Energy-Water Nexus

John M. Rattenbury, PE, LEED Green Associate
Senior Mechanical Engineer
MIT Department of Facilities
Systems Engineering Group (SEG)
Energy reported in Quads/year. Water reported in Billion Gallons/Day.
Water Use Charges
Cover water extraction, treatment, distribution, maintenance.
Water treatment contributes to CO2 emissions.
Backflow Prevention Penalty – 10 psig Loss in Pressure

Pressure Boosting – Typically 5 stories and higher – Indirect CO2 emissions. Repair and maintenance costs.
Waste from labs.

Requires more expensive chemical grade waste pipe.

Fire Retardant Polypropylene (PPFR).

Not recyclable.

Disposed of as hazardous waste at end of life.
About 20 buildings around campus have laboratory waste transfer stations.

Electricity consumption = Indirect CO2 emissions.

Repair and Maintenance.
National Pretreatment Program (NPP) for “indirect industrial dischargers” – also called industrial users (IU’s) - required for our NPDES discharge permit. Monitors and adjusts pH to be above 5.5 and below 12. 7 systems on academic side. 1 at CUP.
Electric power – mixers pumps, controls. Treatment chemicals – corrosive hazard.
Waste disposal and treatment by POTW. Sewer rates. Pay for Pumping, mixing, power for the plant, controls, chemicals. Energy costs contribute to CO2 emissions. Digestive process Contributes to CO2 production (and Methane unless burnt Off to convert to CO2).
Flow restricting aerators. Can reduce flow down to 1.5, 1.0 or 0.5 gpm. Water savings for flow-based tasks. Will require cleaning due to sediment in water.