

Clarkson University
Department of Chemical and Biomolecular Engineering
SEMINAR

“Thermal Systems Engineering for Desalination and Resource Recovery”

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The world’s renewable fresh water supply, from net precipitation, has become much more variable as our climate changes. Further, world population has risen steeply in the last century, and the water demands of growing economies continue to rise. As a result, water scarcity is a growing worldwide problem, with water shortages impacting both human populations and ecosystems.

Desalination has been deployed worldwide to expand the supply of freshwater, especially for coastal populations, and its use has increased rapidly, with more than 100 billion L/day of capacity now installed. The cost and lifetime of plants has also improved steadily. Nonetheless, desalination processes need greater sustainability and circularity, including energy efficiency and resource recovery. In this talk, I will discuss our research on energy inefficiency in desalination, selective recovery of chemical and mineral resources from saline water, and 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, solvent extraction, and lithium capture. I will also discuss our work on implementing desalination at California’s last nuclear power plant, as a potential means of providing energy and water without carbon.

Wednesday, October 26th, 2022 at 3:00 pm
Science Center 360



John H. Lienhard V is the Abdul Latif Jameel Professor and the founding Director of the Abdul Latif Jameel Water and Food Systems Lab at MIT (J-WAFS). During thirty-five years on the MIT faculty, Lienhard’s research and educational efforts have focused on heat and mass transfer, water purification and desalination, and thermodynamics. As Director of J-WAFS, he coordinates MIT’s research in food security and water supply for a growing population on a changing planet. Lienhard received his bachelor’s and master’s degrees in thermal engineering at UCLA and his PhD in environmental fluid dynamics at UC San Diego. His research on water purification has included lithium recovery, solvent extraction, humidification-dehumidification desalination, membrane distillation, reverse osmosis, nanofiltration, electrodialysis, high salinity brines, and energy efficiency. Lienhard has directly supervised 100 graduate theses and postdocs, and is author of more than 300 peer-reviewed publications. He has been issued 40 US patents, and he is a co-founder of the international water treatment company, Gradiant Corporation and a registered professional engineer in Massachusetts and Vermont.

Lienhard is a Fellow of ASME, AAAS, and ASTFE. He is a recipient of the 2012 ASME Technical Communities Globalization Medal, the 2015 ASME Heat Transfer Memorial Award, and the 2019 ASME Edward F. Obert Award.