

Executive Summary



A process to simplify demonstration programs

Guidelines for Utilities Wishing to Conduct Pilot-Scale Demonstrations (ENERI I R13)



The Central Issue

Water resource recovery facilities (WRRFs) can be conservative in their approach to new technologies and processes in an effort to minimize fiscal and regulatory risk. This hinders the advancement of technology and limits beneficial returns. Effective pilot-testing and demonstration programs can overcome the complexities and unknowns of emerging technology. Increased awareness of how pilot testing and demonstration programs can be successfully implemented will help utilities use innovative technologies to meet their fiscal and regulatory goals.

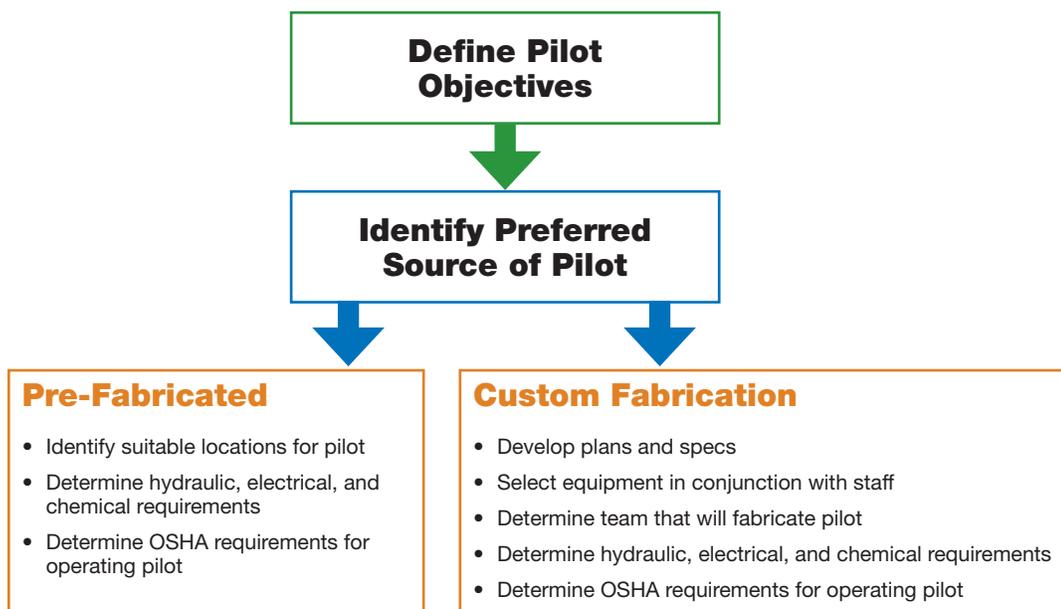
Context and Background

Recent initiatives such as the Leaders Innovation Forum for Technology (LIFT) and the Water Environment Federation Utility of the Future Energy Roadmap have asserted that most utilities are slow to adopt innovation because they conservatively manage risk. Moreover, depending on the procurement process used, innovative technology providers can face high upfront investment to support a demonstration. This research examines the perceived and real complexities in conducting demonstration studies by featuring industry-relevant examples of energy efficiency and recovery pilot studies to elevate

understanding of technologies, performance expectations, and pilot project implementation processes.

The researchers brainstormed common barriers and issues related to technology demonstration and implementation, researched and identified candidate case studies, and ultimately selected the following to profile:

- Anaerobic Digestion Pilot Trailer; King County Resource Recovery Technology Assessment Program, King County, WA
- Anaerobic Membrane Bioreactor (AnMBR) Research Pilot Project; University of Michigan, MI
- Pilot-Testing Mainstream Next Generation Nitrogen Removal Technologies; Hampton Roads Sanitation District, VA
- Evaluating the Use of Lysed Waste Activated Sludge as a Means for Offsetting Supplementing Carbon Costs Associated with Nutrient Removal; Henrico County, VA
- Demonstration of a Novel Separate Centrate Deammonification Process at the 26th Ward Wastewater Treatment Plant; New York City Department of Environmental Protection, NY



Key considerations for the design and construction phase of pilots.

Findings and Conclusions

This research describes the need to identify clear expectations and the processes for ensuring that objectives for pilot-scale demonstrations are met. It outlines critical program elements and guidelines for successful pilot-scale studies. The case studies also demonstrate the following:

- The organizations profiled in the case studies showed benefits from strong collaboration.
- Leveraging university partnerships and needs of WRRFs was highly effective in accomplishing research objectives in an economical fashion.
- The complexity of design and construction for pilot-testing equipment can vary significantly. Although pilot equipment is designed to operate for a specific time period shorter than full-scale facilities, test facilities still need to be robust enough to function well. Budget and labor provisions must be adequate for the duration of the study.

Management and Policy Implications

This research synthesizes sector knowledge to simplify demonstration project processes so that WRRF decision makers are better able to consider new technologies and feel confident in their decision making. By understanding the steps involved in conducting pilot studies that yield supportable results, utilities can better prepare for and benefit from pilot demonstrations. Consequently, this research can guide utilities that wish to successfully conduct pilot-scale demonstrations of emerging technologies and processes to become earlier adopters of innovation.

Related WE&RF Research

Project Title	Research Focus
Low Energy Alternatives to Activated Sludge – Advancing Anaerobic Membrane Bioreactor Research (ENER4R12)	Uses a pilot-scale AnMBR system to demonstrate the feasibility of mainstream municipal wastewater treatment in low winter temperatures. Tests multiple membrane configurations and applies strategies to control membrane fouling that have proven to be successful in previous work.
Fostering Research and Innovation Within Water Utilities (LIFT11C15)	A collaboration with WE&RF and WaterRF, this project characterizes research and innovation activities within water and wastewater utilities. Develops an organizational framework for fostering research and innovation activities, and provides a guidance document and communication guide for research and innovation.
Creating the Space to Innovate (LIFT8C14)	A WE&RF/WEF collaboration, this project identifies and facilitates the conditions where innovation can flourish at WRRFs, based on developing approaches to mitigate and manage risk, identifying positive regulatory and policy approaches, and overcome traditional water sector views that inhibit innovation.
Beyond Demonstration: Barriers and Solutions for Putting Innovation into Practice (ENER11R13a)	The first installation and commercialization of a technology is considered the ‘valley of death’ for putting innovation into practice. Many new technologies do not successfully expand beyond the pilot phase due to the myriad of barriers encountered, particularly in the water sector where regulatory guidelines, practices and permits influence plant design and operations. Documents the barriers experienced at a small utility as it progresses into a resource recovery hub and explores solutions to these barriers.

Principal Investigator: Lori Stone, P.E. LA STONE LLC	Technical Reviewers: Robert Bucher, Ph.D., P.E. King County Dan Frost, P.E. Central Contra Costa Sanitary District Chris Peot, P.E. DC Water	Kellie Rotunno, P.E. Northeast Ohio Regional Sewer District Hong Yin, Ph.D., P.E. Alexandria Renew Enterprises
Project Team: Wendell Khunjar, Ph.D., P.E. Hazen and Sawyer Dana Fredricks Hazen and Sawyer		



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Lauren Fillmore at lfillmore@werf.org