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Research Briefing

Go With The Flow: Making Rainwater Harvesting Mainstream

Accelerating the development of the urban RWH industry in the UK

By Dr Sarah Ward and Professor David Butler

Rainwater harvesting (RWH) can become a mainstream sustainable water technology capable of meeting some of the challenges posed by rising water demand, flooding and climate change — but only if the construction and water industries take a more innovative approach to implementation, a study says.

Research by the University of Exeter's Centre for Water Systems (CWS) has identified key findings and recommendations that could break down some of the social and technical barriers inhibiting development of urban RWH systems in the UK.

Interviews with small and medium enterprises (SMEs) and surveys of householders revealed a clear willingness to adopt the use of RWH. However, businesses were deterred by a lack of information on how to implement the technology and a limited knowledge of available financial incentives. For householders, the primary concerns were perceived health risks, maintenance and installation costs.

The findings also challenge concerns raised by an Environment Agency (EA) report that the amount of energy consumed by RWH pumping systems dents the technology's green credentials.

Using the University of Exeter's Innovation Centre as a case study, academics devised a more accurate method to calculate the energy consumed by a pump employed in an office building's RWH system.

They found the proportion of the Innovation Centre's electricity consumption attributable to RWH was less than 0.1 per cent. They concluded that new, pump-free RWH solutions that can be easily retrofitted could offset concerns over the energy consumption of domestic RWH systems.

The water saving efficiency of the Innovation Centre's RWH system was 97% during winter and spring, the study revealed.

A quantitative health impact assessment also found that flushing a WC with a RWH system posed less of a danger to health than the possibility of being struck by lightning. Raising public awareness is required to dispel the myth that RWH poses a health risk, it said.

It also found RWH provides a significant proportion of an office's WC flushing water requirement, indicating that RWH should be promoted more widely to SMEs.

Key findings

- Industry innovation could overcome some of the barriers to the widespread adoption of RWH in the UK.
- Awareness needs to be raised that RWH does not pose health risks and requires minimal energy consumption for an office building system.
- New pump-free solutions can offset many concerns about energy consumption for domestic RWH systems.
- Developers would benefit from increased publicity of the use of communal RWH systems in new developments.
- More flexible and readily retrofittable RWH system designs are better suited to the UK.

Research showed that the presence of RWH systems in housing or office developments is not being widely publicised by organisations responsible for the developments. This is a missed opportunity for increasing social receptivity to the use of communal and combined-use RWH systems in new developments, academics said.

Innovation in RWH system design is crucial to reduce reliance on pumping mechanisms, simplify maintenance requirements and increase the suitability of RWH for space-scarce urban areas, the study authors said.

In contrast to conventional systems, where water is pumped below or above ground, the increased use of the 'plastic bag' storage tank in Japan and the development of gutter-based systems in Australia highlight the need for RWH systems to be more flexible and readily retrofittable, they said.

Researchers also encountered calls from SMEs for a 'buddy database' — a list of businesses with a RWH system that companies could approach for feedback on efficiency savings and how it operates.

The study concluded that SMEs and developers would benefit from greater transparency of the application process for the Enhanced Capital Allowances scheme – a scheme that offers businesses tax relief on water-saving investments – to encourage retrofit solutions for RWH systems.

Comments and implications

Dr Sarah Ward, an associate research fellow at the Centre for Water Systems, said: "The rainwater harvesting industry in the UK is beginning to demonstrate similar features to RWH in market leading countries such as Germany, Australia and Japan.

"But action is required across the building and water industries if RWH is to make the transition from a novel to a mainstream technology. Despite a willingness by SMEs and householders to consider RWH, it is still regarded as aspirational and difficult to implement.

"And recognition of on-the-ground issues restricting widespread sustainable water management, such as low user confidence due to a lack of expertise in RWH installations, is limited."

She commented that those countries in which RWH has been successful have set up an integrated national water programme, which included direct government support for RWH projects.

She said: "The UK has a range of water policies but there is a lack of integration and clarity on how they relate to RWH. Crucially, RWH is not being embedded in initiatives that focus on how the building and water industries can adapt to the effects of climate change."

Professor David Butler, Director of CWS, added: "Emphasis needs to be placed on the development of innovative RWH system products. About five years ago the chairman of the Environment Agency made a call to British industry to develop products that could assist with floodwater management.

"A similar, equally urgent call needs to be made for RWH to help increase the adaptivity and resilience of water supply infrastructure in the face of climate change."

About the University of Exeter's Centre for Water Systems

The Centre for Water Systems' research activities address a need to support, develop and implement sustainable water management systems for the future benefit of society and the economy.

The Centre, which was established in 1998, brings together more than 25 researchers from civil, environmental and computational engineering, making it the largest UK group in its field and one of the largest worldwide.

It is a key player in many large projects funded by the Engineering and Physical Sciences Research Council and has been particularly successful under the Sustainable Urban Environment programme.

www.exeter.ac.uk/cws

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