

CHAIR OF URBAN WATER SYSTEMS ENGINEERING



PhD Seminar series SoSe 2023



Karl G. Linden, PhD

Mortenson Professor in Sustainable Development
University of Colorado Boulder

When: 27.04.2023, 10.00h

Where: SWW Seminar room (1116)

Who: Everyone

Protecting public health at the speed of (UV) light

ABSTRACT

Intense interest in respiratory viruses at the start of the SARS-CoV-2 pandemic motivated development of innovative solutions to protect health in public spaces and UV-light based treatment was one that manifested in many forms. UV devices emitting UV-C irradiation (200-280 nm) are proven to be effective for virus disinfection in water treatment. How does UV kill pathogens and how effective is it? Can UV be used effectively in public spaces to protect people from airborne virus transmission? We investigated efficacy of numerous UV solutions including conventional UV lamps, UV-LEDs, and Far UV-C krypton chloride (KrCl^{*}) sources for inactivation of SARS-CoV-2. Building on experience in UV-based water disinfection, numerous respiratory viral pathogens and bacteriophage virus surrogates were studied to understand both fundamental mechanisms of how UV works for inactivation and to identify practical applications for air and surfaces to protect public health in high traffic areas. The relative performance of UVC devices, specifically the superior performance of the Far UV-C KrCl^{*} UV source at 222nm, are illuminating a new approach for disinfection of viruses in water and air. Other opportunities for use of KrCl^{*} lamps in water treatment, specifically in advanced oxidation, will be discussed.

CHAIR OF URBAN WATER SYSTEMS ENGINEERING



PhD Seminar series SoSe 2023

BIOGRAPHY

Karl is Chair of the Civil, Environmental, and Architectural Engineering Department and the Mortenson Professor in Sustainable Development at the University of Colorado Boulder, USA where he teaches classes on Sustainable Water Reuse, Water and Wastewater Treatment, and Water and Sanitation in Developing Communities. His research investigates novel water treatment systems, including advanced and innovative UV systems for inactivation of pathogens and degradation of organic and other emerging contaminants in water and wastewater and sustainable implementation of water and sanitation technologies in low-resource settings.

Dr. Linden is a consultant to the World Health Organization for revising the Guidelines for Drinking Water Quality and a member of the WHO Water Quality Technical Advisory Group. He served as 2013-2015 President of the International Ultraviolet Association (IUVA), and 2019-2020 President of the Association of Environmental Engineering and Science Professors (AEESP). He is a Fellow of AAAS, received the 2013 Pioneer Award in Disinfection and Public Health from the Water Environment Federation and the 2019 AEESP Walter J Weber Jr. Frontier in Research Award. In 2020 he received the Borchardt-Glysson Water Treatment Innovation Prize and was named the 2020 NWRI Clarke Prize Laureate.

Suggested Pre-reading/Listening:

The Conversation - Linden wrote 2 articles accessible to the general public on his UV Research:

<https://theconversation.com/ultraviolet-light-can-make-indoor-spaces-safer-during-the-pandemic-if-its-used-the-right-way-141512>

<https://theconversation.com/type-of-ultraviolet-light-most-effective-at-killing-coronavirus-is-also-the-safest-to-use-around-people-169602>

Bill Nye's Science Rules - Linden was on Bill Nye's podcast where he discussed "Killing Covid-19 at the Speed of (UV) Light":

<https://omny.fm/shows/science-rules-with-bill-nye/coronavirus-can-uv-light-live-up-to-its-ultra-hype>