



2015 BOSC Review

Resource Recovery and Water Reuse Research Highlights

Summary of Planned Studies

(See Water Systems project charters for additional details)

- ❖ **Assessment of the impacts and approaches to control the most important waterborne contaminants associated with built infrastructure:** The scope of these studies includes collection and treatment of wastewater, and the treatment and distribution of drinking water. For wastewater, emphasis will be placed on water reuse guidance and resource recovery, with an emphasis on approaches that reduce energy consumption. The treatment, disposal, and reuse of residuals will be evaluated for both drinking water and wastewater. Emphasis will also be placed on evaluating novel in-plant wastewater peak flow treatment technologies for compliance with wastewater treatment regulations, impacts on downstream disinfection processes, and energy efficiency.

Examples of expected deliverables:

- Pathogen and chemical removal data (including surrogates) through wastewater and reuse facilities for use in discussion with OW and others on log removal issues for treated water and water reuse. Emphasis will be placed on the treatment of viruses (e.g. enterovirus, norovirus), emerging contaminants most relevant to the program office, and polyfluorinated chemicals (e.g. perfluorinated octanoic acid)
 - Updates to methodologies for risk assessment of organic residuals (formally called biosolids) including evaluations of coliphage as indicators for viral pathogens and Bacillus endospores as indicators for protozoan and helminthic pathogens.
 - Evaluation of antibiotic resistant bacteria in water reuse and wastewater treatment systems.
- ❖ **Treatment, monitoring, and risk assessment for fit-for-purpose water:** This research will providing water quality data on treated water for a wide variety of finished water types, including irrigation, industrial, and other non-potable reuse categories. Studies will also examine next-generation systems and technologies for fit-for-purpose water treatment.

Examples of expected deliverables:

- Development of anaerobic membrane bioreactors (AnMBR) technologies for municipal wastewater treatment and direct potable reuse.
- Characterization of WWT unit operations to remove chemicals of concern and tools for communities to address challenges in fit-for-purpose reuse scenarios using bioassay analyses to evaluate modes of action within specific adverse outcome pathways.
- Synthesis report on state of the science in membrane technologies for water recovery from challenging water sources such as brine streams.

❖ **System approaches for assessment of transformative fit-for-purpose and resource recovery-based water systems:** This research will provide a framework for holistically advancing water systems that encompasses the entire water cycle: from source to tap and back to the source, and offer potential transformative alternatives to address a suite of issues facing water systems coupled with improved whole system efficiency. It will develop an integrated sustainability assessment framework based on linkages among drinking water, wastewater, stormwater, and natural/green infrastructure contained within a watershed. Transformative alternatives employing the concept of fit-for-purpose water treatment and resource-recovery will be developed and compiled in a “Toolkit” inventory.

Examples of expected deliverables:

- Integrated assessment tools to define optimal resource recovery-based water systems including water fit for purpose for various end uses (e.g. agricultural irrigation, indirect potable reuse, direct potable reuse).
- Tools to assess the sustainability of reuse and recovery infrastructure that include economic and social acceptance issues