The Global Challenge for Water Supply: Is Seawater Desalination a Sustainable Solution?

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Abstract: Water scarcity is one of the greatest global crises that we currently face. In recent years, numerous large-scale seawater desalination plants have been built in water-scarce countries to augment available water resources, and construction of new desalination plants is expected to increase significantly in the near future. Despite the major advancements in reverse osmosis desalination technology, the production of freshwater by seawater desalination is still more energy-intensive than conventional technologies for the treatment of freshwater sources. Furthermore, there are concerns about the environmental impacts of desalination and uncertainty about the potential effects on the marine environment. This presentation will review the energy efficiency, the state of the technology, and the environmental challenges of seawater desalination. A discussion will be presented on the possible reductions in energy demand by state-of-the art seawater desalination technologies; the potential role of advanced materials and innovative technologies in improving energy use, reliability, and environmental impact of seawater desalination; and the sustainability of desalination as a technological solution to global water shortages.

Brief bio: Menachem (Meny) Elimelech is the Roberto Goizueta Professor at the Department of Chemical and Environmental Engineering at Yale University. His research is in the general area of the water-energy nexus, including (i) membrane separations for desalination and wastewater reuse, (ii) environmental applications of nanomaterials, and (iii) water and sanitation in developing countries. Professor Elimelech has received numerous awards in recognition of his research. Notable among these are his election to the National Academy of Engineering in 2006, the Eni Prize for 'Protection of the Environment' in 2015, and the Clarke Prize for excellence in water research in 2005. He has also been recognized as a Thomson Reuters Highly Cited Researcher in two categories: Environment/Ecology and Chemistry. Professor Elimelech has advised 35 Ph.D. students and 24 postdoctoral researchers, many of whom hold leading positions in academia, government, and industry. In recognition of his teaching and mentoring excellence, he received the W.M. Keck Foundation Engineering Teaching Excellence Award in 1994, the Yale University Graduate Mentoring Award in 2004, and the Yale University Postdoctoral Mentoring Prize in 2012.

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