

National Water Research Institute
Clarke Prize Conference

Research and Innovations

in

Urban Water Sustainability

October 20, 2017



Presented By

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Water
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Institute

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Welcome to the 2017 NWRI Clarke Prize Conference

Thank you for attending the **2017 NWRI Clarke Prize Conference**, organized by the National Water Research Institute to highlight “Research and Innovations in Urban Water Sustainability.” The conference is focused on identifying, developing, and managing sustainable water supplies in the urban setting. This year, the emphasis is on potable reuse, particularly research critical to developing water recycling criteria for direct potable reuse in California.

The Clarke Prize Conference is held in conjunction with the annual NWRI Clarke Prize Award Ceremony and Lecture, where a researcher from the United States is presented with a \$50,000 award and medallion for outstanding achievements in water science. The recipient of the 2017 Clarke Prize is **Dr. Charles N. Haas**, the LD Betz Professor of Environmental Engineering and Head of the Department of Civil, Architectural, and Environmental Engineering at Drexel University in Philadelphia, Pennsylvania. Dr. Haas is the twenty-fourth recipient of the Clarke Prize.



Coordinating these two events requires dedication and teamwork. We would like to acknowledge all those who were instrumental in making the award ceremony and conference a success.

First and foremost, we are grateful to the **Joan Irvine Smith & Athalie R. Clarke Prize Foundation** for supporting the Clarke Prize these past 24 years in memory of Mrs. Athalie Richardson Irvine Clarke, co-founder of NWRI. We also are grateful to **Carollo Engineers** for its generosity in becoming a Distinguished Sponsor of the 2017 Clarke Prize Conference

Next, we recognize the NWRI Member Agencies, whose support and guidance are invaluable to NWRI and its activities, particularly this conference. The NWRI Member Agencies include: Inland Empire Utilities Agency, Irvine Ranch Water District, Los Angeles Department of Water and Power, Orange County Sanitation District, Orange County Water District, and West Basin Municipal Water District.

In addition, we appreciate the support of our Conference Sponsors, including: AQUALITY Engineering, Inc.; BioLargo, Inc.; Black & Veatch; Kennedy/Jenks Consultants; Los Angeles Department of Water and Power; Orange County Sanitation District; Trussell Technologies, Inc.; Water Environment & Reuse Foundation; Water Planet, Inc.; and Woodard & Curran.

Certain individuals must be acknowledged for their tremendous efforts towards the Clarke Prize. Notably, we appreciate the outstanding assistance of Ms. Brandi Caskey, Ms. Eileen Chao, Ms. Dawna Hernandez, Ms. Elizabeth Pardo, Ms. Suzanne Sharkey, and Ms. Gina Vartanian of NWRI, who spent significant time and effort planning and managing all aspects of the conference and award ceremony. In addition, we appreciate the services of Tim and Kim Hogan of Tim Hogan Graphics. Special thanks are extended to the speakers and Clarke Prize Laureates whose knowledge and insight are the foundation of this conference.



We also thank the Clarke Prize Executive Committee, who selected Dr. Haas as the 2017 Clarke Prize recipient from among a number of impressive and accomplished candidates. The Committee Members include: Dr. George Tchobanoglous of the University of California, Davis (Chair of the Committee), Dr. Menachem Elimelech of Yale University, Dr. Joan B. Rose of Michigan State University, Mr. Jeffrey J. Mosher of Water Environment & Reuse Foundation, Dr. Jerald L. Schnoor of the University of Iowa, and Mr. Michael P. Wehner of the Orange County Water District.

Finally, we once again thank you, our guest, for attending the 2017 NWRI Clarke Prize Conference. We hope that you enjoy this unique event and find it to be a source of inspiration and understanding.

Kevin M. Hardy

Executive Director
National Water Research Institute
Fountain Valley, California

Conference Program

Friday, October 20, 2017

Irvine Marriott Hotel

7:30 am

Registration Opens

Catalina Ballroom

9:00 am – 9:05 am

Welcome, Preview, and Acknowledgement and Introduction of the 2017 Clarke Prize Recipient

Kevin M. Hardy
*National Water Research Institute
(Fountain Valley, CA)*

9:05 am – 9:35 am

**Summary Presentation of the 2017 Clarke Prize Lecture:
“A Biologist to Engineers, and an Engineer to Biologists”**

2017 Clarke Prize Recipient
Charles N. Haas, Ph.D.
Drexel University (Philadelphia, PA)

9:35 am – 10:00 am

A Clarke Prize Laureate’s Perspective on the 2017 Clarke Prize Lecture Topic

Clarke Prize Laureate (2001)
Joan B. Rose, Ph.D.
Michigan State University (East Lansing, MI)

10:00 am – 10:30 am

The Acute Threat:
Perspectives on Pathogens in Potable Reuse

R. Shane Trussell, Ph.D., P.E.
Trussell Technologies, Inc. (Pasadena, CA)

10:30 am – 10:45 am Networking Break

10:45 am – 11:15 am

Enhanced Source Control to Support Potable Reuse

James Colston, J.D.
*Orange County Sanitation District
(Fountain Valley, CA)*

11:15 am – 11:45 am

Pathogen Removal Mechanisms and Pathogen Credits in Membrane Bioreactor-Based Potable Reuse Trains

Ufuk Erdal, Ph.D., P.E.
AECOM (Los Angeles, CA)

11:45 pm – 12:30 pm Lunch

Catalina Ballroom Patio

12:30 pm – 1:30 pm

**Keynote Presentation:
Our Future in a Warming, Water-Stressed World**

Robert J. Glennon, Ph.D., J.D.
*University of Arizona, College of Law
(Tucson, AZ)*

1:30 pm – 2:00 pm

Assessing and Mitigating Chemicals in Potable Reuse

Andrew Salveson, P.E.
*Carollo Engineers
(Walnut Creek, CA)*

2:00 pm – 2:15 pm Networking Break

2:15 pm – 2:45 pm

The Relevance of Low Molecular Weight Compounds on Monitoring for Direct Potable Reuse

Jeff Neemann, D.Eng., P.E.
*Black & Veatch
(Orange County, CA)*

2:45 pm – 3:15 pm

The Water Environment & Reuse Foundation’s Activities to Advance Potable Reuse

Jeffrey J. Mosher
*Water Environment & Reuse Foundation
(Alexandria, VA)*

3:15 pm – 3:40 pm

A Clarke Prize Laureate’s Perspective on the 2017 Clarke Prize Conference Presentations

Clarke Prize Laureate (2003)
George Tchobanoglous, Ph.D., P.E., NAE, BCEE
*University of California, Davis
(Davis, CA)*

3:40 pm – 4:00 pm

Conference Wrap-Up

Kevin M. Hardy
National Water Research Institute

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