UK Energy Research Centre

Watt-er Conservation:
Conversations on Energy Use in Water Services

Working paper

Hannah Mottram, University of Sheffield

March 2024

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About Energy SHINES

This paper is an output from Energy SHINES (Energy Social sciences and Humanities Insights for Non-Energy Sectors) – a project delivered through UKERC's Whole Systems Networking Fund.

Energy SHINES was set up to facilitate partnerships between women Early Career Researchers from energy social science and humanities backgrounds and organisations in key non-energy sectors undertaking work towards net zero.

Access all publications produced from the project here.

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1. Executive summary

As the UK's population continues to grow and urbanise, coupled with changing consumption patterns, the demand for water has escalated, placing a greater strain on energy requirements within the water sector. Water provision is an energy-intensive process, with energy being needed for various processes, including water abstraction, clean-water treatment, pumping, distribution and wastewater treatment. This energy use contributes to carbon emissions, environmental degradation and increased financial costs.

This brief uses insights from social sciences literature to provide recommendations for how water companies can encourage water conservation, with a focus on incorporating messaging about energy use. Water companies can proactively address energy-related topics to empower their customers to make informed decisions, promote energy-conscious behaviours, and contribute to a more sustainable future.

This work is part of a larger project – Energy SHINES (Energy Social sciences and Humanities Insights for Non-Energy Sectors), funded by the UK Energy Research Centre. The project aims to use insights from the social sciences and humanities to help solve energy challenges in other sectors. Other briefs have looked at challenges in building, housing, local government, product safety, waste and digital health.

Interviews were completed with staff across Yorkshire Water, alongside two education visits and an analysis of Yorkshire Water's social media and online resources. I also reviewed public reports and researched approaches used by Scottish Water and Anglian Water. This has been reviewed in the context of social sciences literature on water and energy, as well as broader ideas such as practice theory.

The discussion of energy use in the context of water services holds relevance for customers on multiple levels. Understanding the energy-intensive processes involved in water abstraction, treatment and distribution allows customers to comprehend the broader environmental impact of their water consumption. By recognising the energy footprint associated with their water usage, customers can develop a sense of responsibility towards reducing their energy consumption.

Key recommendations

- Strengthen connections between individuals and resources, such as by encouraging site visits and incorporating messaging about energy use.
- Build public trust through collaboration with other organisations, and address trust issues through community engagement.
- Consider interconnected aspects (nexus-thinking), such as waste-water-food in the home at both local and national levels. This requires support at the Government level.

- Apply practice theory by doing work to understand households' material context and social norms.
- Increase co-production of research to enable the transfer of insights into practice.

Water companies have a unique opportunity to promote sustainability and empower their customers by discussing energy use in the context of water services. By fostering awareness, providing practical guidance, and emphasising the shared responsibility for environmental stewardship, water companies can contribute to a more energy-conscious society. Through effective communication strategies, these conversations can inspire positive behavioural changes, cost savings and a collective effort towards a greener and more sustainable future.

2. UK context

The water sector uses around 3% of the total energy in the UK (Office for National Statistics, 2023). For example, Scottish Water is one of Scotland's largest single electricity users (Scottish Water, 2023)[1]. There is a misconception in the UK that because it is a rainy country, we do not have an issue with water scarcity. However, it is a costly and energy-intensive process to treat water and pump it around the country. The distribution of water sources does not always align with areas of higher population density and water demand; changes in weather patterns due to climate change could exacerbate water vulnerabilities.

The water sector's energy requirements are important, but often complex to measure, and inconsistently presented (Kenway et al., 2019). Up to 12.6% of national primary energy use can be influenced by water when both energy use by water utilities and water-related energy use of customers are taken into account. However, water for heating is the dominant factor in this. Water utilities (both clean water and wastewater) use 0.6-2.3% of primary energy or 0.6-6.2% of regional electricity (Kenway et al., 2019). This energy is mainly for water pumping, as well as water treatment and business use (such as lighting and running computer systems).

2.1 The role of energy use in behaviour change

Linking water usage to energy use can provide an additional incentive for behaviour change. By highlighting the energy-intensive processes involved in water extraction, treatment and distribution, water companies can emphasise the environmental impact and cost implications of high water consumption.

Environmental Impact: Demonstrating the relationship between water usage and energy consumption can help customers understand that reducing water waste directly translates into reduced energy consumption and greenhouse gas emissions. By conserving water, customers contribute to mitigating climate change and preserving natural resources.

Cost Savings: Connecting energy use to water consumption can highlight the financial benefits of reducing water usage. By using less water, customers save on their water bills and indirectly lower their energy bills, especially those related to water heating.

Behavioural Triggers: Framing water-saving messages regarding energy can tap into customers' concerns about energy conservation and environmental stewardship. By linking the two concepts, water companies can leverage the motivation and behaviour change strategies already employed in energy conservation campaigns.

By integrating discussions about energy use into their communication and education efforts, water companies can enhance customer understanding, motivation and engagement, leading to more sustainable water usage behaviours and reduced energy consumption in the water sector.

Various factors influence household water use, so it is difficult to identify the impact of behaviour change activities. This is hindered further as many homes do not have water meters, so water use is aggregated. The success of campaigns is often measured by customer sample surveys, using metrics such as the recall rate of the campaign and customer perception of whether they have changed their behaviour.

2.2 Challenges for encouraging water conservation

While integrating social sciences and emphasising energy awareness in water conservation efforts can be effective, there are certain limitations to consider:

Lack of trust: Trust in water companies is generally low, particularly due to an increase in incidents of sewage overflow alongside private sector profits and CEO salaries. This limits how the public will engage with water companies and their messaging. Research from South Korea suggests that having clear net zero policies, which would involve energy, positively impacts both trust and reciprocity (referring to a feeling of receiving benefits from other actors' efforts) (Lee, 2023).

Cultural and Contextual Variations: Strategies that work well in one cultural or regional context may not be as effective in others. Cultural norms, values and social practices surrounding water and energy can differ significantly. Therefore, water companies must carefully adapt their messaging and approaches to account for cultural and contextual variations, ensuring they resonate with the target audience.

Limited Behaviour Change: Encouraging customers to change their behaviours and adopt energy-conscious water practices can be challenging. Even with effective communication strategies, individuals may resist change due to habit persistence, lack of awareness, or other barriers. Overcoming resistance and driving sustained behaviour change requires long-term engagement, continuous reinforcement and the addressing of underlying barriers.

Data Privacy Concerns: Water companies may need to collect and analyse customer data to provide personalised recommendations and track customer water usage. However, privacy concerns can arise, especially when data collection and analysis involve sensitive information. Water companies must prioritise data privacy and establish transparent policies to maintain customer trust.

Resource Constraints: Implementing multidimensional communication strategies that integrate social sciences requires resources, including financial, technological and human capital. Some water companies may face limitations in terms of budget, expertise, or available technologies, which can impact the depth and effectiveness of

their initiatives. Ofwat's approach to spending limits this, as it can be difficult to quantify the benefits of social approaches to water reduction.

Varying Levels of Customer Engagement: Customer engagement levels can vary widely. While some customers may actively participate in conservation efforts and embrace energy-conscious practices, others may be less receptive or disengaged. Water companies must address the diverse needs and motivations of their customer base to ensure maximum participation and impact.

Intersectionality and Inclusivity Challenges: Ensuring inclusivity in messaging and addressing different groups' unique challenges may require ongoing research, consultation and collaboration with diverse stakeholders.

External Factors and Policy Influence: The success of water conservation efforts is also influenced by external factors, such as government policies, infrastructure limitations and economic considerations. Water companies may face constraints in implementing strategies if they are not supported by appropriate policies or infrastructure.

3. Insights from academic literature

3.1 Practice theory

One approach from the literature is to use practice theory, which draws on interpretive and relational understandings (Watson et al., 2020). A key aspect is understanding the material situation of households, which will limit how they can change their actions. Many companies are already using this approach by targeting specific everyday activities, such as providing shower timers and information on the energy cost of showers. However, there is scope for more work on the role of how social norms affect practices and the importance of community engagement. Watson et al. (2020) suggest that co-production of research between policy professionals, academics and other actors could help translate insights into practice.

3.2 Feminist perspectives

Water companies should incorporate feminist perspectives to ensure inclusive energy messaging considering diverse gender identities and experiences (Schwartz et al., 2018). An important issue to consider here is who is expected to take on additional labour associated with water conservation, such as changes in practices around childcare, laundry and cooking. By addressing gender inequalities in water-related tasks and decision-making processes, companies can empower all individuals to participate in energy-conscious water practices(Tong et al., 2017). Inclusive messaging acknowledges different groups' varying needs and circumstances, fostering an environment that encourages everyone to contribute to sustainable water consumption.

3.3 Collaborative approaches

Sharp et al. (2015) found that a technology-focused approach and a narrow framing of households can limit the impact of water reduction interventions. They suggest that greater involvement and collaboration across actors could improve outcomes, highlighting issues with geographical mismatches and siloed funding sources. Improving this would involve Yorkshire Water working closer with partners such as local councils, and advocating with Ofcom for funding for cross-organisational projects.

3.4 Nexus approaches

Foden et al. (2018) introduce the idea of the nexus-at-home, which brings together water, food and energy. Focusing on the issue of fats, oils and grease, they reflect

on how daily life, household dynamics, cultural conventions and infrastructures influence these practices. They suggest that rethinking this as a nexus issue and understanding lived experiences could lead to changes in behaviour. Water is so easily obtained in the UK that it could be viewed as ‘invisible’. This links with the previous paragraph on enhancing collaboration, particularly around understanding the home practices which lead to people disposing of fats, oils and grease into the sink.

3.5 Reconnecting with water

Sharp (2017) suggests that connecting people more closely with water is needed for more sustainable water management. The current customer-company relationship means that households expect a service, but may not perceive that they have a responsibility. Sharp proposed several ways people could reconnect, from involvement in water management to creating connections with water sources. Feminist approaches also suggest a more caring approach to water management with equal power structures would improve sustainability, rather than masculine approaches focusing on profit and technology. Improving peoples’ relationships could influence water use, wastewater practices and interactions with drainage systems.

4. Conclusions and recommendations

In conclusion, integrating messaging about water and energy presents a promising avenue for encouraging conservation efforts in both areas. Yorkshire Water has already taken strides in this direction, with departments like the Community Engagement team employing integrated messaging strategies. Yorkshire Water can extend this messaging to reach customers through billing statements and educational resources to amplify the impact further.

Addressing the issue of public trust in water companies is crucial for fostering a successful partnership with customers. Collaborating with other organisations can help mitigate these concerns and build confidence among the public. Furthermore, emphasising shared responsibility and collaboration can contribute to rebuilding trust. By actively involving customers in the conversation and demonstrating a commitment to environmental stewardship, Yorkshire Water can pave the way for a more sustainable future and nurture a positive relationship with its customer base.

The lessons from communicating about energy in water use can be valuable for other sectors like waste, health, construction and local government.

Practice Theory and Social Norms: Understanding the material context and social norms influencing behaviour is crucial in promoting sustainable practices. This approach can be applied to other sectors as well. For example, waste management initiatives can target specific everyday activities, such as providing recycling bins and composting facilities, while considering social norms and community engagement to encourage behaviour change.

Inclusive Messaging: Incorporating feminist perspectives and considering diverse gender identities and experiences in messaging can foster inclusivity and encourage broader participation in sustainable practices.

Collaborative Approaches: Adopting a technology-focused approach or narrowly focusing on specific aspects of a problem may limit the impact of interventions. Greater involvement and collaboration across different actors can lead to more effective outcomes. Other sectors can benefit from working together with relevant stakeholders to address complex issues and secure funding for cross-organisational projects.

Nexus Thinking: The idea of the nexus-at-home, which brings together interconnected aspects such as water, food and energy, can be relevant to various sectors. For instance, waste management initiatives can consider the interactions between food disposal and water use, while health campaigns can explore the connections between water access and public health.

Reconnecting People with Resources: Creating stronger connections between individuals and the resources they use can enhance sustainable practices. This could be applied in waste management by encouraging people to visit recycling centres or to see where their waste ends up.

Building Public Trust: Trust is essential for successful partnerships and engagement with customers or the public. Collaborating with other organisations and emphasising shared responsibility can help address trust issues in various sectors, such as local councils collaborating with community groups to develop and implement sustainable initiatives.

Integrated Messaging: Integrating messaging about related aspects (e.g. water and energy) can encourage conservation efforts and increase awareness of interconnected challenges. Other sectors can benefit from incorporating integrated messaging strategies to promote sustainable practices among their target audiences.

5. Acknowledgements

I am grateful to everyone at Yorkshire Water who gave their time to this project, in particular Ian Buckle and the education team. Thanks to contacts at Scottish Water, the Energy Saving Trust and the University of Sheffield for providing wider insights into these issues. I was supported by Aled Jones at Anglia Ruskin University, as well as the wider Energy SHINES team and my colleagues on other placements. This placement was through UKERC's Whole Systems Networking Fund.

6. References

Foden, Browne, Evans, Sharp, & Watson. (2018). *The water-energy-food nexus at home: new opportunities for policy interventions in household sustainability*. https://doi.org/10.1111/geoj.12257

Kenway, S. J., Lam, K. L., Stokes-Draut, J., Sanders, K. T., Binks, A. N., Bors, J., Head, B., Olsson, G., & McMahon, J. E. (2019). Defining water-related energy for global comparison, clearer communication, and sharper policy. *Journal of Cleaner Production*, *236*. https://doi.org/10.1016/J.JCLEPRO.2019.06.333

Lee, H. J. (2023). How do companies' net zero efforts affect consumer product evaluation through reciprocity and trust? A study in Korea. *Sustainable Production and Consumption*, *38*, 149–158. https://doi.org/10.1016/J.SPC.2023.03.021

Office for National Statistics. (2023). *Energy use: by industry, source and fuel - Office for National Statistics*. https://www.ons.gov.uk/economy/environmentalaccounts/datasets/ukenvironmentalaccountsenergyusebyindustrysourceandfuel

Schwartz, K., Gupta, J., & Tutusaus, M. (2018). Editorial - Inclusive development and urban water services. *Habitat International*, *73*, 96–100. https://doi.org/10.1016/J.HABITATINT.2018.02.006

Scottish Water. (2023). *Energy*. https://www.scottishwater.co.uk/about-us/energy-and-sustainability/energy

Sharp, L. (2017). *Reconnecting People and Water : Public Engagement and Sustainable Urban Water Management*. Routledge. https://www.routledge.com/Reconnecting-People-and-Water-Public-Engagement-and-Sustainable-Urban-Water/Sharp/p/book/9780415728454

Sharp, L., Macrorie, R., & Turner, A. (2015). Resource efficiency and the imagined public: Insights from cultural theory. *Global Environmental Change*, *34*, 196–206. https://doi.org/10.1016/J.GLOENVCHA.2015.07.001

Tong, Y., Fan, L., & Niu, H. (2017). Water conservation awareness and practices in households receiving improved water supply: A gender-based analysis. *Journal of Cleaner Production*, *C*(141), 947–955. https://doi.org/10.1016/J.JCLEPRO.2016.09.169

Watson, M., Browne, A., Evans, D., Foden, M., Hoolohan, C., & Sharp, L. (2020). Challenges and opportunities for re-framing resource use policy with practice theories: The change points approach. *Global Environmental Change*, *62*, 102072. https://doi.org/10.1016/J.GLOENVCHA.2020.102072