

Extracting Energy from Water: Electricity Generation from Wastewaters, Using Microbial Fuel Cells, and from Natural or Engineered Salinity Gradients



Bruce E. Logan, Ph.D.

Evan Pugh Professor

The Stan and Flora Kappe Professor

Director, Engineering, Energy &

Environmental Institute

Penn State University

Friday, November 9, 2018
3:00pm (Reception at 2:45pm)
66-110

Abstract: To reduce CO₂ emissions, new methods are needed to reduce energy consumption and also to exploit additional carbon-neutral energy sources for electricity generation. In the US, our water infrastructure consumes ~30 gigawatts of electrical power, which is clearly unsustainable for a world where 1-2 billion people still lack adequate access to potable water supplies or sanitation. Microbial fuel cells (MFCs) are being examined as a new method of wastewater treatment. In an MFC, certain bacteria can degrade organic matter and directly produce electricity, making it possible to both treat wastewater and produce power. At many locations in the US and around the world, treated wastewater is often discharged into the ocean, but salinity differences between this water and seawater could provide an additional source of power. I will summarize recent advances in MFCs and SGE technologies, and present research on how these processes have inspired new, low-energy methods for brackish water desalination.