Candidate Technology 9: Novel Membrane[9]

Technology Name	Novel Membrane			
Technology Solution(s)	☒ Water Use Efficiency	☒ Increase Water Supply	☐ Reduce Use of Potable Water for Non-Potable Uses	☐ Water Management Tools
Sector(s)	☐ Agricultural	☐ Commercial	☒ Industrial	☐ Residential
Industry Segment(s)	Wastewater Treatment			
Drought Resilience	☒ High	☐ Medium	☐ Low	
Water Benefits	☒ Reduces Water Use	☒ Increases Water Supply	☐ Produces/Uses Recycled Water	☐ Reduces Water Loss
Electric Benefits	☒ Energy Efficiency (**Reduces kWh**)	☐ Demand Response (**Ability to Shift Load?**)	☐ Distributed Generation (**Increase Ability to Produce Clean Energy**)	☐ Increase Energy Storage (**Ability to Store Energy**)
GHG Benefits	Yes. reducing electric use and electric demand reduce production and/or purchase of marginal electric resources.			
Implementation Timeline	☐ <= 3 years	☒ 3-7 years	☐ > 7 years	
Estimated Simple Payback	Cost not available to perform payback analysis.			

What is the technology?

Novel membrane technology can minimize fouling of membrane surfaces in wastewater treatment operations; thus, increasing water recovery and lowering energy demand. Membrane fouling can be substantially reduced, and the flux rate increased using proposed surface-modified amphiphilic, anti-adhesive membrane for water treatment. The technology can be successfully used for treatment of various types of feed water (e.g. surface water, backwash water, organic spiked water).

How does it work?

The technology is skid mounted and includes minor modifications to tie into hydraulic, piping, and electrical systems at an existing microfiltration water treatment facility. The novel membrane proposes to replace existing hydrophilic membranes with amphiphilic membranes, a procedure similar to routine scheduled membrane replacements, and installation of a 480v motor connected to the pilot membrane unit feed water pump, as well as installation of equipment necessary to test and evaluate benefits, including increased energy efficiency, reduced greenhouse gas emissions, and reduced operating costs. The total footprint of the technology installations will be approximately 600 square feet.

[9] Source: Grant Request Form on www.energy.gov.

What are the benefits?

Builds drought resilience

- The use of locally available water resources through cost effective reclamation results in drought resiliency
- Preliminary estimates indicate, at a per capita water use of 125 gpd, the conserved water can provide an annual water supply to a population of approximately 58,000 people.

Supports Electric Reliability

- Reduces electric consumption (kWh): Preliminary estimate assuming 40% improvement in efficiency during MF membrane treatment and 20% improvement in energy efficiency RO treatment at 10 & 50% market penetration indicates annual electricity savings of 8.7 million and 47 million kWh.

Technology Name	Novel Membrane
Sector	Industrial
Industry Segment	Wastewater Facilities
Water Benefits	Level of Drought Resilience: High
	Type of Drought Benefit: • Increases water supply • Preliminary estimates indicate, at a per capita water use of 125 gpd, the conserved water can provide an annual water supply to a population of approximately 58,000 people.
Water Resources	Type of Water Resource Benefit: • Because water is used more efficiently, there is less demand for potable water used in non-potable settings.
Electric Benefits	• Preliminary estimate assuming 40% improvement in efficiency during MF membrane treatment and 20% improvement in energy efficiency RO treatment at 10 & 50% market penetration indicates annual electricity savings of 8.7 million and 47 million kWh.
Cost-Benefit Analysis	• Although energy and water savings data were estimated, no explicit cost estimates were provided from information sources gathered to perform a cost-benefit analysis.
Other Benefits: Health and Safety	• No documentation was found to show other health or safety benefits.
Other Benefits: Environmental	Reduces GHG Emissions • Reducing electric use and electric demand reduce production and/or purchase of marginal electric resources
Other Benefits: Economic	• Reduces costs of municipal wastewater system resulting from less wastewater being treated at the plant