Agreement between California Energy Commission and Water Research Foundation

Title: Advancing Process Optimization in the Water Industry to Include Energy Efficiency and Control of Green House Gas Emissions
Amount: $425,000.00
Term: 48 months
PIER Contact: Paul Roggensack
RD&D Committee: 1/26/2010

Funding

FY	Program	Area	Initiative	Budget	This Project	Remaining Balance	
08	Electric	IAW	Water/Energy	$1,000,000	$425,000	$575,000	43%

Recommendation

Approve this agreement with Water Research Foundation (Foundation) for $425,000.00. The Foundation is providing $425,000 in match funding. Staff recommends placing this item on the discussion agenda of the Commission Business Meeting.

The Problem

Availability of clean water at a low cost is essential to California's economy and continued prosperity. California needs to treat large quantities of water to meet both municipal and waste discharge requirements that are heavily dependent on electricity. Energy for water treatment can be as much as 1,500 kilowatt hours for one million gallons. Statewide electricity consumption is approximately 3,100 gigawatts per year for treatment and distribution. For wastewater treatment, electricity consumption can be as high as 4,600 kilowatt hours for one million gallons. Statewide electricity consumption for wastewater treatment is over 2,000 gigawatts per year. Water and wastewater treatment facilities in California use over 2 percent of all the electricity used in California.

Proposed Research

The proposed project will address water issues with the following two components:

1) Advance process optimization in the water industry to include energy efficiency and control of green house gas emissions.
2) Develop a roadmap to identify and prioritize research and development projects for energy efficiency in the water and wastewater industries.

Research Justification and Goals

This project "[will develop, and help bring to market] increased energy efficiency in buildings, appliances, lighting, and other applications beyond applicable standards, and that benefit electric utility customers" (Public Resources Code 25620.1. (b)(2)), (Chapter 512, Statues of 2006)) by:

- Advance process optimization in the water industry to include energy efficiency and control of green house gas emissions.
- Develop a roadmap to identify and prioritize research and development projects for energy efficiency in the water and wastewater industries.

Background

Under the proposed project, the Foundation will issue a Request for Proposals (RFP) and enter into contracts with the successful bidders to implement the research tasks. The RFP and research tasks will be implemented using the Foundation's solicitation and contracting process. The Foundation is providing $425,000 in match funding for this effort. PIER funds will not be used for administrative costs and will be used only to fund research. Energy Commission staff, working collaboratively with the Foundation staff, will have oversight of the solicitation and selection processes.

The first research task is to optimize the Energy and Water Quality Management Systems (EWQMS) to holistically improve energy efficiency and reduce greenhouse gas at water and wastewater facilities. The EWQMS consist of control systems for pumps and equipment, and process control systems for pumping cycles, leak detection, pressure differentials and reservoir levels.

It is currently not standard practice to integrate these systems into a facility-wide management system for energy efficiency and green house gas reduction. For example, control systems for treatment plants could be integrated with control systems for collection and distribution systems to maximize over-all energy efficiency. In addition, while control systems are used to manage costs, they are not designed to reduce greenhouse gas emissions. If carbon constraints are put on these systems, they may be very differently operated than they are for cost reduction alone.

To address these issues, this task will do the following:

- Document the relationships between optimized system practices and green house gas emission reductions.
- Adapt the existing EWQMS software to include elements of green house gas emission control, pressure management, leakage control, reservoir management, and pump station efficiency.
- Develop pilot demonstration projects that document energy savings and green house gas emission reductions by applying the modified EWQMS protocols.

The second task is to conduct a workshop with water and wastewater industry professionals to identify, prioritize R&D projects that will address energy efficiency for water and wastewater processes. The deliverable for this part will be a roadmap that identifies projects that could be competitively bid in future collaborations between the Commission and the Foundation, or each could pursue separately.