This post draws on two recently published articles (here and here) by an international group of collaborators: Christian Binz, Sasha Harris-Lovett, Bernhard Truffer, David Sedlak, and myself, courtesy of the ReNUWIt program.

Potable water reuse is increasingly seen as a potential way to help ease urban water supply challenges. Potable reuse is as it sounds – recycling wastewater to augment drinking water supplies. There are many reasons why potable water reuse makes sense in water scarce regions, but like other emerging technologies, moving from theory to implementation has proven challenging in some cases.

Potable reuse has characteristics that should make it desirable as an addition to some urban water portfolios. Treatment technologies can purify wastewater to meet current water quality standards, and since wastewater is always available for treatment, potable reuse can complement other means of offsetting increasing water demands. At the same time, recycled water is itself more reliable than other sources such as imported surface water – as long as urban households and industries continue to use large quantities of water, wastewater will be available for reuse. Further, developing local sources can be less energy and greenhouse gas intensive in some areas than importing water from afar.

Cartoon: Cathy Wilcox (HT green-mom.com)

But as with many unfamiliar new technologies – or possibly even more so – actually putting potable reuse projects in place can be quite challenging. Despite the benefits, there is the

obvious challenge of the “yuck factor” associated with reusing wastewater. Local public opposition to potable reuse has in the past invoked derogatory descriptions of these programs. Highly effective efforts to oppose potable reuse have succeeded in negatively branding the practice. “Toilet to tap” or other monikers more easily enter the public consciousness than do, for instance, technical descriptions of the actual purity of the newly treated water. This reticence exists despite the fact that the majority of urban systems are downstream of other wastewater treatment plants, and thus most of us are indirectly drinking some recycled water already.

Since California is among very few regions worldwide where potable reuse is becoming common practice, our team used it as a case study of the challenges of innovation in urban water. Specifically, we asked – what have California water utilities (and other interest groups) done to effectively implement potable reuse, where have utilities been unsuccessful in efforts to implement it, and what did they do differently in each of these cases?

Focus: Legitimacy

We used qualitative methods to assess why some potable reuse projects were successfully implemented while others faced fierce public opposition. We focused on the sociological concept of legitimacy. Societal legitimacy is the generalized perception or assumption that a technology is desirable or appropriate within its social context. A simple barometer for the legitimacy of a particular technology or idea is its “taken-for-grantedness,” which reflects broad acceptance and lack of controversy. We applied the legitimacy concept to our observations, and detailed nine elements of legitimacy as they apply to successful adoption of potable reuse. Please contact me for copies of the two articles that explore these ideas in more detail.

What did we find? That there are many dimensions to legitimacy of new technology.

Result: Beyond Consumer Acceptance

Much of the previous work looking at potable reuse has focused on consumer acceptance, evaluating how utilities can put together effective marketing campaigns and public engagement programs. Our results show that successful efforts to implement potable reuse have used a suite of methods – this suggests that marketing is necessary, but by no means sufficient, to develop the base of support and legitimacy needed to enable potable reuse projects.

Proponents of a legitimated potable water reuse project in Orange County, California

engaged in a portfolio of strategies that addressed three main dimensions of legitimacy, termed pragmatic, moral and cognitive legitimacy in our framework. For example, Orange County Water District (OCWD) engaged in targeted outreach and education campaigns, but they also developed emergency intervention and quality monitoring plans, framed potable reuse as recycling and groundwater protection, and had their management personally involved in engagement with the community, among other things.

In contrast, other proposed projects that faced extensive public opposition relied on a smaller set of legitimation strategies that focused near-exclusively on the development of robust water treatment technology.

Conclusions

In the end, 'acceptance' of radically new technologies has to be understood based on a complex process of social legitimacy and not – as is often assumed – as a direct outcome of education and information campaigns that only target pragmatic dimensions of legitimacy.

Source: Binz et al. 2015

Widespread legitimation of potable water reuse projects, including direct potable water reuse, may require the establishment of a portfolio of standards, procedures, and possibly new institutions. As with everything in California water, droughts have played a role in moving the ball forward by focusing political attention and creating a sense of urgency – the timeline of how potable reuse has developed in California illustrates this.

As California and other areas move in the direction of formalizing state policy support for potable reuse, an awareness of the need for more robust ways to generate legitimacy will be important, if only to counter the NIMBY-ism that can derail new technologies.

Public acceptance aside, the primary importance and primary benefit of legitimation is that through developing legitimacy technology can match up with society's values, norms, and expectations. Ultimately, institutional frameworks and increased transparency required to legitimate technology may themselves contribute to protecting public health.

References

Binz, C., S. Harris-Lovett, M. Kiparsky, D. L. Sedlak and B. Truffer (2016). "The thorny road to technology legitimation—Institutional work for potable water reuse in California." Technological Forecasting and Social Change **103**: 249-263. Contact me for a copy if you

are not able to access the article.

Harris-Lovett, S. R., C. Binz, D. L. Sedlak, M. Kiparsky and B. Truffer (2015). "Beyond user acceptance: a legitimacy framework for potable water reuse in California." Environmental Science & Technology **49**(13): 7552-7561. Contact me for a copy if you are not able to access the article.