#WEFIWAProcessEng | www.wef.org/processengineering

2023

WEF/IWA INNOVATIONS IN PROCESS ENGINEERING CONFERENCE

CONFERENCE
JUNE 6 - 9

WORKSHOP
JUNE 6

REGENCY PORTLAND
PORTLAND, OREGON

This conference is jointly hosted by the Water Environment Federation and International Water Association, in cooperation with the Pacific Northwest Clean Water Association, the IWA USA National Committee, and the IWA Nutrient Removal and Recovery Specialist Group.

Water Environment Federation
the water quality people®

IWA
the international water association

PNCWA

USA NATIONAL COMMITTEE
USANC
the international water association

WEF/IWA
Innovations in Process Engineering Conference

June 6-9, 2023
Portland, Oregon, USA
Hyatt Regency Portland

www.wef.org/ProcessEngineering
#WEFIWAProcessEng

This conference is jointly hosted by the Water Environment Federation and International Water Association, in cooperation with the Pacific Northwest Clean Water Association, the IWA USA National Committee, and the IWA Nutrient Removal and Recovery Specialist Group.

June 6, 2023

Dear Colleagues,

Welcome to Portland, Oregon! The Water Environment Federation, International Water Association, Pacific Northwest Clean Water Association, and IWA United States National Committee are honored to have you join us for the WEF/IWA Innovations in Process Engineering Conference. On their behalf, we fully invite you to participate in this exceptional opportunity for education and collaboration! Glen Daigger, our honoree chair, has made significant contributions to the industry, and we are excited to celebrate his work during the event.

WEF/IWA are committed to providing continuing learning and information transfer opportunities for our design, operations, and research communities. This conference series focuses on the most innovative emerging technologies in greater detail. This conference, therefore, presents a unique opportunity to share ideas, which is critical for the continued advancement, acceptance, and implementation of sustainable process strategies into practice and the identification of knowledge gaps and future needs in this crucial field.

Our Opening General Session will feature a technical keynote by Daniel Nolasco on innovations from intensification to the circular economy and decarb, as well as an address from Glen Daigger discussing future challenges and ideas for overcoming them in the water sector. From there, the following 27 moderated sessions within the technical program feature speakers from various backgrounds, including regulatory, research, design, implementation, and utility operations. These sessions comprise 15-minute presentations, short technical briefings, and interactive facilitated discussions. Session topics include:

- Process fundamentals and modeling
- Nutrient removal and recovery
- Sedimentation and separation processes
- Water reuse
- Balancing and optimizing carbon management
- Enhancing secondary treatment, including densification, ballasted processes, and membranes
- Contaminants of emerging concern and associated treatment means
- Process aeration and mixing systems
- Alternative disinfectants and improved disinfection control
- Digestion – pretreatment, post-treatment, control, co-digestion

We will have a featured symposium in honor of Dr. Daigger contained within the overall conference. This symposium will highlight his contributions to four main areas: fundamentals and modeling, biological nutrient removal, sedimentation and separation processes, and water reuse.

We also feature several workshops for those who are able to participate on Monday: Mainstream Annamox Accelerating Tech Adoption and Upscaling PdNA with an Aim Towards PNA (full day); A Convergence of WRF Machine Learning Based Controller Implementation and Research (full day); Establishing Design and Operational Criteria for Achieving Process Intensification (half day) and Innovations in Anaerobic Treatment – Mainstream (half day). The conference workshops are always popular and well attended, offering fantastic opportunities to meet your peers and hear current ideas for tackling the issues we face as an industry.

We encourage you to network with fellow attendees and presenters, sharing your experiences and learning from one another. Facilitated discussions have been incorporated into each session to promote collaboration and idea exchange.

We hope you enjoy this informative event and have many productive interactions.

Sincerely,

2023 IPE Conference Co-Chairs
Martha Dagnew, *Western University*
Haydee De Clippeleir, *DC Water*
Adrienne Menniti, *Clean Water Services*
Pusker Regmi, *Brown and Caldwell*

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REGISTRATION

All events are held in the Hyatt Regency Portland.

The Registration Desk in Regency Foyer Level 2 will be open at the following times:

Tuesday, June 6	7:30 a.m. – 5:00 p.m.
Wednesday, June 7	7:30 a.m. – 5:00 p.m.
Thursday, June 8	8:00 a.m. – 5:00 p.m.
Friday, June 9	8:00 a.m. – 11:00 a.m.

PRESENTER AND FACILITATOR INFORMATION

All presenters and facilitators should sign in at the conference Registration Desk and attend their assigned briefing.

Presenters participating Wednesday, Thursday, and Friday should attend their assigned briefing. Please attend only once unless speaking on multiple days. The Speaker Briefing and room schedule is as follows:

Wednesday, June 7 — Room Willamette 1 7:45 a.m. – 8:15 a.m.
*Sessions 1 through 9

Thursday, June 8 — Room Willamette 1 7:45 a.m. – 8:15 a.m.
*Sessions 10 through 27

WI-FI

Complimentary standard Wi-Fi is provided in all event rooms and meeting spaces in the. Please use the following information to access Wi-Fi.

Network: @hyatt_meeting

Password: WEF23

RECEPTION AND MEAL FUNCTIONS

Staff have arranged to have a variety of food options to accommodate vegan and vegetarian preferences. Please advise staff if you have additional special dietary requirements.

Networking Luncheon
Lunch will be provided for all registered attendees on the first full day of the WEF/IWA Innovations in Process Engineering Conference. Use this opportunity to meet your fellow participants from across the country and abroad while enjoying the meal.

Wednesday, June 7
Regency Ballroom
12:00 p.m. – 1:30 p.m.

Networking Receptions
Join fellow Innovations in Process Engineering Conference colleagues in the Regency Ballroom on two separate evenings to network and enjoy a complimentary beverage and light hors d'oeuvres.

Networking Reception
Wednesday, June 7
Regency Ballroom 5:00 p.m. – 6:00 p.m.
All conference registrants are invited to join for this welcome reception.

Young Professional/Young Water Professional Networking Reception
Thursday, June 8
Regency Ballroom 5:00 p.m. – 6:00 p.m.
All conference registrants are invited to join for this second networking reception focusing on meeting and integrating our newer colleagues into the fun work our seasoned colleagues know all too well! Join us for a drink, some snacks, and a couple activities before heading out to enjoy the city of Portland for the evening.

Networking Breaks will take place in the Deschutes Foyer at the following times:

Wednesday, June 7
10:00 a.m. – 10:30 a.m. and 3:00 p.m. – 3:30 p.m.

Thursday, June 8
10:00 a.m. – 10:30 a.m. and 3:00 p.m. – 3:30 p.m.

Friday, June 9
10:00 a.m. – 10:15 a.m.

CONFERENCE SAFETY AND SECURITY

Hyatt Regency Portland at the Oregon Convention Center: 375 NE Holladay St Portland, OR 97232

Phone: (971) 222-1234

- If the situation is an emergency --- dial “55” from any Hotel phone and immediately report it. If the matter is NOT an emergency, dial “4240” from any Hotel phone, ask to speak to the Manager on Duty, and report the matter accordingly.
- Paramedics, the Fire Department, Law Enforcement and Hospitals are all located approximately 4-7 minutes from the hotel.
- The Hotel has on-site security staff 24 hours per day. All hotel staff receive training in the event of a fire and other emergencies, and all key staff receive first aid and CPR training.
- Guest rooms have Safety Exit maps on the back of the door as well as a compendium in the room which contains guidance for guests to follow in case of Fire and other emergencies.

WEF SOCIAL MEDIA POLICY

WEF strongly encourages the use of social media to share your experiences at our event. This includes sharing interesting quotes or information, taking pictures with colleagues, and using the event hashtag: **#WEFIWAProcessEng**. However, to protect intellectual property, videotaping, filming, or live-streaming of any technical session is prohibited. Any participant violating this policy must relinquish the media and may be removed from the conference. Also, promotional or commercial use of photographs taken at WEFTEC and other WEF conferences is strictly prohibited. If you are interested in content, materials, or products, please consider talking to the speaker who may provide the information or grant permission.

CODE OF CONDUCT

WEF is committed to providing a professional, safe, and welcoming environment during its in-person and virtual events for all water professionals and their guests. WEF expects all attendees, exhibitors, speakers, sponsors, media, and other participants to uphold our commitment to diversity and inclusion by helping us provide a positive conference environment for everyone.

As a conference participant you agree to the following:

- To treat all individuals with respect and create a collegial, inclusive, and professional environment.
- To value a diversity of views and opinions by communicating openly with respect for others.
- Not to verbally abuse any individual or to discriminate, harass, or intimidate on the basis of gender, race, gender identity and expression, sexual orientation, physical or mental disability, physical appearance, age, religion, national origin, veteran status, citizenship, or professional rank.

Anyone requested to stop unacceptable behavior is expected to comply immediately. WEF management may take any action deemed necessary and appropriate, including removal from the event (and any remaining portions thereof) without warning and without refund of registration fee.

Additionally, if you are a WEF Member, you agree to uphold the WEF Member Code of Conduct while attending WEF Events.

Reporting Concerns
To report a Code of Conduct violation, you may email WEF Executive Director, at executivedirector@wef.org.

For the complete Code of Conduct, please visit
https://www.weftec.org/about/about-weftec/code-of-conduct/.

WEF VISION & CORE VALUES

WEF's Vision
Life free of water challenges

WEF's Core Values

- Lead boldly with purpose and agility
- Focus on our customers through empathy and service
- Collaborate for collective impact
- Integrate diversity, equity, and inclusion in all we do

For more information about WEF's new strategic plan, mission, and vision, visit https://www.wefwaterfuture.org/.

CONTINUING EDUCATION

Continuing Education credit files will be made available online after the event.

Participating attendees will receive an email within 4 weeks after each event informing them when CE Credit documentation becomes available. Attendees will be able to view and download a certificate and transcript detailing their event participation using the link provided in the event follow up messaging. These details are also posted under the Events & Education tab of www.WEF.org.

How Do I Receive Credit For this Conference?

In order to receive credit for participation in any of the event sessions attendees will be required to properly fill out and track session times using the CE Credit Request Form. This requires obtaining a room monitor or WEF staff member initial for each session which you'd like to claim CE credit hours. These forms will be made available at the registration counter. Credits obtained during this event will be available after the conference using the link provided above. Please ask a WEF staff member if you have any questions or if you need to locate a CE Credit Request Form.

Pre-Conference Workshops:

WEF offers Continuing Education Units (CEUs) for participation in workshops. One CEU is the equivalent to 10 hours of training or formal instruction. These are distributed for structured, relevant professional training above and beyond that of initial certification or employment in a particular field.

Technical Sessions:

WEF offers Professional Development Hours (PDHs) for participation in technical sessions. A PDH is defined as one hour spent engaged in an activity that contributes to the advancement or enhancement of professional skills or scientific knowledge of a professional engineer or operator.

When Will I Receive Credits For this Conference?

Certificates and transcripts are available for download after each event. WEF will send an email after the conference to inform attendees where they can obtain their credits. Please keep in mind that most state licensing boards require the individual licensees to report continuing education credits.

Note: Educational Credits will not be recorded, and documentation will not be distributed unless the attendee is a confirmed registrant of this event and the proper steps are completed as indicated in the directions provided here and on the CE Request Forms.

CONTINUING EDUCATION

Are WEF Continuing Education Credits Approved in My State?
Most state engineering boards will accept WEF event credits as issued by WEF. WEF applies for approval in many states for operators and will be happy to work with individuals and Member Associations for additional state or agency approvals upon request. In addition, WEF has been approved as a Training Provider through the following: The Florida Board of Professional Engineers, the New York State Department of Education, and the Ohio EPA.

Please visit www.wef.org for specific state approval information for each event.

What Else Do I Need to Know?

WEF follows the International Association of Continuing Education and Training (IACET) guidelines along with strict state-specific CE Credit regulations. We strive to maintain these policies and procedures regarding our Continuing Education Program to meet with and receive state recognition of our events. WEF calculates education credits following a standardized method that is widely accepted by certification and licensing agencies. However, many states differ in the type and/or number of credits they will approve for educational events. Because of this, participants are responsible for exploring their state requirements and for ensuring that WEF conference credits are accepted.

Service and Support…

WEF maintains a database of all continuing education files for a minimum of 7 years. You may contact WEF's Customer Service Team between the hours of 8:30 a.m. and 5:00 p.m. EST, Monday through Friday for questions related to WEF Programs - 1-800-666-0206 or csc@wef.org.

State Credit Calculations:
Each state has its own set of CE credit requirements. Some licensing boards use different acronyms for approved training credits. In most instances the credits issued by WEF can be converted to meet state specific requirements that vary from the system used by WEF. This is usually managed at the state level using the following conversion:

1.0 CEU = 10 Hours of session time
1.0 PDH = 1 Hour of session time
1.0 General Contact Hour = 1 Hour of session time
For example: **1.7 CEU** Credits = **17.0 PDH** depending on individual state regulations.

**CEU & PDH credits are available for Workshops to Professional Engineers licensed in the state of New York (NYSED).*

Please note: courses that are not related to professional practice, such as accounting/financial planning, basic Auto CAD, general office management, insurance, marketing, real estate, risk management, DE&I, etc. are not approved for continuing education credits by some state licensing boards, including the NYSED.

For more information regarding WEF's Continuing Education Program, please visit the Events & Education tab at www.WEF.org.

SPONSORS

We would like to thank the following sponsoring companies for their contributions to the conference and program.

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SESSIONS AT A GLANCE

Number	Title	Start Time	End Time	CE Credits
Tuesday, June 6				
Workshop A	Mainstream Anammox: Accelerating Technology Adoption and Upscaling PdNA With An Aim Towards PNA	8:30 AM	5:00 PM	**0.6 CEUs**
Workshop B	A Convergence of WRF Machine Learning Based Controller Implementation and Research	8:30 AM	5:00 PM	**0.6 CEUs**
Workshop C	Establishing Design and Operational Criteria for Achieving Process Intensification	8:30 AM	12:00 PM	**0.3 CEUs**
Workshop D	Innovations in Anaerobic Treatment - Mainstream and Digestion	1:30 PM	5:00 PM	**0.3 CEUs**
Wednesday, June 7				
OGS	Opening General Session	8:30 AM	10:00 AM	**1.5 GCHs**
Session 01	Insight through Modelling	10:30 AM	12:00 PM	**1.5 PDHs**
Session 02	Balancing and Optimizing Carbon Management	10:30 AM	12:00 PM	**1.5 PDHs**
Session 03	Full Scale PdNA	10:30 AM	12:00 PM	**1.5 PDHs**
Session 04	Water Reuse	1:30 PM	3:00 PM	**1.5 PDHs**
Session 05	Advances in Biological Phosphorus Removal	1:30 PM	3:00 PM	**1.5 PDHs**
Session 06	Mainstream Shortcut Nitrogen Removal	1:30 PM	3:00 PM	**1.5 PDHs**
Session 07	Advances in Membrane Aerated Biofilm Reactors	3:30 PM	5:00 PM	**1.5 PDHs**
Session 08	Thermal Hydrolysis Processes	3:30 PM	5:00 PM	**1.5 PDHs**
Session 09	Densified Activated Sludge	3:30 PM	5:00 PM	**1.5 PDHs**

SESSIONS AT A GLANCE

Number	Title	Start Time	End Time	CE Credits
Thursday, June 8				
Session 10	Sector Update on Membrane Bio Reactors	8:30 AM	10:00 AM	**1.5 PDHs**
Session 11	Sidestream Nutrient Removal	8:30 AM	10:00 AM	**1.5 PDHs**
Session 12	Internally Stored Carbon for Nutrient Removal	8:30 AM	10:00 AM	**1.5 PDHs**
Session 13	Advances in Separation Technologies	10:30 AM	12:00 PM	**1.5 PDHs**
Session 14	Phosphorus Recovery	10:30 AM	12:00 PM	**1.5 PDHs**
Session 15	Diving Deep into Low DO Processes	10:30 AM	12:00 PM	**1.5 PDHs**
Session 16	Low DO Facility Performance	1:30 PM	3:00 PM	**1.5 PDHs**
Session 17	Resource Recovery	1:30 PM	3:00 PM	**1.5 PDHs**
Session 18	Tools for Process Understanding and Troubleshooting	1:30 PM	3:00 PM	**1.5 PDHs**
Session 19	Handing Young Water Professionals the Compass and Map for the future of Sustainable Resource Recovery	3:30 PM	5:00 PM	**1.5 PDHs**
Session 20	Data Driven Models	3:30 PM	5:00 PM	**1.5 PDHs**
Session 21	Alternative Nitrogen Removal Concepts	3:30 PM	5:00 PM	**1.5 PDHs**
Friday, June 9				
Session 22	Greenhouse Gases	8:30 AM	10:00 AM	**1.5 PDHs**
Session 23	What We Know (and Don't Know) about S2EBPR	8:30 AM	10:00 AM	**1.5 PDHs**
Session 24	Digestion Process Treatment Advancements	8:30 AM	10:00 AM	**1.5 PDHs**
Session 25	Disinfection	10:15 AM	11:45 AM	**1.5 PDHs**
Session 26	From Digestion to Recovery	10:15 AM	11:45 AM	**1.5 PDHs**
Session 27	Digital Tools for Optimization	10:15 AM	11:45 AM	**1.5 PDHs**

PRE-CONFERENCE WORKSHOPS

(Additional fees required)

Workshop A: Mainstream Anammox: Accelerating Technology Adoption and Upscaling PdNA With An Aim Towards PNA

Tuesday, June 6, 2023 **Room: Columbia 1**

8:30 a.m. – 5:00 p.m. **0.6 CEUs**

Coordinator: Stephanie Fevig, The Water Research Foundation

8:30 a.m. **Introduction & PdNA at HRSD**
Charles Bott, HRSD

8:50 a.m. **Short-cut Nitrogen Removal Evolution**
Haydee De Clippeleir, DC Water

9:30 a.m. **PdNA Modeling and Technology Transfer Considerations**
Ahmed Al-Omari, Brown and Caldwell

10:00 a.m. **Networking and Coffee Break**

10:30 a.m. **Pilot and Full-Scale PdNA and PNA Experience at HRSD**
Stephanie Klaus, HRSD

10:55 a.m. **Mainstream partial denitrification-anammox with raw fermentate: concept development for Blue Plains**
Demi Ladipo-Obasa, DC Water

11:15 a.m. **Application of Partial Nitrification- Denitrification-Anaerobic Ammonia Oxidation for Nitrogen Removal in Tertiary MBBR**
Greg Pace, Hazen and Sawyer

11:35 a.m. **Can Biological Phosphorus Removal be Integrated with Partial Denitrification/Anammox?**
George Wells, Northwestern University

12:00 p.m. **Break for lunch**

1:30 p.m. **Hydrogels and Short-cut Nitrogen Reduction in Wastewater Treatment**
Mari Winkler, University of Washington

Workshop A agenda continued on following page

PRE-CONFERENCE WORKSHOPS

(Additional fees required)

Workshop A agenda continued from previous page

Workshop A: Mainstream Anammox: Accelerating Technology Adoption and Upscaling PdNA With An Aim Towards PNA
Tuesday, June 6, 2023 **Room: Columbia 1**
8:30 a.m. – 5:00 p.m. **0.6 CEUs**

1:50 p.m. **Piloting shortcut N removal for sewage treatment**
Siegfried Vlaeminck, University of Antwerp)

2:10 p.m. **Partial Nitritation and Anammox at the Xi'an No. 4 WWTP**
Glen Daigger, UM - Xi'an Facility

2:30 p.m. **Successful pilot-scale demonstration of mainstream partial nitritation and anammox in a continuous-flow anoxic-oxic system**
Min Zheng, University of Queensland

3:00 p.m. **Networking and Coffee Break**

3:30 p.m **Activity/Breakout Discussions**

4:30 p.m. **Report Out**

5:00 p.m. **Workshop adjourns**

PRE-CONFERENCE WORKSHOPS

(Additional fees required)

Workshop B: A Convergence of WRF Machine Learning Based Controller Implementation and Research

Tuesday, June 6, 2023 **Room: Columbia 2**

8:30 a.m. – 5:00 p.m. **0.6 CEUs**

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Coordinator: Bruce Johnson, Jacobs

8:30 a.m. **Workshop introduction: Motivation, Scope and Objectives**
Bruce Johnson, Jacobs; Jeff Moeller, WRF

8:45 a.m. **PART 1: Machine Learning and Research Project Overviews**

Bruce Johnson, Jacobs

- **WRF 5121 ODIN**
  Bruce Johnson, Jacobs
- **WRF 5141**
  Jeff Moeller, WRF
- **Machine Learning Terminology and Overview**
  Kate Newhart, West Point
- **Small Group Discussion**
- **Report Outs & Summary**

10:00 a.m. **Networking and Coffee Break**

10:30 a.m. **PART 2a: Technical Design Aspects: IT/OT**
Peter Vanrolleghem, Université Laval

- **5141 Case Study #1 (Pure ML)**
  Nam Ngo, DC Water
- **5141 Case Study #2 (Hybrid)**
  Charles Bott, HRSD
- **WRF ODIN (both case studies)**
  Keaton Lesnik, Maia Analytica

11:05 a.m. **PART 2b: Technical Design Aspects: Data**
Peter Vanrolleghem, Universite Laval

- **5141 Approach**
  Kate Newhart, West Point
- **WRF ODIN Approach**
  Joshua Registe, Jacobs

Workshop B agenda continued on following page

PRE-CONFERENCE WORKSHOPS

(Additional fees required)

Workshop B agenda continued from previous page

11:35 a.m. **What are the major technical challenges in implementing DTs?**

12:00 p.m. **Break for lunch**

1:30 p.m. **PART 2c: Technical Design Aspects: Use of ML**
Charles Bott, HRSD

- **ML Refresher**
  Kate Newhart, West Point
- **5141 Approaches (Both)**
  Peter Vanrolleghem, Université Laval; Gina Kittleson, university of Michigan
- **WRF ODIN (Both)**
  Keaton Lesnik, Maia Analytica
- **Panel: Flexibility of ML**

2:20 p.m. **PART 3: Human Design Aspects**
Charles Bott, HRSD

- **WRF ODIN (Both)**
  Adrienne Menniti, Clean Water Services
- **5141 (Both)**
  Ali Gagnon, HRSD
- **Plenary: How do we change from engineer to operator focused modelling?**

3:00 p.m. **Networking and Coffee Break**

3:30 p.m. **PART 4: Consensus**
Bruce Johnson, Jacobs; Jeff Moeller, WRF

- **Summary: Technical**
  Peter Vanrolleghem, Université Laval
- **Summary: Human**
  Adrienne Menniti, Clean Water Services
- **Breakouts: What are the opportunities for Advanced Controllers at "your" facility. What would need to change to enable?**
- **Panel and Plenary**
- **Wrap-up**

5:00 p.m. **Workshop adjourns**

PRE-CONFERENCE WORKSHOPS

(Additional fees required)

Workshop C: Establishing Design and Operational Criteria for Achieving Process Intensification

Tuesday, June 6, 2023 **Room: Columbia 3**
8:30 a.m. – 12:00 p.m. **0.3 CEUs**

Coordinators: Murthy Kasi, Olsson and Dwight Houweling, Dynamita

8:30 a.m. **Introduction to Achieving Selection and Process Intensification**
Murthy Kasi, Olsson

8:45 a.m. **Physical, Chemical and Biological Selection**
Sudhir Murthy, NEWHub

9:05 a.m. **Parameterization of Biological Selection for Densification: F:M, Carbon Diversion, and Feast/Famine**
Rudy Maltos, Denver Metro

9:25 a.m. **Process Modeling Approaches: Internal and External Selectors**
Dwight Houweling, Dynamita

9:40 a.m. **Facilitated Discussion**
Murthy Kasi, Olsson

10:00 a.m. **Networking and Coffee Break**

10:30 a.m. **Using Mobile Media: Physical and Biological Selection**
Tom Johnson, Jacobs

10:50 a.m. **Using Media Cassettes: The Case for Biological Selection with Counter Diffusion Biofilms in MABRs**
Nerea Uri Carreño, VandCenter Syd

11:10 a.m. **Carbon Diversion for Process Intensification**
Jose Jimenez, Brown and Caldwell

11:30 a.m. **Process Modeling Approaches: Biofilm Support Media and Carbon Diversion**
Dwight Houweling, Dynamita

11:40 a.m. **Facilitated Discussion**
Murthy Kasi, Olsson

12:00 p.m. **Workshop Adjourns**

PRE-CONFERENCE WORKSHOPS

(Additional fees required)

Workshop D: Innovations in Anaerobic Treatment - Mainstream and Digestion

Tuesday, June 6, 2023 **Room: Columbia 3**

1:30 p.m. – 5:00 p.m. **0.3 CEUs**

Coordinator: Paul Wood, Lockwood, Andrews & Newnam, Inc.

1:30 p.m. **Welcome and Introductions**
Paul Wood, Lockwood, Andrews & Newnam, Inc.

1:45 p.m. **Overview**

- **Anaerobic treatment of high strength wastewaters**
- **Context**
- **COD - soluble and/or particulate**
- **Hydrolysis, fermentation, and methanogenesis**
- **Liquid and solid separation**
- **Nitrogen and phosphorus in the effluent**
- **Soluble methane**

Jose Jimenez, Brown and Caldwell

2:30 p.m. **Presentation on:**

- **Why do Anaerobic digesters fail?**
- **Biomass Management**

Tim Ellis, Iowa State University

3:00 p.m. **Networking and Coffee Break**

3:30 p.m. **Presentation on:**

- **State of the art anaerobic membrane bioreactors**
- **Applying hybrid processes to anaerobic treatment**
- **Anaerobic biofilm membrane bioreactor**
- **Mathematical Modeling**
- **Technical and economic analysis**

Joshua Boltz, Woodard & Curran

4:00 p.m. **Presentation on: Cold and dilute anaerobic wastewater treatment and Municipal and industrial treatment**
B. Conoll Holohan, NVP Energy

4:30 p.m. **Panel Discussion**

5:00 p.m. **Workshop adjourns**

TECHNICAL PROGRAM

Opening General Session
Wednesday, June 7, 2023 **Room: Regency Ballroom**
8:30 a.m. – 10:00 a.m. **1.5 GCHs**

8:30 a.m. **Welcome to the 2023 Conference!**
Martha Dagnew, Western University, Co-Chair, IWA
Haydee De Clippelier, DC Water, Co-Chair, IWA
Adrienne Menniti, Clean Water Services, Co-Chair, WEF
Pusker Regmi, Brown and Caldwell, Co-Chair, WEF

8:40 a.m. **WEF and IWA Introductions**
Jamie Eichenberger, HDR, WEF Past President
Sudhir Murthy, NEWhub, Chair of IWA NRR Specialist Group

8:50 a.m. **Introduction to the Glen Daigger Symposium on Sustainable Water Resource Recovery**
Sudhir Murthy, NEWhub

9:00 a.m. **From Intensification to Circular Economy and Decarb**
Daniel Nolasco, Vice President, IWA

9:30 a.m. **Wisdom from Yogi Berra**
Glen Daigger, University of Michigan, Honorary Conference Chair 2023

10:00 a.m. **Session adjourns for coffee and networking break**

Sponsored by: *INVENT Environmental Technologies, Inc.*

TECHNICAL PROGRAM

Session 01: Insight through Modelling
Wednesday, June 7, 2023 **Room: Deschutes A**
10:30 a.m. - 12:00 p.m. **1.5 PDHs**

This session is part of the Glen Daigger Symposium on Sustainable Water Resource Recovery.

Facilitators: Bruce Johnson, Cheng Yang, Jacobs

10:30 a.m. **Facilitator Introduction**

10:35 a.m. **Evolutions in WRRF Modelling: WRRmod 2022 + Keynote Overview**
Bruce Johnson, Jacobs

10:50 a.m. **Evaluating the Sensitivity of Secondary Treatment Infrastructure Requirements Utilizing BioWin: Wet and Dry Weather Infrastructure Needs**
Katya Bilyk; Joshua Powell, Hazen and Sawyer; Eric Polli, Hazen and Sawyer

11:05 a.m. **Studies and Strategies for Compliance with Temperature and Thermal Load Permit Limits**
Chris Maher, Clean Water Services

11:20 a.m. **Further Examinations of MABR Fingerprint in the Application of Nitrogen Removal and Robustness in Variable Organic Concentrations and Compositions**
Yi Cao, University of Michigan; Glen Daigger, University of Michigan

11:35 a.m. **Facilitated Discussion**

12:00 p.m. **Session adjourns for luncheon**

TECHNICAL PROGRAM

Session 02: Balancing and Optimizing Carbon Management
Wednesday, June 7, 2023 **Room: Deschutes B**
10:30 a.m. - 12:00 p.m. **1.5 PDHs**

Facilitators: Ahmed Al-Omari, Brown and Caldwell; Willow Crites, University of Idaho

10:30 a.m. **Facilitator Introduction**

10:35 a.m. **Coupling Advanced Primary Treatment and Innovative Biocatalysts for Intensified Nitrogen Removal: A Mid-flight Update & Intensification of Water Resource Recovery Facilities via Advanced Primary Treatment and Advanced Secondary Treatment Processes**
Ajay Nair, Microvi Biotech; Onder Caliskaner, Caliskaner Water Technologies; Fatemeh Shirazi; Felipe Cartin Munoz; Yihan Zhang, Yuanbin Wu, Everardo Martinez, Caliskaner Water Technologies; George Tchobanoglous; Brian Davis, Linda County Water District

10:50 a.m. **Low-Temperature, Mainstream Anaerobic Treatment of Dilute Municipal Wastewater: A First Full-Scale Demonstration Case Study**
B. Conoll Holohan, NPV Energy; Anna Trego, University of Galway; Ciara Keating, The University of Glasgow; Alison Graham, Sandra O'Connor, University of Ireland, Galway; Michael Gerardo, Dwr Cymru Welsh Water; Dermot Hughes, NVP Energy Ltd.

11:05 a.m. **Management of Embedded Carbon via Primary Sludge Fermentation**
Francesca Cecconi, Yueyun Tse, Kai-Feng Chen, Black & Veatch; McKay Breuner; Sandeep Sathyamoorthy

11:20 a.m. **Facilitated Discussion**

12:00 p.m. **Session adjourns for luncheon**

TECHNICAL PROGRAM

Session 03: Full Scale PdNA
Wednesday, June 7, 2023 **Room: Deschutes C**
10:30 a.m. - 12:00 p.m. **1.5 PDHs**

Facilitators: Stephanie Fevig, The Water Research Foundation; Alexander Seidel, George Washington University & DC Water

10:30 a.m. **Facilitator Introduction**

10:35 a.m. **Mainstream PdNA Demonstration at Blue Plains AWWTP with Primary Sludge Fermentate**
Mojolaoluwa Ladipo-Obasa, DC Water / The George Washington University; Stephanie Fuentes; Alexander Seidel, Rumana Riffat, George Washington University; Hossain Azam, University of the District of Columbia; Ryu Suzuki, Nicholas Passarelli, DC Water

10:50 a.m. **Full-scale Mainstream Deammonification via Partial Nitrification- Denitrification-Anammox**
Gregory Pace, Wendell Khunjar, Hazen & Sawyer; Jiefu Wang, Virginia Tech; Zhiwu Wang; Yewei Sun, Hazen and Sawyer; Sajana Chitrakar, Noman M Cole Jr Pollution Control Center

11:05 a.m. **Full-Scale Implementation of Partial Denitrification/Anammox (PdNA) IFAS**
Stephanie Klaus, HRSD

11:20 a.m. **Leveraging Densified Activated Sludge and Partial Nitrification/Denitrification/Anammox within an Integrated Advanced Water Treatment Facility for Large-Scale Potable Reuse**
Yewei Sun, Hazen and Sawyer; Michael Liu, LA County Sanitation Districts; Bryce Danker, Hazen and Sawyer; Rachel Deco, Hana Long, Artin Laleian, Bruce Mansell, LA County Sanitation District

11:35 a.m. **Facilitated Discussion**

12:00 p.m. **Session adjourns for luncheon**

TECHNICAL PROGRAM

Session 04: Water Reuse
Wednesday, June 7, 2023 **Room: Deschutes A**
1:30 p.m. - 3:00 p.m. **1.5 PDHs**

This session is part of the Glen Daigger Symposium on Sustainable Water Resource Recovery.

Facilitators: Ufuk Erdal, Arcadis; Huanqi (Haley) He, University of Michigan

1:30 p.m. **Facilitator Introduction**

1:40 p.m. **A Sustainable Approach for Data Center Cooling**
Ufuk Erdal, Arcadis; Jon Liberzon, Tomorrow Water

1:50 p.m. **A Partnership for Potable Reuse: Demonstrating Cost Effective Management of Leachate 1,4-Dioxane through Cometabolic Biological Pretreatment at the Landfill**
Hannah Stohr, HRSD; Rohan Menon; Mike Martin, Micaela Griffin, James Sabo, HRSD; Brian Brazil, Waste Managment; Charles Bott, HRSD

2:05 p.m. **Optimize Biologically Active Filtration (BAF) Design and Operation Using Mathematical Model**
Yewei Sun, Wendell Khunjar, Hazen andSawyer; Erik Rosenfeldt; Meric Selbes, Hazen and Sawyer

2:20 p.m. **Facilitated Discussion**

3:00 p.m. **Session adjourns for networking break**

TECHNICAL PROGRAM

Session 05: Advances in Biological Phosphorus Removal
Wednesday, June 7, 2023 **Room: Deschutes B**
1:30 p.m. - 3:00 p.m. **1.5 PDHs**

Facilitators: Jim McQuarrie, TetraTech; McKenna Farmer, Northwestern University

1:30 p.m. **Facilitator Introduction**

1:35 p.m. **PHA Insights and Questions: Adding a New Tool to the Box**
Peter Schauer, Adrienne Menniti, Clean Water Services; Skylar Watnick; Rachel Golda, Clean Water Services

1:50 p.m. **Pushing the Limits of Bio-P: Determining Washout SRT Towards Biological Phosphorus Removal and Improved Settleability in High Rate Activated Sludge Processes**
Chengpeng Lee, Hau Truong, Northwestern University; Khoa Nam Ngo, DC Water; Emily Kin, Northwestern University; Stephanie Fuentes; Xiaojue Chen, University of Maryland, College Park; George Wells, Northwestern University

2:05 p.m. **Enhanced Biological Phosphorus Removal with a Comprehensive Mixing Strategy**
John Koch, EnviroMix

2:20 p.m. **Facilitated Discussion**

3:00 p.m. **Session adjourns for networking break**

TECHNICAL PROGRAM

Session 06: Mainstream Shortcut Nitrogen Removal
Wednesday, June 7, 2023 **Room: Deschutes C**
1:30 p.m. - 3:00 p.m. **1.5 PDHs**

Facilitators: Jacek Mąkinia, Gdansk University of Technology; Brett Wagner, AECOM

1:30 p.m. **Facilitator Introduction**

1:35 p.m. **External Carbon Source Choices: Lessons Learned from an Integrated PdNA System with Methanol Polishing**
Alexander Seidel, George Washington University; Mojolaoluwa Ladipo-Obasa, DC Water / The George Washington University; Rumana Riffat, George Washington University; Charles Bott, HRSD; Haydee De Clippeleir, DC Water

1:50 p.m. **Principles of Mathematical Modeling for PdNA Processes**
Parin Izadi, Mehran Andalib, Stantec

2:05 p.m. **Partial Nitritation/Anammox with Ion-Exchange (IX-PN/A) for Nitrogen Removal from Mainstream Municipal Wastewater**
Leiyu He, Meng Wang, Penn State University; Sarina Ergas, Sheyla Chero-Osorio, University of South Florida

2:20 p.m. **Towards Shortcut Nitrogen Removal for Sewage Treatment: Compiled lab- and pilot-scale insights from Antwerp**
Siegfried Vlaeminck, Weiqiang Zhu, Yankai Xie, Michiel Van Tendeloo, University of Antwerp

2:35 p.m. **Facilitated Discussion**

3:00 p.m. **Session adjourns for networking break**

TECHNICAL PROGRAM

Session 07: Advances in Membrane Aerated Biofilm Reactors
Wednesday, June 7, 2023 **Room: Deschutes A**
3:30 p.m. - 5:00 p.m. **1.5 PDHs**

This session is part of the Glen Daigger Symposium on Sustainable Water Resource Recovery.

Facilitators: Dwight Houweling, Dynamita; Yi Cao, University of Michigan

3:30 p.m. **Facilitator Introduction**

3:40 p.m. **Floc, Film, Densified Sludge & Membranes – Synergistic Coupling of Continuous Flow Densification with MABR & MBR**
Jeff Peeters, Niclas Astrand, Veolia Water Technologies & Solutions; Daniel Coutts; Sylvain Donnaz, Jean Gagnon, Veolia Water Technologies & Solutions; Sudhir Murthy, NEWhub Corp

3:50 p.m. **Fully Anoxic Suspended Growth Treatment of Domestic Wastewater Performing Biological Nitrogen and Phosphorus Removal**
Avery Carlson, Glen Daigger, University of Michigan; Nancy Love; Dwight Houweling, Dynamita North America, Inc.; Gregory Dick, University of Michigan

4:05 p.m. **Biofilm Profile, Boundary Layer Thickness, Mixing Regime, and Biofilm Attachment in Membrane Aerated Biofilm Reactor Achieving Partial Nitritation Anammox: A Novel Robust Start-Up Strategy**
Ahmad Shabir Razavi, Martha Dagnew, Western University

4:20 p.m. **Improved Nitrogen Removal by Combing a Membrane Aerated Biofilm Reactor (MABR) with a Recirculating Dynamic Membrane Bioreactor (R-DMBR)**
Hang Song, Tim Fairley-Wax, University of Michigan; Oliver Schraa, Mirzaman Zamanzadeh, inCTRL Solutions, Inc.; Lutgarde Raskin, Steven Skerlos, University of Michigan

4:35 p.m. **Facilitated Discussion**

5:00 p.m. **Session adjourns for networking reception**

TECHNICAL PROGRAM

Session 08: Thermal Hydrolysis Processes
Wednesday, June 7, 2023 **Room: Deschutes B**
3:30 p.m. - 5:00 p.m. **1.5 PDHs**

Facilitators: Chris deBarbadillo, Black & Veatch; Ornella Sosa Hernandez, Clean Water Services

3:30 p.m. **Facilitator Introduction**

3:35 p.m. **Reducing Energy Demand with the Next Generation of Thermal Hydrolysis: A case-study from Europe**
William Barber, Cambi Inc

3:50 p.m. **Lessons learned from 8 years of operating a large THP system**
Nicholas Passarelli, Miguel Miranda, Ryu Suzuki, Theresa Bruton, Eric Barnett, Diran Adalian, DC Water

4:05 p.m. **Assessing Impacts of Thermal Hydrolysis on Mainstream Non-Biodegradable Organic Carbon and Nutrients at the Broad Run WRF**
Ankit Pathak, Wendell Khunjar, Hazen and Sawyer; Bradley Schmitz, Kendra Sveum, Loudoun Water; Zhiwu Wang; Rafael Iboleon, Virginia Tech CEE Department - Occoquan Laboratory; Phill Yi

4:20 p.m. **Facilitated Discussion**

5:00 p.m. **Session adjourns for networking reception**

TECHNICAL PROGRAM

Session 09: Densified Activated Sludge
Wednesday, June 7, 2023 **Room: Deschutes C**
3:30 p.m. - 5:00 p.m. **1.5 PDHs**

Facilitators: Tanja Rauch-Williams, Carollo Engineers; Nam Ngo, DC Water

3:30 p.m. **Facilitator Introduction**

3:35 p.m. **Unraveling the Differences between Densified and Flocculant Activated Sludge Properties**
Haley Noteboom, Wendell Khunjar, Gayathri Ram Mohan, Hazen and Sawyer; Ron Latimer; Paul Pitt; Alonso Griborio, Hazen & Sawyer

3:50 p.m. **Understanding Factors that Influence DAS Stability and Performance – Influence of Carbon Management Strategy, Physical Selection and Aeration Control**
Rudy Maltos, Kristen Wisdom, Daniel Freedman, Metro Water Recovery; Wendell Khunjar, Hazen and Sawyer; Ron Latimer

4:05 p.m. **Sludge Densification and 0d Models: An evaluation of capabilities and limitations for practitioners**
Dwight Houweling, Dynamita North America, Inc.; Niclas Astrand, Zebo Long, Matthew Reeve, Sylvain Donnaz, Veolia Water Technologies & Solutions

4:20 p.m. **Effects of NRCY and its Location Change on the Startup of Physical and Biological Selection Pressure-Driven Aerobic Granulation for Biological Nitrogen Removal in Plug-Flow Bioreactors Fed with Real Domestic Wastewater**
Jiefu Wang, Virginia Tech; Zhaohui An; Robert Angelotti, Matthew Brooks, Upper Occoquan Service Authority; Zhiwu Wang; Yewei Sun, Hazen and Sawyer

4:35 p.m. **Facilitated Discussion**

5:00 p.m. **Session adjourns for networking reception**

Session 10: Sector Update on Membrane Bio Reactors
Thursday, June 8, 2023 **Room: Deschutes A**
8:30 a.m. - 10:00 a.m. **1.5 PDHs**

This session is part of the Glen Daigger Symposium on Sustainable Water Resource Recovery.

Facilitators: Tim Fairley-Wax, University of Michigan; Zeynep Erdal, Black & Veatch; Alex Song, University of Michigan

8:30 a.m. **Facilitator Introduction**

8:35 a.m. **Our Research Journey from Conventional MBRs to Dynamic MBRs in Anaerobic Applications**
Tim Fairley-Wax, University of Michigan

8:50 a.m. **MBRs are More Cost Effective than Ever Before**
Thor Young, GHD; Jeremy Kraemer; Daniel Rizzuti; Sophia Malatches, GHD Limited; Jennifer Lim, Christoph Thiemig, Veolia

9:05 a.m. **Demonstration of Innovative Tertiary MBR Design Concepts for Potable Reuse in Southern California**
Colin Fitzgerald, Jacobs; Bruce Mansell, Michael Liu, Rachel Deco, Nikos Melitas, LA County Sanitation District; Timothy Constantine, Paul Swaim, Jacobs

9:20 a.m. **Biological and Membrane Performance of Pilot Scale Aerobic Membrane Bioreactors Under Short Solids Retention Time**
Allyson Paris, Baoqiang Liao, Lakehead University; Zebo Long, Veolia Water Technologies & Solutions; Hui Guo; Sylvain Donnaz, Veolia Water Technologies & Solutions

9:35 a.m. **Facilitated Discussion**

10:00 a.m. **Session adjourns for networking break**

TECHNICAL PROGRAM

Session 11: Sidestream Nutrient Removal
Thursday, June 8, 2023 **Room: Deschutes B**
8:30 a.m. - 10:00 a.m. **1.5 PDHs**

Facilitators: Joe Husband, Arcadis; Ahmed AlSayed, York University & Northwestern University

8:30 a.m. **Facilitator Introduction**

8:35 a.m. **Comparison of Full-scale, Long-term Performance of Anammox and Conventional Nit-Denite Sidestream Treatment Processes in North America**
Anton Dapcic, Tanja Rauch-Williams, Carollo Engineers; William Mancell-Egala; George Kontos, Carollo Engineers

8:50 a.m. **Startup and Long-Term Performance for the First Full-Scale Microvi MNE Technology Installation for Sidestream Treatment in the Bay Area**
Michael Falk, HDR Inc; Jimmy Dang, Oro Loma Sanitary District; Ajay Nair, Microvi Biotech; Fatemeh Shirazi; Anand Patel, HDR

9:05 a.m. **Sidestream Treatment of Anaerobically Digested Sludge Centrate in Aerobic Granular Sludge Bioreactor**
Rania Hamza, Toronto Metropolitan University; Guillian Morgan, Ryerson University

9:20 a.m. **Simultaneous Recovery of Struvite and Calcium Phosphate from Mainstream Anaerobic Membrane Bioreactor (AnMBR) Treated Swine Wastewater**
Arvind Damodara Kannan, Carollo Engineers; Prathap Parameswaran; Jaime Herrera, Kansas State University

9:35 a.m. **Facilitated Discussion**

10:00 a.m. **Session adjourns for networking break**

Session 12: Internally Stored Carbon for Nutrient Removal
Thursday, June 8, 2023 **Room: Deschutes C**
8:30 a.m. - 10:00 a.m. **1.5 PDHs**

Facilitators: Rob Sharp, Manhattan College; Kayla Bauhs, Brown and Caldwell

8:30 a.m. **Facilitator Introduction**

8:35 a.m. **Application of Real-Time Process Control and Post-Anoxic Denitrification Via Internally Stored Carbon to Achieve Low TN Discharge Limits**
David Wankmuller, Hazen and Sawyer; John Dodson, City of Durham; Wendell Khunjar, Hazen and Sawyer

8:50 a.m. **A Deeper Dive into Optimization of Full-Scale Multistage Low DO BNR System**
Pusker Regmi, Brown and Caldwell; Martin Johnson, Caroline Nguyen, Washington Suburban Sanitary Commision; Ahmed Al-Omari; George Wells, Northwestern University; Brad Yeakle, Washington Suburban Sanitary Commision

9:05 a.m. **Interrogating the Performance and Microbial Ecology of an EBPR/Post-anoxic Denitrification Process at Bench and Pilot Scales**
Erik Coats, University of Idaho; Felicity Appel; Nick Guho; Cynthia Brinkman, University of Idaho; Jason Mellin

9:20 a.m. **Combination of EBPR, Endogenous Denitrification, Partial Nitrification/Denitrification and Anammox to Achieve Cost-Effective Nutrient Removal**
Jiefu Wang, Virginia Tech; Yewei Sun, Wendell Khunjar, Hazen and Sawyer; Mari Winkler, University of Washington; Ramesh Goel, University of Utah; Zhiwu Wang

9:35 a.m. **Facilitated Discussion**

10:00 a.m. **Session adjourns for networking break**

Session 13: Advances in Separation Technologies
Thursday, June 8, 2023 **Room: Deschutes A**
10:30 a.m. - 12:00 p.m. **1.5 PDHs**

This session is part of the Glen Daigger Symposium on Sustainable Water Resource Recovery.

Facilitators: Sudhir Murthy, NEWhub; Chengpeng Lee, Northwestern University

10:30 a.m. **Facilitator Introduction**

10:35 a.m. **Demonstration and Performance Evaluation of Advanced Primary Treatment Technologies for Intensification and Energy Savings at Water Resource Recovery Facilities**
Onder Caliskaner, Yihan Zhang, Yuanbin Wu, Everardo Martinez, Caliskaner Water Technologies; George Tchobanoglous; Brian Davis, Linda County Water District

10:50 a.m. **The AAA Settler: Promoting Enhanced Energy Recovery and Enhanced Nutrient Removal**
Sudhir Murthy, NEWhub Corp; Bernhard Wett; Jose Jimenez, Brown and Caldwell; Thomas Worley-Morse, Metro Wastewater Reclamation District

11:05 a.m. **Quantifying the Prediction Power of Different Extracellular Polymeric Substance Model Approaches to Describe Clarification**
Nam Ngo, DC Water; Tanush Wadhawan, Dynamita North America; Joshua Boltz; Belinda Sturm, University of Kansas; Jeneva Hinojosa; Arash Massoudieh, Catholic University of America; Imre Takacs, Dynamita

11:20 a.m. **Intensification with an Adaptive Clarifier Inlet and Blanket Filtration**
Mario Benisch, HDR; Martin Armbruster, Hydrograv

11:35 a.m. **Facilitated Discussion**

12:00 p.m. **Session adjourns for lunch on own**

TECHNICAL PROGRAM

Session 14: Phosphorus Recovery
Thursday, June 8, 2023 **Room: Deschutes B**
10:30 a.m. - 12:00 p.m. **1.5 PDHs**

Facilitators: Erik R. Coats, University of Idaho; Avery Carlson, University of Michigan

10:30 a.m. **Facilitator Introduction**

10:35 a.m. **Full Scale Characterization of Vivianite and its Relations in Improving Class A Biosolids Applications**
Peibo Guo, DC Water and Cornell University; Yuan Yan, Cornell University; Nam Ngo, DC Water; Melissa Bollmeyer, Cornell University; Chris Peot, DC Wate; Matthew Reid, Cornell University; April Gu

10:50 a.m. **Tracking the Formation Potential of Vivianite within the Treatment Train of Full-Scale Wastewater Treatment Plants**
Lobna Amin, Aalto Univeristy; Raed Al-Juboori, NYU Abu Dhabi; Mansour Bounouba, Université de Toulouse; Fredrik Lindroos, Abo Akademi University; Jennifer Mas-Desessard, SIAAP; Kati Blomberg, Helsinki Region Environmental Services Authority HSY; Melissa Lopez Viveros, SIAAP; Marina Graan, Helsinki Region Environmental Services Authority HSY; Johan Linden, Abo Akademi University; Anna Mikola, Aalto Univeristy; Mathieu Sperandio, Université de Toulouse

11:05 a.m. **Benchtop Testing: Sharpening the Pencil on Phosphorus Recovery Technology Evaluations**
Derek Lycke, Jacobs; Jigs Patel, City of Calgary; Yuemin Zhu; Matthew MacPhail, City of Calgary

11:20 a.m. **Comprehensive Nutrient Recovery at Wastewater Treatment Plant by RAVITA Process**
Sini Reuna, Kati Blomberg, Mari Heinonen, Maria Valtari, Kristian Sahlstedt, Helsinki Region Environmental Services Authority HSY

11:35 a.m. **Facilitated Discussion**

12:00 p.m. **Session adjourns for lunch on own**

TECHNICAL PROGRAM

Session 15: Diving Deep into Low DO Processes
Thursday, June 8, 2023 **Room: Deschutes C**
10:30 a.m. - 12:00 p.m. **1.5 PDHs**

Facilitators: Patrick O'Donnell, INVENT; Demi Ladipo-Obasa, George Washington University & DC Water

10:30 a.m. **Facilitator Introduction**

10:35 a.m. **Evaluating Nitrogen Oxides Transformations at Low Dissolved Oxygen Concentrations**
Jose Jimenez, Brown and Caldwell; Joshua Boltz; Mark Miller, Brown and Caldwell; Belinda Sturm, University of Kansas; Bruce Rittmann, Arizona State University

10:50 a.m. **Adaptation of Nitrifiers and Heterotrophs to Low Dissolved Oxygen Operation in an Activated Sludge BNR Pilot**
Shashank Khatiwada, ODU Research Foundation; Kester McCullough, Stephanie Klaus, HRSD; Tanja Rauch-Williams, Carollo Engineers; Gary Schafran, Old Dominion University; Charles Bott, Christopher Wilson, HRSD

11:05 a.m. **Batch Kinetic Testing using Advanced DO Control for Characterization of Low DO-Adaptation at Full and Pilot-Scale**
Kayla Bauhs, Varun Srinivasan, Mark Miller, Jose Jimenez, Brown and Caldwell; Belinda Sturm, University of Kansas; Megan Wittman

11:20 a.m. **Coexistence of Nitrifying Populations Adapted at Different Dissolved Oxygen Concentrations: From Bench Scale to Full Scale Implications**
Fabrizio Sabba,Eric Redmond, Black & Veatch; Caitlin Ruff; Mike Young, Trinity River Authority; Leon Downing, Black & Veatch

11:35 a.m. **Facilitated Discussion**

12:00 p.m. **Session adjourns for lunch on own**

Session 16: Low DO Facility Performance
Thursday, June 8, 2023 **Room: Deschutes A**
1:30 p.m. - 3:00 p.m. **1.5 PDHs**

This session is part of the Glen Daigger Symposium on Sustainable Water Resource Recovery.

Facilitators: Helen Littleton, LX Environmental; Pusker Regmi, Brown and Caldwell

1:30 p.m. **Facilitator Introduction**

1:35 p.m. **Learning from Experience: Lessons from Low DO Full-Scale Facilities**
Pusker Regmi, Brown and Caldwell

1:50 p.m. **Design and Operational Approaches for Implementing Suboxic Nutrient Removal in BNR Facilities: A technology analysis among low DO facilities in North America**
Tanja Rauch-Williams, Natalie Beach, Carollo Engineers; Alex Ekster, Ekster & Associates; Thomas Weiland, Philip Ackman, LA County Sanitation District; Stephanie Klaus, Charles Bott, HRSD

2:05 p.m. **Understanding Important Factors for Sludge Settleability in Low Dissolved Oxygen Activated Sludge Systems**
Matt Seib, Carly Amstadt, Madison Metropolitan Sewerage District

2:20 p.m. **First Ever Full-Scale Demonstration of AVEVA Advanced Predictive Control Against Finely Tuned Ammonia Based Aeration Control**
Bryan Coday, Carollo Engineers; Anna Schroeder, Chloe Lopez-Jauffret, South Platte Renew; Bill Poe, Paul Kesseler, AVEVA; Tanja Rauch-Williams, David Pier, Carollo Engineers

2:35 p.m.. **Facilitated Discussion**

3:00 p.m. **Session adjourns for networking break**

TECHNICAL PROGRAM

Session 17: Resource Recovery
Thursday, June 8, 2023 **Room: Deschutes B**
1:30 p.m. - 3:00 p.m. **1.5 PDHs**

Facilitators: Thor Young, GHD; Peibo Guo, Cornell University & DC Water

1:30 p.m. **Facilitator Introduction**

1:35 p.m. **Advanced Heat Recovery: Direct Heat Transfer Under Vacuum**
Mathieu Haddad, SUEZ; Troels Hilstroem, TH Process Solutions; Pierre-Emmanuel Pardo, Pedro Fonseca, Valéry Geaugey, Adrien Belacel, SUEZ

1:50 p.m. **Arrested Anaerobic Digestion and Recovery of Value-added Products through Vacuum-intensified Alkaline Fermentation**
Ahmed Al-Omari; Gamze Kirim, Western University; Xuanye Bai; John Walton, USP Technologies; Christopher Muller, Brown and Caldwell; Katherine Bell, Stantec; Domenico Santoro, USP Technologies

2:05 p.m. **Advanced Thermal Conversion of Sewage Sludge to Biochar**
Richard Lancaster; Ross Wilson, Esme Piechozcek, Sarah-Jane Westlake, Atkins; Yadira Bajon Fernandez, Ewan McAdam, Cranfield University; Ken Shapland, UKWIR

2:20 p.m. **Facilitated Discussion**

3:00 p.m. **Session adjourns for networking break**

Session 18: Tools for Process Understanding and Troubleshooting
Thursday, June 8, 2023 **Room: Deschutes C**
1:30 p.m. - 3:00 p.m. **1.5 PDHs**

Facilitators: Murthy Kasi, Olsson; Yuan Yan, Cornell University

1:30 p.m. **Facilitator Introduction**

1:35 p.m. **Expect the Unexpected: Peaceful Coexistence of PAO and GAO in a Carbon-Limited Sidestream EBPR Demonstration**
McKenna Farmer, Northwestern University; Fabrizio Sabba, Black & Veatch; Zhen Jia, Northwestern University; Patrick Dunlap, Black & Veatch; James Barnard; Cindy Qin; Levi Straka

1:50 p.m. **In-situ, Laboratory, and Model-Based Investigations of Nitrification Rates and Inhibitors**
Trevor Prater, George Sprouse, Metropolitan Council; Lee Pinkerton; Michael Rieth; Adam Sealock, Metropolitan Council

2:05 p.m. **Wastewater Respirometry for Data-Hungry WRRF Digital Twins**
Daniel Andres Mendoza Grubert, Karen Mesta, modelEAU - Université Laval; Jean-David Therrien; Niels Nicolaï, Peter Vanrolleghem, Université Laval

2:20 p.m. **Nanobubble Pretreatment Enables Process Intensification by Eliminating Inhibition Caused by Common Pollutants**
John Crisman, Andrea White, Moleaer

2:35 p.m. **Facilitated Discussion**

3:00 p.m. **Session adjourns for networking break**

Session 19: Handing Young Water Professionals the Compass and Map for the Future of Sustainable Resource Recovery
Thursday, June 8, 2023 **Room: Deschutes A**
3:30 p.m. - 5:00 p.m. **1.5 PDHs**

This session is part of the Glen Daigger Symposium on Sustainable Water Resource Recovery.

Facilitators: Alexandria Gagnon, HRSD; Nerea Uri Carreño, VCS Denmark

Speakers: Glen Daigger, University of Michigan; Matt Seib, Madison Metropolitan Sewerage District; William Tarpeh, Stanford University

Participants will first hear from honorary Chair Prof. Glen Daigger on the roles YWP/YPs will play in the future of WRRFs and how they will shift from their current roles. This will be followed by presentations by YWP/YPs looking towards the future of WRRFs in topics tied to conference themes. A moderated discussion on the future of WRRFs and YWP/YPs roles in WRRF industry will close out the session. A YWP/YPs-focused networking reception will immediately follow this session. During the 1.5-hour reception activities that encourage interactive engagement and connection of YWP/YPs and EWPs.

3:30 p.m. **Looking Forward to Sustainable WRRFs**
Glen Daigger, University of Michigan

3:50 p.m. **YWP/YPs on the Future of WRRFs**
- **Accelerating Adoption of Innovative Technologies**
  Nerea Uri Carreño, VCS Denmark
- **Future of Operations**
  Matt Seib, Madison Water
- **Distributed Systems**
  William Tarpeh, Stanford University

4:35 p.m. **Facilitated Discussion**

5:00 p.m. **Session adjourns for networking reception**

Session 20: Data Driven Models
Thursday, June 8, 2023 **Room: Deschutes B**
3:30 p.m. - 5:00 p.m. **1.5 PDHs**

Facilitators: Peter Vanrolleghem, Université Laval; Lee Pinkerton, Metropolitan Council Environmental Services

3:30 p.m. **Facilitator Introduction**

3:35 p.m. **Data-Driven Modelling to Control the High-Rate Contact Stabilization Process and Address Its Settleability Challenges – A Full Scale Study**
Ahmed Alsayed, Emily Kin, Northwestern University; Khoa Nam Ngo, Haydee De Clippeleir, DC Water; Usman Khan; George Wells, Northwestern University

3:50 p.m. **Techniques to Improve Process Monitoring: ARIMA Time Series Forecasting and Statistical Process Control**
Laura Fletcher, Elizabeth Schrandt, Rebecca Heyerdahl; George Sprouse, Metropolitan Council

4:05 p.m. **Successful Demonstration of Artificial Intelligence and Machine Learning in Potable Reuse Projects**
Ufuk Erdal, Ozan Erdal, Arcadis

4:20 p.m. **Polymer Dosage With Machine Learning: Predicting Total Solids From Real-Time Acoustic Sensor Data**
Gina Kittleson, University of Michigan Dept of Civil & Env Eng; Bishav Bhattarai, University of Utah; Nam Ngo, DC Water; Han Nguyen; Trieu Nguyen, Haydee De Clippeleir, DC Water Nancy Love

4:35 p.m. **Facilitated Discussion**

5:00 p.m. **Session adjourns for networking reception**

Session 21: Alternative Nitrogen Removal Concepts
Thursday, June 8, 2023 **Room: Deschutes C**
3:30 p.m. - 5:00 p.m. **1.5 PDHs**

Facilitators: Michael Liu, LASCD; Ahmed Shabir Razavi, Western University

3:35 p.m. **Successful Full-Scale Demonstration of Nitrogen Removal in a High Purity Oxygen Facility with no Infrastructure Modification**
Bryce Danker, Hazen and Sawyer; Paul Pitt, ; Ron Latimer, ; Patricia Hsia, LA County Sanitation District; Michael Liu, LA County Sanitation Districts; Bruce Mansell, LA County Sanitation District; Gustavo Caro, LA County Sanitation District

3:50 p.m. **Mainstream Nitrogen Removal from Low Temperature and Low Ammonia Strength Municipal Wastewater using Hydrogel-encapsulated Comammox and Anammox**
Bruce Godfrey, University of Washington; Bo Li, University of Washington; Raymond RedCorn, University of Washington; Pieter Candry, University of Washington; Zhiwu Wang, ; Ramesh Goel, ; Mari Winkler, University of Washington

4:05 p.m. **Enhancing Anaerobic Ammonia Oxidation by Sulfate Addition & Influence of COD on Sulfur Transformations during Anaerobic Ammonia Oxidation**
Dominika Derwis, PrzemysÅ‚aw Kowal, Hussein Al-Hazmi, Jacek Makinia, Joanna Majtacz, Gdansk University of Technology

4:20 p.m. **Strategies for Managing Recalcitrant Nutrients to Meet Low Nutrient Limits**
Jeffrey Hlad, Metro Water Recovery; Wendell Khunjar, Hazen and Sawyer; Kristen Wisdom, Metro Water Recovery

4:35 p.m. **Facilitated Discussion**

5:00 p.m. **Session adjourns for networking reception**

Session 22: Greenhouse Gases
Friday, June 9, 2023 **Room: Deschutes A**
8:30 a.m. - 10:00 a.m. **1.5 PDHs**

Facilitators: George Wells, Northwestern University; Nerea Uri Carreño, VCS Denmark

8:30 a.m. **Facilitator Introduction**

8:35 a.m. **Low N_2O Emissions and the Mechanisms in a Pilot-Scale Mainstream Partial Nitritation/Anammox Process**
Haoran Duan, Min Zheng, The University of Queensland

8:50 a.m. **Comparing Mechanistic and Machine Learning Models for Predicting N_2O Emissions in Full-Scale Wastewater Treatment Plants**
Ewa Zaborowska, Mohanad Awad, Gdansk University of Technology; Bartosz SzelÄ…g, Kielce University of Technology; Mojtaba Maktabifard, Jacek Makinia, Gdansk University of Technology

9:05 a.m. **Seasonal Changes of Nitrous Oxide Emissions in Finnish Wastewater Treatment Plants**
Anna Mikola, Milla Sieranen, Aalto University; Helena Hilander, AFRY; Henri Haimi, FCG; Timo Larsson, Aalto University; Anna Kuokkanen

9:20 a.m. **Dynamic Simulations of Nitrogen Removal and Greenhouse Gas Emissions of a Hybrid MABR System with Plant-Wide Aeration Controls**
Huanqi He, Glen Daigger, University of Michigan

9:35 a.m. **Facilitated Discussion**

10:00 a.m. **Session adjourns for networking break**

Session 23: What We Know (and Don't Know) about S2EBPR
Friday, June 9, 2023 **Room: Deschutes B**
8:30 a.m. - 10:00 a.m. **1.5 PDHs**

Facilitators: Andy Shaw, Black & Veatch; Peter Schauer, Clean Water Services

This Special Technical Session will explore the known and unknown parameters related to S2EBPR systems. The presentations will focus on utility and academic perspectives with discussion focused on providing the audience a forum to better understand S2EBPR systems.

8:30 a.m. **Carbon Balance and AFR as the Key to S2EBPR**
Andy Shaw, Black & Veatch

8:45 a.m. **Measuring the Apparent Fermentation Rate and Where the Carbon Goes**
Adrienne Menniti, Clean Water Services

9:00 a.m. **Incorporation of the Apparent Fermentation Rate inro Modeling and Carbon Balances**
Patrick Dunlap, Black & Veatch

9:15 a.m. **Do We Really Know Anything about PAO and GAO Ecology?**
McKenna Farmer, Northwestern University

9:30 a.m. **Facilitated Discussion**

10:00 a.m. **Session adjourns for networking break**

Session 24: Digestion Process Treatment Advancements
Friday, June 9, 2023 **Room: Deschutes C**
8:30 a.m. - 10:00 a.m. **1.5 PDHs**

Facilitators: Erik Larson, Vaughan Company; Manny Moncholi, Stantec

8:30 a.m. **Facilitator Introduction**

8:35 a.m. **Routine Bench Scale Testing to Evaluate Anaerobic Digesters Stability and Capacity**
Ornella Sosa-Hernandez, Peter Schauer, Clean Water Services

8:50 a.m. **Using CFD Modeling for Analysis of Digester Mixing Approaches to Optimize Performance**
Ed Wicklein, Rashi Gupta, Jie Zhang, Haiwen Gao, Carollo Engineers

9:05 a.m. **The Impact Of Process Parameters On The Amount Of Micropollutant In The Generated End Products During Sewage Sludge Pyrolysis**
Felizitas Schlederer, Université Laval; Céline Vaneeckhaute, Université Laval

9:20 a.m. **Investigating the Polymer Dose Decision-Making to Reduce Operational Cost for Belt Filter Press Dewatering**
Nam Ngo, Trieu Nguyen, DC Water; Han Nguyen; Dat Dao, Catholic University of America; Jeffrey Proctor; Wendell Smith, Aklile Tesfaye, DC Water

9:35 a.m. **Facilitated Discussion**

10:00 a.m. **Session adjourns for networking break**

Session 25: Disinfection
Friday, June 9, 2023 **Room: Deschutes A**
10:15 a.m. - 11:45 a.m. **1.5 PDHs**

Facilitators: Jenny Reina, Jacobs; Domenico Santoro, USP Technologies

10:15 a.m. **Facilitator Introduction**

10:20 a.m. **Disinfection of Primary Effluent: Bench Scale Evaluation of Peracetic Acid to Achieve Enterococcus Limits for CEPT Marine Discharge**
Benjamin Luke, Gresham Smith; Jason Ogg, Gresham Smith & Partners; Randall Booker, ; Ronald Abraham, Gresham Smith & Partners; Ken Baker, Bowling Green Municipal Utilities; Eric Krueger,

10:35 a.m. **Innovative Chlorination Strategy to Tackle the Challenge of Stringent THM Limits**
June Leng, HDR; Anand Patel, HDR; Michael Falk, HDR Inc

10:50 a.m. **Prediction of Post-Secondary E. coli for Disinfection Control: Application of statistical and machine learning algorithms**
Leah Pifer; Josh Goldman, Metro Water Recovery; Nancy Love, University of Michigan; Katherine Newhart, United States Military Academy

11:05 a.m. **PAA Optimization Efforts at the Robert W. Hite Wastewater Treatment Facility in Denver, CO**
Josh Goldman, Metro Water Recovery

11:20 a.m. **Facilitated Discussion**

11:45 a.m. **Conference adjourns**

Session 26: From Digestion to Recovery
Friday, June 9, 2023 **Room: Deschutes B**
10:15 a.m. - 11:45 a.m. **1.5 PDHs**

Facilitators: Phil Ackman, Los Angeles County San. Dist.; Nick Guho, Carollo Engineers

10:15 a.m. **Facilitator Introduction**

10:20 a.m. **Process for Sustainable Food Waste Co-digestion and Beneficial Biogas Utilization**
Christian Tasser, Carollo Engineers

10:35 a.m. **Comparing Biomethane Production of Different Wastes and F/M ratios**
Mohamed Zaghloul, Ahmed El Sayed, Rania Hamza, Toronto Metropolitan University; Elsayed Elbeshbishy

10:50 a.m. **Enhancing Anaerobic Digestion with the Microbial Hydrolysis Process**
David Parry, Madeleine Fairley-Wax, Corey Klibert, Todd Williams, Jacobs

11:05 a.m. **Microaeration and Iron Dosing for Anaerobic Digestion: A Systematic Comparison of Desulfurization Performance, Antibiotic Resistance Genes Removal and Operating Costs**
Bipro Dhar, Seyed Mohammad Azizi, Basem Zakaria, Nervana Haffiez, Parisa Niknejad, University of Alberta; Rasha Maal-Bared, EPCOR; Saif Molla

11:20 a.m. **Facilitated Discussion**

11:45 a.m. **Conference adjourns**

Session 27: Digital Tools for Optimization
Friday, June 9, 2023 **Room: Deschutes C**
10:15 a.m. - 11:45 a.m. **1.5 PDHs**

Facilitators: Ashwin Dhanasekar, The Water Research Foundation; Leila Barker, Clean Water Services

10:15 a.m. **Facilitator Introduction**

10:20 a.m. **Impact of Collection System Geography on Water Reclamation Facility Influent Flow Forecasts**
Jacob Barclay, Spencer Snowling, Hatch Ltd.

10:35 a.m. **A Leap in Digital Twin: Dynamic Influent Soft Sensing without Fancy Instrumentation**
Cheng Yang, Bruce Johnson, Joshua Registe, Jacobs; Thomas Johnson; Arifur Rahman, Jacobs; Joseph Kenyon, United Utilities

10:50 a.m. **Hybridizing a First-Principles Biofilm Model with a Data-Based Model to Improve Model Accuracy for Model Predictive Control of a 6 million PE WRRF**
Marcello Serrao, modelEAU & LEESU; Vincent Jauzein, Sam Azimi, Vincent Rocher, SIAAP; Bruno Tassin, LEESU; Peter Vanrolleghem, Université Laval

11:05 a.m. **Nutrient Management and Process Operation Optimization using Data-Driven Modeling, Case Study Loudoun Water, Virginia**
Javad Roostaei, Katya Bilyk, Hazen and Sawyer; Kendra Sveum, Loudoun Water; Wendell Khunjar, Hazen and Sawyer

11:20 a.m. **Facilitated Discussion**

11:45 a.m. **Conference adjourns**

PRESENTER AND FACILITATOR DIRECTORY

Phil Ackman
Los Angeles County San. Dist.
Facilitator Session 26

Ahmed Al-Omari
Brown and Caldwell
Presenter Workshop A, Session 17; Facilitator Session 02

Ahmed Alsayed
Northwestern University
Presenter Session 20; Facilitator Session 11

Lobna Amin
Aalto Univeristy
Presenter Session 14

Mehran Andalib
Stantec
Presenter Session 06

Niclas Astrand
Veolia Water Technologies & Solutions
Presenter Session 07

William Barber
Cambi Inc
Presenter Session 08

Jacob Barclay
Hatch
Presenter Session 27

Leila Barker
Clean Water Services
Facilitator Session 27

Kayla Bauhs
Brown and Caldwell
Presenter Session 15; Facilitator Session 12

Mario Benisch
HDR
Presenter Session 13

Josh Boltz
Woodard & Curran
Presenter Workshop

Charles Bott
HRSD
Presenter Workshop A

Onder Caliskaner
Caliskaner Water Technologies
Presenter Session 02, 13

Yi Cao
University of Michigan
Presenter Session 01; Facilitator Session 07

Avery Carlson
University of Michigan
Presenter Session 07; Facilitator Session 14

Francesca Cecconi
Black & Veatch
Presenter Session 02

Erik Coats
University of Idaho
Presenter Session 12; Facilitator Session 14

Bryan Coday
Carollo Engineers
Presenter Session 16

Willow Crites
University of Idaho
Facilitator Session 02

Glen Daigger
University of Michigan
Presenter OGS, Session 19

Arvind Damodara Kannan
Kansas State University
Presenter Session 11

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Bryce Danker
Hazen and Sawyer
Presenter Session 21

Anton Dapcic
Carollo Engineers
Presenter Session 11

Haydee De Clippeleir
DC Water
Presenter Workshop A

Dominika Derwis
Gdansk University of Technology
Presenter Session 21

Ashwin Dhanasekar
The Water Research Foundation
Facilitator Session 27

Bipro Dhar
University of Alberta
Presenter Session 26

Leon Downing
Black & Veatch
Presenter Session 23

Patrick Dunlap
Black & Veatch
Presenter Session 23

Ahmed El Sayed
Toronto Metropolitan University
Presenter Session 26

Timothy Ellis
Iowa State University
Presenter Workshop D

Ufuk Erdal
Arcadis
Presenter Session 04, 20; Facilitator Session 04

Zeynep Erdal
Black and Veatch
Facilitator Session 10

Maddy Fairley-Wax
Jacobs
Presenter Session 26

Tim Fairley-Wax
University of Michigan
Facilitator Session 10

Michael Falk
HDR Inc
Presenter Session 11

McKenna Farmer
Northwestern University
Presenter Session 18, 23; Facilitator Session 05

Stephanie Fevig
The Water Research Foundation
Coordinator Workshop A; Facilitator Session 03

Colin Fitzgerald
Jacobs Engineering
Presenter Session 10

Laura Fletcher
Metropolitan Council Environmental Services
Presenter Session 20

Alexandria Gagnon
HRSD
Presenter Workshop A, Session 19

Bruce Godfrey
University of Washington
Presenter Session 21

Josh Goldman
Metro Water Recovery
Presenter Session 25

Nick Guho
Carollo Engineers
Facilitator Session 26

Peibo Guo
DC Water and Cornell University
Presenter Session 14; Facilitator Session 17

Mathieu Haddad
SUEZ
Presenter Session 17

Rania Hamza
Toronto Metropolitan University
Presenter Session 11

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Huanqi He
University of Michigan
Presenter Session 22; Facilitator Session 04

Jeffrey Hlad
Metro Water Recovery
Presenter Session 21

B. Holohan
NPV Energy
Presenter Workshop D, Session 02

Dwight Houweling
Dynamita North America, Inc.
Presenter Workshop C, Session 09; Facilitator Session 07

Joe Husband
Arcadis
Facilitator Session 11

Jose Jimenez
Brown and Caldwell
Presenter Workshop C, D, Session 15

Bruce Johnson
Jacobs
Coordinator Workshop B; Facilitator Session 01

Sreerama Murthy Kasi
Olsson
Presenter Workshop C; Facilitator Session 18

Shashank Khatiwada
ODU Research Foundation
Presenter Session 15

Wendell Khunjar
Hazen & Sawyer PC
Presenter Session 08

Gina Kittleson
University of Michigan Dept of Civil & Env Eng
Presenter Session 20

Stephanie Klaus
HRSD
Presenter Session 03

John Koch
EnviroMix
Presenter Session 05

Mojolaoluwa Ladipo-Obasa
DC Water / The George Washington University
Presenter Workshop A, Session 03; Facilitator Session 15

Erik Larson
Vaughan Company
Facilitator Session 24

Chengpeng Lee
Northwestern University
Presenter Session 05; Facilitator Session 13

June Leng
HDR
Presenter Session 25

Keaton Lesnik
Maia Analytica
Presenter Workshop B

Yitao Li
Virginia Tech
Presenter Session 08

Helen Littleton
LX Environmental
Facilitator Session 16

Michael Liu
LACSD
Facilitator Session 21

Benjamin Luke
Gresham Smith
Presenter Session 25

Hao Luo
Virginia Tech
Presenter Session 08

Derek Lycke
Jacobs
Presenter Session 14

Chris Maher
Clean Water Services
Presenter Session 01

Joanna Majtacz
Gdansk University of Technology
Presenter Session 21

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Jacek Mąkinia
Gdansk University of Technology
Facilitator Session 06

Rudy Maltos
Metro Water Recovery
Presenter Workshop C, Session 09

Jim McQuarrie
TetraTech
Facilitator Session 05

Adrienne Menniti
Clean Water Services
Presenter Session 23

Anna Mikola
Aalto University
Presenter Session 22

Jeff Moeller
The Water Research Foundation
Presenter Workshop B

Manny Moncholi
Stantec
Facilitator Session 24

Sudhir Murthy
NEWhub Corp
Presenter Workshop C, OGS; Facilitator Session 13

Ajay Nair
Microvi Biotech
Presenter Session 02

Kathryn Newhart
United States Military Academy
Presenter Workshop B, Session 25

Khoa Nam Ngo
DC Water
Presenter Workshop B, Session 13, 24; Facilitator Session 09

Daniel Nolasco
NOLASCO & Asociados S. A.
Presenter OGS

Haley Noteboom
Hazen and Sawyer
Presenter Session 09

Patrick O'Donnell
INVENT
Facilitator Session 15

Gregory Pace
Hazen and Sawyer
Presenter Workshop A, Session 03

Allyson Paris
Lakehead University
Presenter Session 10

Lee Pinkerton
Metropolitan Council
Facilitator Session 20

Eric Polli
Hazen and Sawyer
Presenter Session 01

Trevor Prater
Metropolitan Council
Presenter Session 18

Tanja Rauch-Williams
Carollo Engineers
Presenter Session 16; Facilitator Session 09

Ahmad Shabir Razavi
Western University
Presenter Session 07; Facilitator Session 21

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Jacobs
Presenter Workshop B

Pusker Regmi
Brown and Caldwell
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Jacobs
Facilitator Session 25

Sini Reuna
Helsinki Region Environmental Services Authority HSY
Presenter Session 14

Javad Roostaei
Hazen and Sawyer
Presenter Session 27

Fabrizio Sabba
Black & Veatch
Presenter Session 15

Domenico Santoro
USP Technologies
Facilitator Session 25

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Clean Water Services
Presenter Session 05, 23

Felizitas Schlederer
Université Laval
Presenter Session 24

Anna Schroeder
South Platte Renew
Presenter Session 16

Matt Seib
Madison Metropolitan Sewerage District
Presenter Session 16, 19

Alexander Seidel
George Washington University
Presenter Session 06; Facilitator Session 03

Marcello Serrao
modelEAU & LEESU
Presenter Session 27

Rob Sharp
Manhattan COllege
Facilitator Session 12

Alex Song
University of Michigan
Facilitator Session 10

Hang Song
University of Michigan
Presenter Session 07

Ornella Sosa-Hernandez
Clean Water Services
Presenter Session 24; Facilitator Session 08

Hannah Stohr
Hampton Roads Sanitation District
Presenter Session 04

Yewei Sun
Hazen and Sawyer
Presenter Session 03, 04, 09, 12

William Tarpeh
Stanford University
Presenter Session 19

Christian Tasser
Carollo Engineers
Presenter Session 26

Nerea Uri Carreño
VCS Denmark
Presenter Workshop A, Facilitator Session 19, 22

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Francisco Valdes
Valsi Water Solutions
Presenter Workshop

Peter Vanrolleghem
Université Laval
Presenter Workshop B, Session 18; Facilitator Session 20

Siegfried Vlaeminck
Dr Ugent - Labmet
Presenter Workshop A, Session 06

Tanush Wadhawan
Dynamita North America
Presenter Workshop C

Brett Wagner
AECOM
Facilitator Session 06

Meng Wang
Penn State University
Presenter Session 06

David Wankmuller
Hazen and Sawyer
Presenter Session 12

George Wells
Northwestern University
Presenter Workshop A; Facilitator Session 22

Bernhard Wett
ARAconsult
Presenter Session 13

Andrea White
Moleaer
Presenter Session 18

Ed Wicklein
Carollo Engineers
Presenter Session 24

Ross Wilson
Atkins
Presenter Session 17

Paul Wood
Lockwood, Andrews & Newnam, Inc.
Coordinator Workshop D

Yuan Yan
Cornell University
Facilitator Session 18

Cheng Yang
Jacobs Engineering Group Inc.
Presenter Session 27; Facilitator Session 01

Thor Young
GHD
Presenter Session 10; Facilitator Session 17

Ewa Zaborowska
Gdansk University of Technology
Presenter Session 22

Mohamed Zaghloul
Toronto Metropolitan University
Presenter Session 26

Xueyao Zhang
Virginia Tech
Presenter Session 17

Min Zheng
University of Australia
Presenter Workshop A, Session 22

CONFERENCE SCHEDULE AT-A-GLANCE

Tuesday, June 6

7:30 a.m. – 5:00 p.m.	Registration
8:30 a.m. – 5:00 p.m.	Workshop A, B
8:30 a.m. – 12:00 p.m.	Workshop C
1:30 p.m. – 5:00 p.m.	Workshop D

Wednesday, June 7

7:30 a.m. – 5:00 p.m.	Registration
8:30 a.m. – 10:00 a.m.	Opening General Session
10:30 a.m. – 12:00 p.m.	Technical Sessions 1, 2, 3
12:00 a.m. – 1:30 p.m.	Networking Luncheon
1:30 p.m. – 3:00 p.m.	Technical Sessions 4, 5, 6
3:30 p.m. – 5:00 p.m.	Technical Sessions 7, 8, 9
5:00 p.m. – 6:00 p.m.	Networking Reception

Thursday, June 8

8:00 a.m. – 5:00 p.m.	Registration
8:30 a.m. – 10:00 a.m.	Technical Sessions 10, 11, 12
10:30 a.m. – 12:00 p.m.	Technical Sessions 13, 14, 15
12:00 p.m. – 1:30 p.m.	Lunch on Own
1:30 p.m. – 3:00 p.m.	Technical Session 16, 17, 18
3:30 p.m. – 5:00 p.m.	Technical Sessions 19, 20, 21
5:00 p.m. – 6:00 p.m.	YP/YWP Networking Reception

Friday, June 9

8:00 a.m. – 11:00 a.m.	Registration
8:30 a.m. – 10:00 a.m.	Technical Session 22, 23, 24
10:15 a.m. – 11:45 a.m.	Technical Session 25, 26, 27
11:45 a.m.	Conference Adjourns

NOTES

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