

## Executive Summary

Infrastructure degradation is a chronic problem for fats, oils, and grease (FOG) pretreatment programs at wastewater utilities, which can lead to harmful bypass and high loss of a renewable energy feedstock. Additionally, infrastructure compliance rates are a challenge from a management perspective, with an estimated 30% compliance rate nationwide (Environmental Protection Agency, 2017). When a device begins to degrade, it often does not cause a sudden problem; rather it is a chronic problem that builds up over time. Prematurely identifying degrading infrastructure and possible FOG bypass has long-term benefits for the utility, the sewer infrastructure, and the restaurant. Many attempts to address these problems focus on a top-down, engineering-focused approach that continuously has limited the interventions because they do not incorporate concepts of equity, future-thinking, and social context (Kibert, 2007). This project fills an important gap in the sustainable development literature by providing a concrete example where hard and soft infrastructure can be combined to achieve community sustainability, infrastructure compliance, institutional resilience, and business equity.

Throughout this project, there have been major gaps identified in the infrastructure management of FOG pretreatment programs at the City of Tempe. Previously the TGC has utilized the traditional enforcement model to address infrastructure issues, but this strategy lacked a critical, holistic, systems thinking perspective, which contradicted the sustainability-focus of the business advocacy and regulatory partnership model that is foundational to the TGC's success. Through the desired future-state vision of the City of Tempe, it quickly became clear that a sustainable approach to infrastructure management was necessary to achieve these long-term goals. The method to achieve these strategic goals was to identify an intervention point at the intersection of infrastructure compliance, restaurant equity and advocacy, and resource recovery.

The gaps identified in the City of Tempe FOG Pretreatment Program were (1) inequity between TGC members and non-TGC restaurants when replacing or repairing FOG infrastructure (2) the existing workflow for identifying repairs in TGC members was inconsistent, inefficient, and did not value the partnership approach (3) the repair and replacement process for non-TGC members was not reflective of stakeholder needs, including education and advocacy. Intervention points to address these gaps were identified through the

Applied Project Methodology of the National Resource Council (National Academy of Science, 1983). The significance of this approach to the project methodologies is that this framework connects specific actions and pathways with their critical context and application. The process places emphasis on human-technology systems to optimize performance beyond the current state through observational analysis, surveys, system data, future scenario planning, and an on-going evaluation of intervention success. It was important to utilize a methodology that applied easy-to-follow steps and a narrative of the entire process, including critical decision-making context so that these intervention points could be adapted to other wastewater utilities.

The findings of this research resulted in five intervention points and a series of deliverables to help the program reach its future vision, which are interconnected in order to provide a holistic approach. The intervention points are (1) Program Recommendations, which provide two additional intervention points that align with the goals but were outside the scope of the project (2) FOG Resource Packet, which provides a comprehensive, educational tool for restaurants to better understand the replacement process (3) TGC Repairs and Compliance, which is a new workflow to provide a more resilient compliance process utilizing a hard and soft infrastructure approach (4) Vendor Registry, which provides an alternative pathway for recruiting qualified vendors to perform high-quality, grease management services and (5) the Grease Trap Assistance Program, which balances the inequities between TGC and non-TGC members by providing financial assistance for infrastructure upgrades. The next step is to share the infrastructure management solution with other municipalities to better support the FOG pretreatment programs that affect our regional wastewater treatment.

By providing the tools for community businesses to maintain their infrastructure long-term, the issue of infrastructure degradation can be addressed with both a hard and soft infrastructure approach which fulfills a gap in the current sustainable infrastructure literature. Through a comprehensive approach to infrastructure assistance, including internal administration, funding, and external partner messaging, this program can cultivate a community where sewer health, environmental longevity, and resource recovery are local values and shift the paradigm from enforcement to partnership.