



**WEF Forum 2019:
James Barnard Research Conference on
Emerging Themes in Biological Phosphorus
Removal and Recovery**

**January 14-16, 2019
Embassy Suites Austin Central
University of Texas at Austin
Austin, Texas, USA**



This Forum is held by the Water Environment Federation in cooperation with The Water Research Foundation and the Leaders Innovation Forum for Technology program, and the University of Texas at Austin.

WEF Forum 2019:
James Barnard Research Conference on Emerging Themes in Biological Phosphorus Removal and Recovery

Overall Event Layout

January 14, 2019 Arrival and Day 1	January 15, 2019 Day 2	January 16, 2019 Day 3 and Departure
	7:15am-8:15am BREAKFAST (for Embassy Suites guests)	7:15am-8:15am BREAKFAST (for Embassy Suites guests)
	8:30am-9:45am 2: Emerging Trends and Unexpected Outcomes	8:30am-10:00am 7: Whole Plant Impacts
	9:45am-11:00am 3: Understanding Microbial Ecology of EBPR	10:00am-12:00pm 8: Preparing for Future Nutrient Mgmt Strategies
	11:00am-12:30pm 4: Modeling Challenges and New Thoughts	12:00pm-2:45pm WORKING LUNCH and Closing Session/Roadmap
12:00pm-1:30pm <i>Registration Open & Check-in</i>	12:30pm-1:30pm LUNCH	
1:30pm-2:30pm Opening Session	1:30pm-3:00pm 5: Interaction with Nitrogen Removal	
2:30pm-5:00pm 1: Watershed Based Strategies for Managing Phosphorus	3:00pm-4:30pm 6: Design and Operating Practices	Working Session approx. 2:45pm-5:00pm Steering committee to lead; all participants invited Head start on take-aways and next steps
5:00pm-6:00pm Evening Welcome Reception <i>[Reception continues until 7:00pm for Embassy Suites guests]</i>	4:30pm-6:00pm AFTERNOON BREAK -- FREE <i>Board bus at hotel for commute to UT Austin</i>	
	6:30pm-8:30pm Dinner and Reception at UT Austin	
	<i>Board bus at UT Austin for travel back to hotel</i>	

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Opening Session

Monday, January 14, 2019

1:30pm-2:30pm

Facilitators: Christine deBarbadillo, *DC Water, 2019 Forum Co-Chair*
Peter Schauer, *Clean Water Services, 2019 Forum Co-Chair*

1:30pm **Introduction to the 2019 Forum**
Christine deBarbadillo, *DC Water, 2019 Forum Co-Chair*
Peter Schauer, *Clean Water Services, 2019 Forum Co-Chair*
Peter Vanrolleghem, *modelEAU - Université Laval, WEF Board of Trustees*

1:40pm **What is the Importance of Phosphorus?**
James Barnard, *Black and Veatch*

2:00pm **Introducing Forum Topics, Discussion Questions, and Future Research**
2019 Forum Co-Chairs and Steering Committee

Session 1: Watershed Based Strategies for Managing Phosphorus

Monday, January 14, 2019

2:30pm-5:00pm

Facilitator: Glen Daigger, *University of Michigan*

- 2:30pm** **Introduction to Session and Purpose**
Glen Daigger, *University of Michigan*
- 2:45pm** **HRSD's Vision for Advanced Water Treatment and Managed Aquifer Recharge in Eastern Virginia, USA: Sustainable Water Initiative for Tomorrow (SWIFT)**
Charles Bott, *Hampton Roads Sanitation District*
- 3:00pm** **Monterey, CA Case Study**
TBD
- 3:15pm** **Dixie Drain: Evolution of Watershed Based Phosphorus Removal**
Haley Falconer, *City of Boise, Idaho*
- 3:30pm** **Chesapeake Approach**
TBD
- 3:45pm** **Progress with Source Separation and Conversion to Fertilizer**
Nancy Love, *University of Michigan*
- 4:00pm** **SFPUC Experience Institutionalizing Source Separation**
TBD
- 4:15pm** **Facilitated Panel Discussion**
All presenters, led by Session Facilitator

Session 2: Emerging Trends and Unexpected Outcomes

Tuesday, January 15, 2019

8:30am-9:45am

Facilitator: **Beverley Stinson, AECOM**

8:30am **Chronicle Review of Progress of EBPR, Challenges, and Future Trends and Needs**

James Barnard, *Black and Veatch*

8:45am **Exploring and Piloting the Implementation of Sidestream EBPR with Mainstream Shortcut Nitrogen Removal Processes**

Charles Bott, *Hampton Roads Sanitation District*

8:50am **Couple EBPR with Aerobic Granular Sludges: Microbial Ecology, Advantages, and Limitations**

David Weissbrodt, *TU Delft*

9:20am **Experiences from Incorporation of Phosphorus Recovery Technologies in EBPR Processes**

Peter Schauer, *Clean Water Services*

9:30am **Facilitated Panel Discussion**

All presenters, led by Session Facilitator

Session 3: Understanding Microbial Ecology of EBPR

Tuesday, January 15, 2019

9:45am-11:00am

Facilitators: Per Nielsen, *Aalborg University*
April Gu, *Cornell University*

- 9:45am** **Overview of Current Microbial Ecology in EBPR, New Advances, and Existing Knowledge Gaps**
Per Nielsen, *Aalborg University*
- 10:10am** **DPAOs in EBPR**
George Wells, *Northwestern University*
- 10:20am** **Combining Phenotyping, Phylogeny, and Modeling to Reveal the Factors which Impact EBPR Performance and Stability**
April Gu, *Cornell University*
- 10:35am** **Challenges in EBPR in Warm Climates**
Yingyu Law, *Nanyang Technological University*
- 10:45am** **Facilitated Panel Discussion**
All presenters, led by Session Facilitators

Session 4: Modeling Challenges and New Thoughts

Tuesday, January 15, 2019

11:00am-12:30pm

Facilitators: April Gu, *Cornell University*
Andy Shaw, *Black and Veatch*

11:00am **Introduction**
Adrienne Menniti, *Clean Water Services*
April Gu, *Cornell University*

Topic: Current EBPR Models and Knowledge Gap

11:05am **Current Models, Advantages, and Limitations**
Imre Takacs, *Dynamita*

11:15am **Towards a Comprehensive Metabolic-ASM Model for Full-Scale Biological Nutrient Removal Systems**
Jorge Santos, *Universidade Nova de Lisboa*
Leiv Rieger, *inCTRL Solutions, Inc.*

11:25am **Agent-Based Modeling in EBPR, Process Heterogeneity, and Population Heterogeneity**
Andy Schuler, *University of New Mexico*
April Gu, *Cornell University*

11:35am **How to Incorporate Mechanistic Parameters/Models into Practice Model Effectively?**
Patrick Dunlap, *Black and Veatch*
Andy Shaw, *Black and Veatch*

11:45am **Facilitated Panel Discussion**
➤ **Which Approach is Best and Why?**
➤ **Knowledge Gap in Current Models: What Is the Critical Information Missing?**
All presenters, led by Session Facilitators

Session 5: Interaction with Nitrogen Removal

Tuesday, January 15, 2019

1:30pm-3:00pm

Facilitator: Pusker Regmi, *Brown and Caldwell*

1:30pm **Facilitator Introduction**
Pusker Regmi, *Brown and Caldwell*

Topic: Utility – Process Flow Diagram, Objectives, and Challenges

1:35pm **Sidestream and Cyclone Based Granulation**
Jim McQuarrie, *Denver Metro Water Reclamation District*

1:40pm **Impact of Shortcut Nitrogen Removal on Biological Phosphorus**
Peter Schauer, *Clean Water Services*

Topic: Prospective Solutions

1:45pm **Integrating BioP with Shortcut Nitrogen Removal at Pilot Scale**
Stephanie Klaus, *Virginia Tech and Hampton Roads Sanitation District*

2:00pm **Understanding Low DO-Based Shortcut Nitrogen with Biological Phosphorus Removal**
Jose Jimenez, *Brown and Caldwell*

2:10pm **Aerobic Granular Sludge**
Mari Winkler, *University of Washington*

2:20pm **Facilitated Panel Discussion**
All presenters, led by Session Facilitator

Session 6: Design and Operating Practices

Tuesday, January 15, 2019

3:00pm-4:30pm

Facilitator: JB Neethling, *HDR*

- 3:00pm** **Facilitator Introduction**
JB Neethling, *HDR*
- 3:05pm** **Operational Strategies to Optimize Fermentation and Carbon Use**
Gerry Stevens
- 3:15pm** **What Happens in the Bioreactor Should Not Stay in the Bioreactor:
Shedding Light Upon Bio-P Removal with Integrated CFD-Biokinetics**
Usman Rehman, *AM-TEAM*
- 3:25pm** **Denitrifying Glycogen Accumulating Organisms: (Out?) Selection, Impact
on EBPR Stability, and Supplemental Carbon Control**
Alexandra Gagnon, *Virginia Tech and Hampton Roads Sanitation District*
- 3:35pm** **BioP and ChemP Interplay**
Bryce Figdore, *HDR*
- 3:45pm** **Facilitated Panel Discussion**
All presenters, led by Session Facilitator

Session 7: Whole Plant Impacts

Wednesday, January 16, 2019

8:30am-10:00am

Facilitator: Jim McQuarrie, *Denver Metro Water Reclamation District*
Blair Wisdom, *Denver Metro Water Reclamation District*

8:30am **Facilitator Introduction**
Blair Wisdom, *Denver Metro Water Reclamation District*

8:35am **The Total Value of Phosphorus Recovery**
Brooke Mayer, *Marquette University*

8:50am **Struvite Management – Breaking the Magnesium Pump**
Wendell Khunjar, *Hazen and Sawyer*

9:05am **Impacts of BPR on Dewaterability After Anaerobic Digestion**
Jeff Nicholson, *Virginia Tech and Hampton Roads Sanitation District*

9:20am **Facilitated Panel Discussion**
All presenters, led by Session Facilitators

Session 8: Preparing for Future Nutrient Management Strategies

Wednesday, January 16, 2019

10:00am-12:00pm

Facilitator: Jeanette Brown, *Manhattan College*

10:00am Introduction

Jeanette Brown, *Manhattan College*

10:05am Back-Casting Exercise – 30-50 Years in the Future

Phosphorus from Field to Fork and Beyond

David Vaccari, *Stevens Institute of Technology*

This discussion will focus on phosphorus from the perspective of global supply and demand, summarizing the global flows of phosphorus from mine to field to fork to disposal and showing how wastewater and its recycling fits into the overall scheme. The potential effectiveness of several conservation measures will be compared, including reuse and recycling of phosphorus from wastewater.

Innovative Technology to Solve Nutrient Issues Now and in the Future

Don Mavinic, *University of British Columbia*

“Waste Not, Want Not” – Utilities in the Future

Amit Pramanik, *The Water Research Foundation*

For more than a century, water professionals have contributed significantly to protecting the public and environment, as well as increasing human longevity. They have made even greater strides in the past few decades and are beginning to focus their attention on global issues, including the United Nation’s “sustainable development goals” (SDGs), especially clean water and sanitation for all people. Water & sanitation also intersect with several other SGGs – the next few decades will see more innovations in our water utilities that begin to make larger & more positives impact on other goals, including food, energy, sustainable cities and communities, etc. – by using our resources even more wisely.

10:40am Group Exercise

Small Groups with Facilitated Discussion Questions

11:15am Facilitated Discussion

All presenters, led by Session Facilitator

Closing Session / Roadmap

Wednesday, January 16, 2019

12:00pm-2:45pm

Facilitator: Charles Bott, *Hampton Roads Sanitation District*

This session will kick off at noon with a working lunch and from there will lead into the program listed below.

- 12:00pm** **Working Lunch**
Report Outs and Discussion on Important Topics and Research Questions from Session Facilitators for Sessions 1-8
- 1:30pm** **Discuss and Document the Most Important Research Questions and Path Forward**
Facilitated Panel with All Session Facilitators; Sessions 1-8
- 2:00pm** **Summarizing the Forum, Future Directions, and Research Needs**
David Jenkins, *University of California at Berkeley*
- 2:30pm** **Final Comments**
James Barnard, *Black and Veatch*

Working Session

2:45pm-5:00pm

The Steering Committee will lead discussions immediately following the Closing Session. All Forum registrants are invited to participate in take-aways and next steps. More information will be forthcoming shortly.