Yr. 1 Short Report

Enhancing Campus Sustainability: Hot Water Reduction Program

Washing hands in warm or hot water is a common practice in cities worldwide. Despite the scientific evidence showing that hot water does not significantly reduce bacteria, many countries' building regulations require the provision of it on a basis of comfort leading to unnecessary carbon emissions. The misconception that hot water is an essential component in handwashing hygiene and perception that it is a 'social norm' perpetuate this practice. The potential for reduced carbon emissions and energy savings, since cold water usage requires less energy than warm or hot water, point to the need for policy and behavioral change.

Project partners worked together to identify, reduce and eliminate non-essential hot water use across three campuses, King's College London, UK; Dublin City University, Ireland; and Arizona State University, USA with the goal to change outdated and ill-informed regulations that require provisioning of non-essential hot water in public buildings. The original goal of the project was to develop a 'toolkit' of good practices and methods that can be applied to other sustainability issues in a broader societal context.

The 'campus as a living laboratory' approach was utilized in the three pilot campuses. Each selected 3-4 buildings to test the removal of hot water from wash basins in bathrooms and engaged different building users (including faculty, staff and students) and operations and facilities management to offer information, test, and trial the interventions. Each location performed energy use assessments of the trialed buildings as well as qualitative assessments of people's attitudes and perceptions of handwashing, and of the project objectives. Engineering solutions were identified ensuring that risks to health and safety were comprehensively addressed; the challenge to regulations was around user comfort. These evaluations helped to identify and mitigate the key concerns and potential barriers to carrying out the project, thereby informing the development of communications and engagement strategies to better gain support for the experiments and ultimately, long-term removal.

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In this first year, the project successfully developed and tested tools and methodologies to better understand carbon savings and behavior change needs associated with removing nonessential hot water. The experiences and insights from the pilot locations provided some qualitative and quantitative evidence and feasibility assessment of the removal within the campus setting – this evidence is crucial to achieve scalability, i.e., changing policy in the public sector. The approach requires a change in attitude to a removal or change to a level of service or provision. The level of information provision certainly increased the understanding and acceptability of the pilot and the pilot tested the levels of engagement. The initial testing of minimal engagement

created significant issues with the users and full communications was adopted as soon as issues were starting to be raised.

The project requires continued testing and engagement with the policy/regulators to deliver hard evidence supporting policy change delivering an estimated 3-5% carbon reduction in buildings. This includes greater monitoring and verification efforts to: verify that levels of hygiene have been maintained or even improved; provide a tested and reviewed definition of 'essential hot water'; and, monitor changes in perception to the sustainability intervention before, during and at the end of project through follow-up questionnaires and interviews.

The following are reflections and insights on the project process and outcomes from year one:

- **Turning off the hot water required significant retrofitting of point-of-use water heaters in essential locations.** This required substantial investment from the Estates team.
- **Full engagement was required across all buildings.** The initial behavioral engagement strategy of three levels, from minimal to full engagement, was identified as unacceptable at an early stage.
- **Supporting research was constantly challenged**. The impact of hot/cold water published by the WHO and other leading publications was constantly challenged requiring Phase 2 to identify hygiene swab testing to demonstrate no decrease in hygiene.
- **A clear definition of 'essential' hot water and a replicable method of assessment.**
- **Testing whilst complying remains a challenge**. This refers to testing and evidence provision to support a change in legislation whilst still complying with the current regulations.
- **Work to be done/information required to drive a policy change:**
    - Carbon and cost monitoring and measurement including savings on legionella testing and other health risks for both retrofits and new construction.
    - Provide evidence that there is no decrease to hygiene levels from people washing hands less due to cold.
    - Demonstrate no significant decrease in building user comfort (there are no guidelines for this).
    - Obtain evidence to define hot, cold and warm water more accurately.
    - Defining what 'minimum provision' is for essential use.

Signage placed in the bathrooms of tested buildings at ASU

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