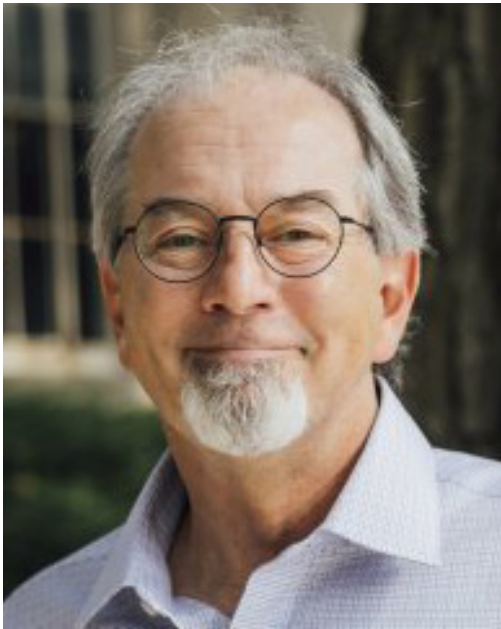


DISTINGUISHED SEMINAR SERIES

THERMAL SYSTEMS ENGINEERING FOR DESALINATION AND RESOURCE RECOVERY



JOHN H. LIENHARD V

**THURSDAY, OCTOBER 22ND
3:30PM-5:00PM, ME 3021**

BIO: John H. Lienhard V is a Professor of Mechanical Engineering at MIT. His work has focused on heat and mass transfer, thermodynamics, and water purification and desalination. He received his bachelor's and master's degrees in thermal engineering from UCLA. He earned his PhD at UC San Diego, where he conducted wind-tunnel experiments on the statistical and spectral evolution of thermally stratified turbulent flows. He joined the MIT faculty in 1988. At MIT, Lienhard's research on water purification has spanned a broad range of desalination technologies, encompassing fundamental thermodynamics, transport phenomena, chemical and electrochemical separations, and system design. He holds more than 40 U.S. patents on the resulting inventions, most of which have been commercialized through start-up companies from his group, including Gradiant Corporation, Sandymount Technologies, and Harmony Desalting. Lienhard has also authored hundreds of technical papers and three textbooks. Lienhard is a Member of the US National Academy of Engineering and an Honorary Member of the American Society of Mechanical Engineers. He received 2024 Lifetime Achievement Award of the International Desalination and Reuse Association, the 2021 AIChE Donald Q. Kern Award, the 2019 ASME Edward F. Obert Award, and the 2015 ASME Heat Transfer Memorial Award.

ABSTRACT: The world's renewable fresh water supply, from net precipitation over land, has become much more variable as the Earth's surface temperature has risen. Further, world population has nearly quadrupled during the past century, and the water demands of growing economies have continued to rise. As a result, water scarcity is a growing problem worldwide, impacting not only water for drinking and sanitation, but also reducing crop production and the health of ecosystems. Desalination has been deployed worldwide to expand the supply of freshwater and to manage wastewater. Installed desalination capacity has risen rapidly, especially in coastal areas, and now exceeds 100 billion L/day. Although the cost and lifetime of plants have improved steadily, energy efficiency and brine resource recovery remain significant goals. In this talk, I will discuss my group's research on energy use in desalination, on selective recovery of chemical and mineral resources from saline water, and on the application of concepts from thermal systems engineering to improve the performance of both thermal and membrane desalination systems. Examples will be drawn from reverse osmosis, humidification-dehumidification, membrane distillation, and lithium capture. I will also discuss our work on large-scale desalination at California's last nuclear power plant, to provide both energy and fresh water without carbon emissions.