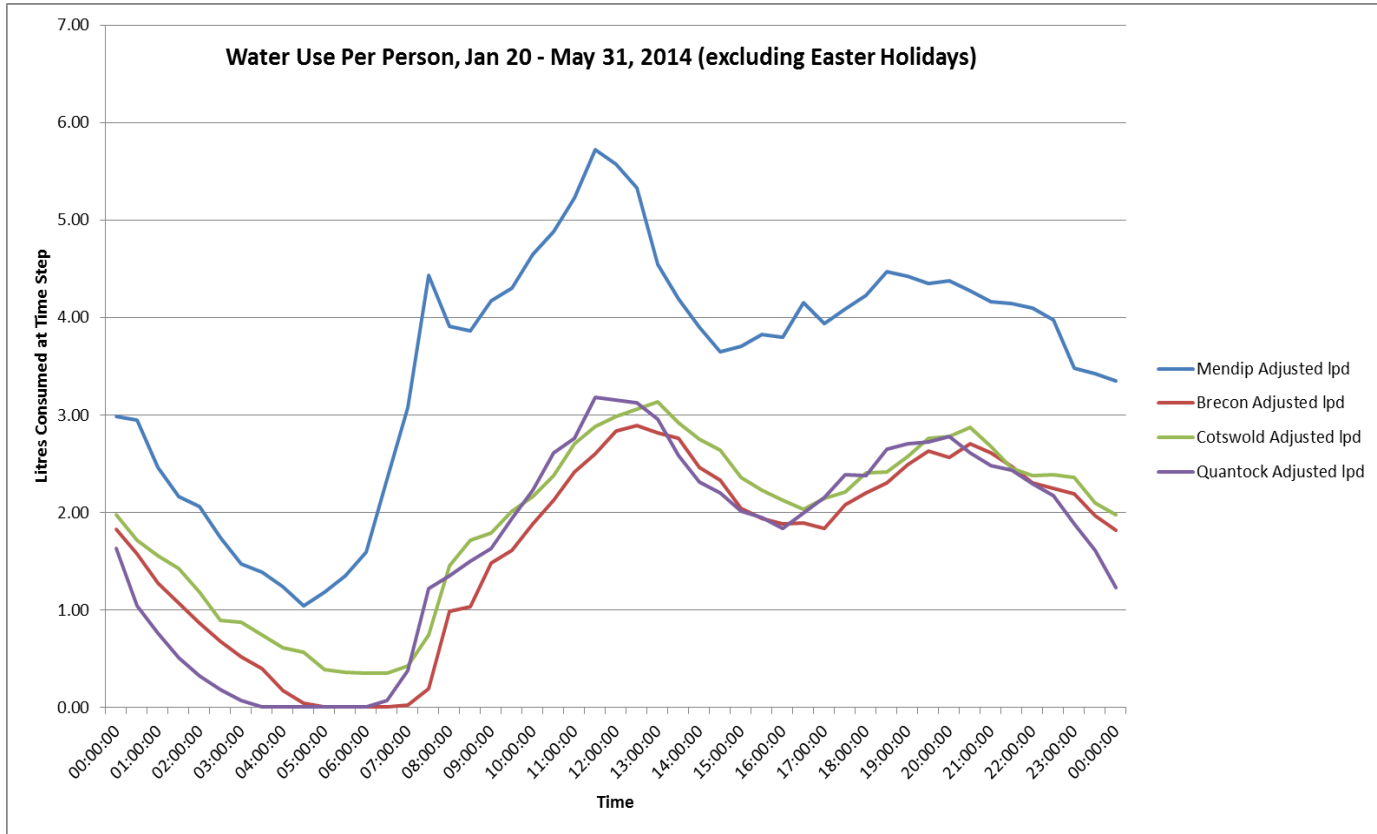
**Fresher throws pool party
in Brecon Court and floods
his bathroom**



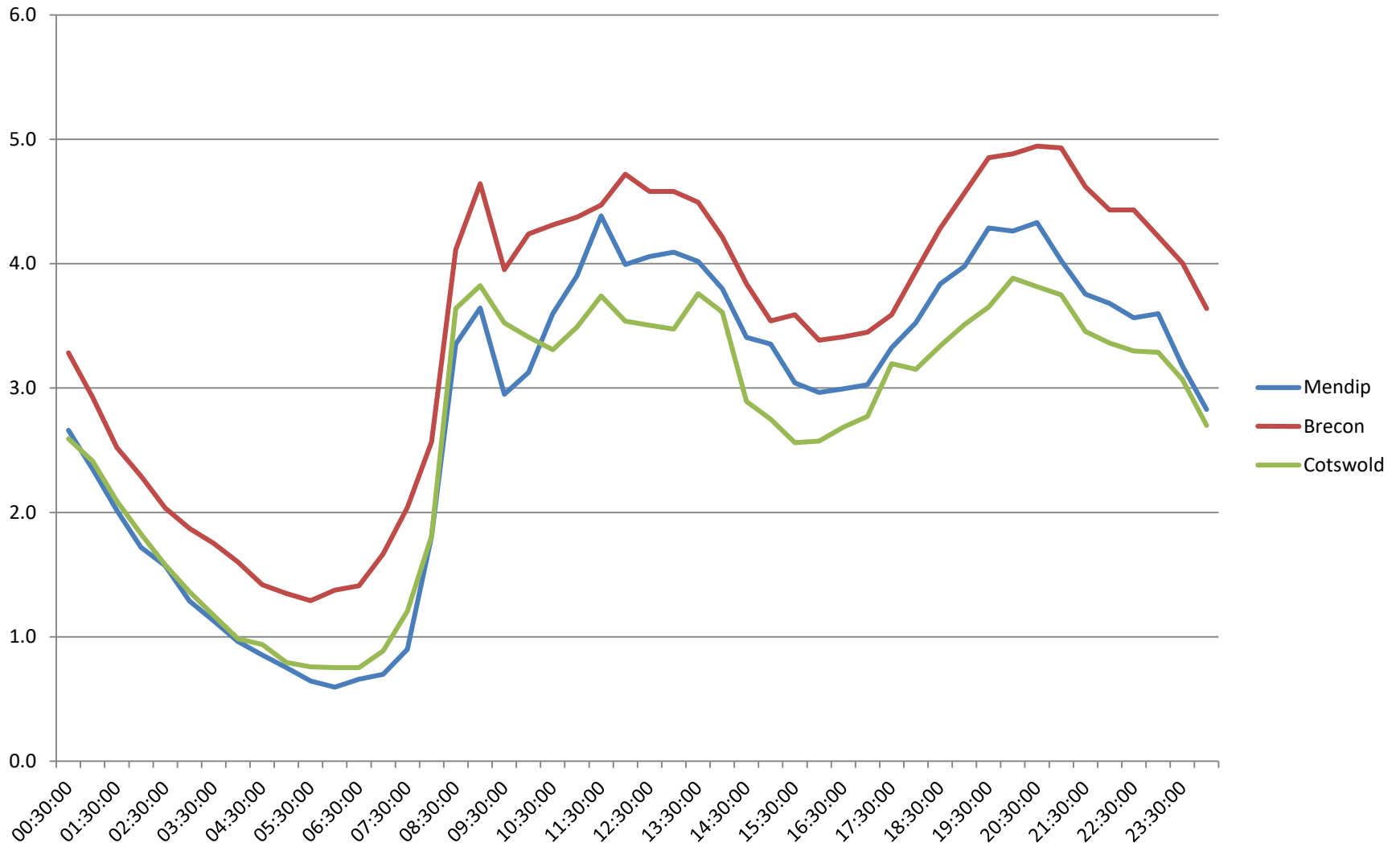
Analysis

- Occupancy patterns:
 - Week-days v. weekends
 - Weekend residence v. (long) weekends away
- Mid-week (Tuesday-Thursday) to ensure a like-for-like comparison
- From weeks 2-11 of term time (omitting first and last weeks – for extended holidays/late arrivals/early departures)
- Exclude reading week/field trip effects

2013-14 – average diurnal flow pattern

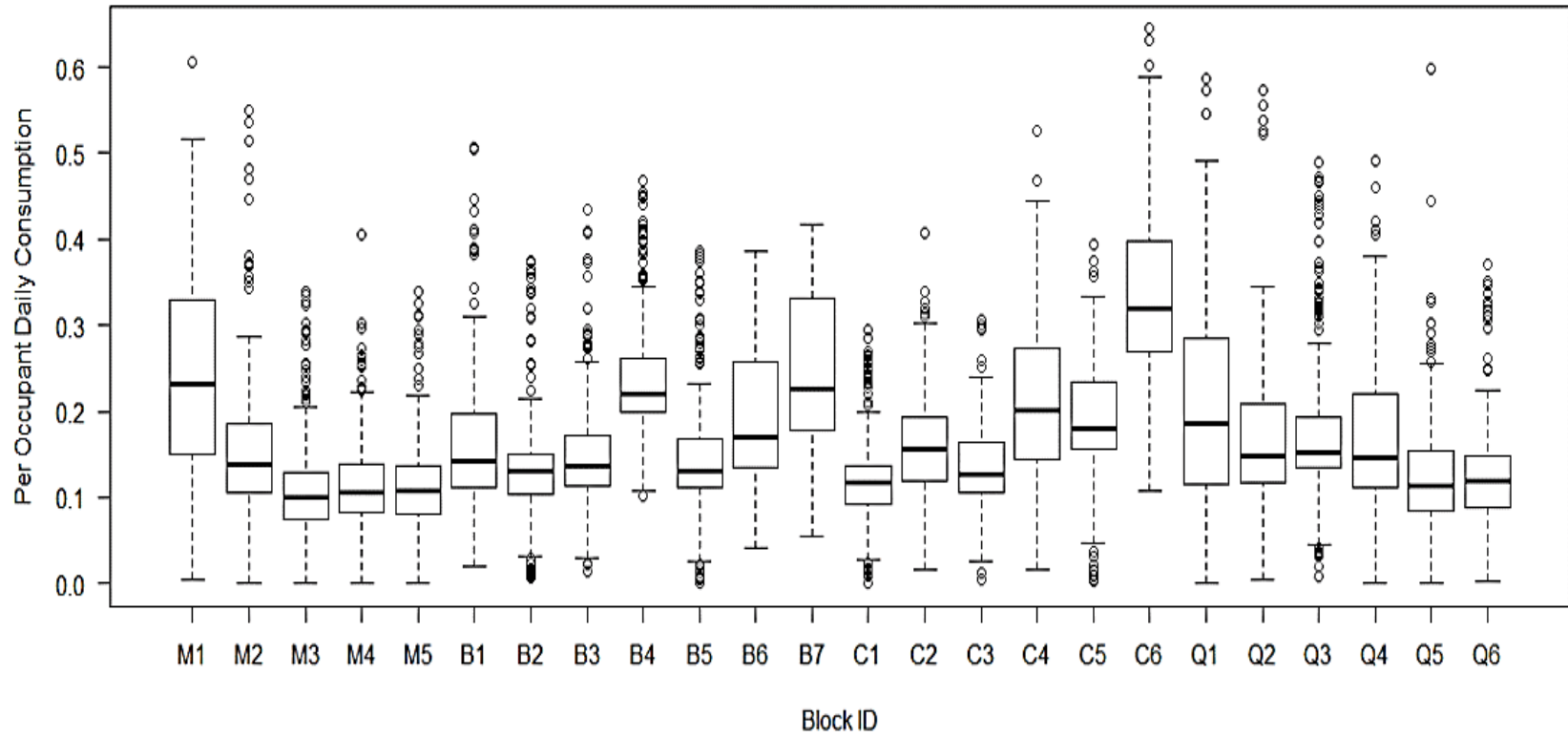


Term time 2015



2014-15 – inter-block variation in per occupant consumption across academic year

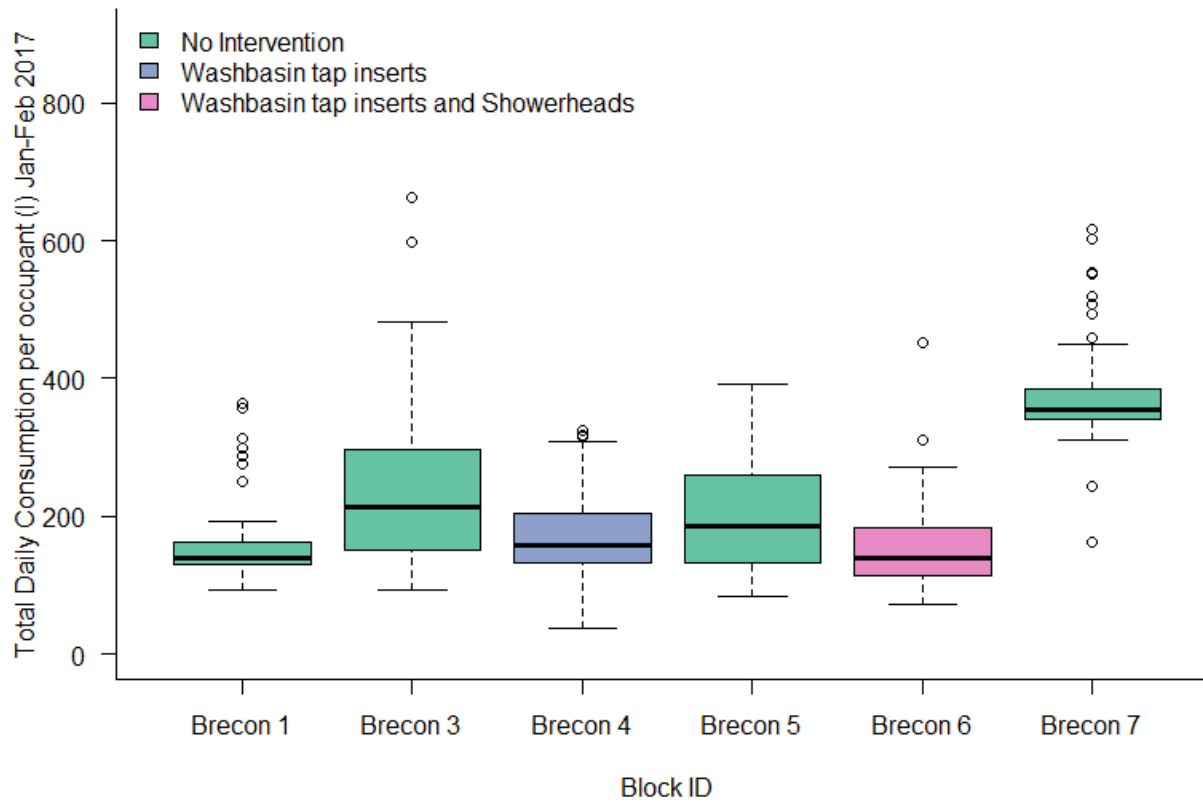
October 2014 - May 2015



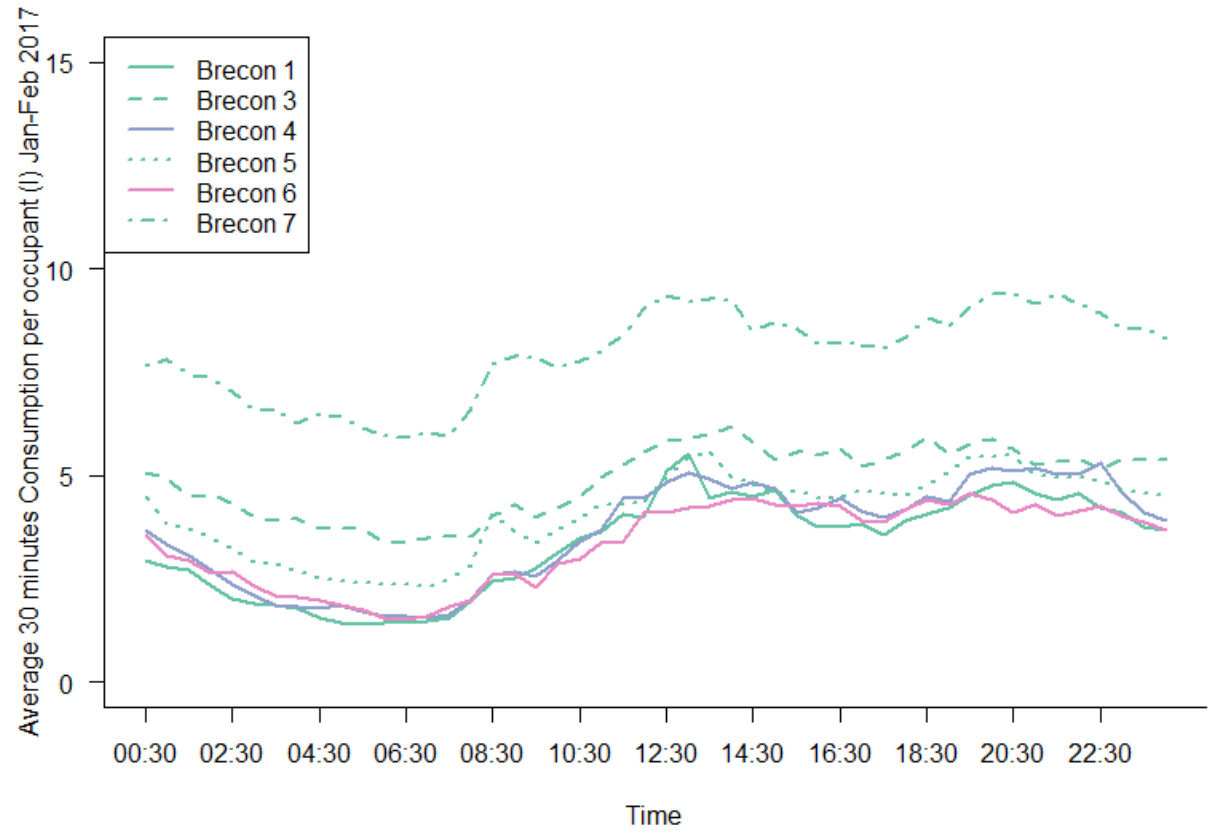
What we learned?

- Huge benefits of the experimental design....but it has taken considerable time to get there.
- Our study has become as interested/involved with facilities management as water behaviour/conservation
- “hard” interventions often easily cancelled out by behaviour modification (e.g. showerheads)
- Demographics are important, in complex interacting ways

Jan-Feb 2017 – preliminary results for Brecon inter-block variation in per occupant consumption



Jan-Feb 2017 – preliminary results for Brecon average diurnal flow pattern



Current and future plans

1. 2016-17: limited number of blocks targeted with 100% fixtures change as follows:
 1. Enigma descalers installed in one blocks
 2. new Neoperl tap inserts in three blocks
 3. audit/standardisation of shower fixtures
 4. messaging and competition (social media 'Reduce the Juice' campaign, Feb 2017 'water sprint')
2. New guidance to Facilities Management/Accommodation Services on regular inspection and rectification and business case for re-fit
3. 2017-18: Wallscourt Park hall (404 rooms) in 37 sub-metered town-houses (10-12 rooms per house), allows for possible
 1. micro-component/shower logging at finer resolution
 2. gamification of data at house-scale
4. Qualitative element to study – to explore behaviours and practices – follow-up RtJ & Brecon courtyard





*This is how your friends
@UWE are saving water*

FOLLOW THE LEAD!

I keep a jug of water in the fridge - no need to run the tap for water to get cold.

- Vicky

I always do a full load of laundry.

- Billy-Jo

I have been showering less frequently and for a shorter time to save water.

- David

Never shower and only drink Monster energy drinks. :D

- Samuel

I save the cold water run before it turns hot when washing up and use it to water my plant.

- Lorna

I turn the tap off when brushing my teeth.

- Amelia

I don't leave the water running while washing dishes.

- Lukas

Use leftover cooking water to water plants.

- Joe

Listen to short songs to time your showers.

- Bethan



www.watersecuritynetwork.org
www.twitter.com/water_network

Acknowledgement

The project is funded by Lloyd's Register Foundation, a charitable foundation helping to protect life and property by supporting engineering-related education, public engagement and the application of research.

For more information, see: www.lrfoundation.org.uk